Annals of IMA AMS

All India Medical Conference
98th National Conference of IMA
Theme : GERIATRIC MEDICINE

NATCON 2023

27th & 28th December 2023
KOVALAM, KERALA

INDIAN MEDICAL ASSOCIATION
ACADEMY OF MEDICAL SPECIALITIES
Head Quarters, Hyderabad, Telangana

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ANNALS OF
INDIAN MEDICAL ASSOCIATION
ACADEMY OF MEDICAL SPECIALITIES

ALL INDIA MEDICAL CONFERENCE
98th NATIONAL CONFERENCE OF IMA
Theme : GERIATRIC MEDICINE
NATCON - 2023

27th & 28th December 2023
KOVALAM, KERALA

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Chairman, IMA AMS

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Hony. Secretary, IMA AMS

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IMA PRAYER

May everybody be happy
May everybody be healthy
May everybody be free from pain
May everybody be free from sorrow
May we be the healing cure
Beyond every greed & lure

FLAG SALUTATION

We, the members of Indian Medical Association
Stand here to salute our National Flag.
Its honour and glory shall be our light and strength
And its course shall be our course.
We pledge our allegiance to it and realizing our responsibilities
As the accredited members of this National organization,
We swear we will dedicate everything in our power
To see it fly high in the comity of Nations.
Jai Hind!

From the Editor's Desk

Dr. Shilpa Basu Roy
MBBS (Hons), MS (General Surgery), MCh (CTVS)
Associate Professor & Consultant Cardiothoracic, Vascular &
Transplant Surgeon, Institute of Postgraduate Medical Education and
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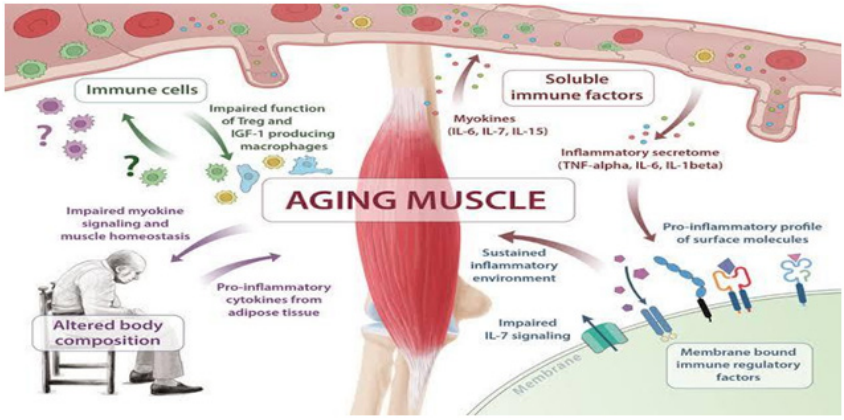
"The heart has no wrinkles" was said by a famous clinician once. As a Cardiothoracic & vascular surgeon, it is an orthodox gesture from me to think about the thorax & its diseases when it comes to any and every paradigm which today encompasses the essence of Geriatric Medicine. Geriatric medicine focuses on a colossal horizon of pathologies including but not limited to, hypertension along with diabetes and it's wide spectra of complications such as the coronary artery disease, congestive cardiac failure, depression & dementia who are presumably good friends, the macular degeneration of the eye, cataracts, lung function defects & the dreaded overwhelming infections, the chronic renal failure or the acute (in order of merit), diseases due to impaired immunity & to point other diseases such as Osteoporosis, the notorious vertigo & falls, bone fractures attributable as a sequel to a plenty of syndromes & diseases, Parkinsonism referable to Neurodegeneration, Sarcopenia & the most crucial but often ignored are the neglects & abuses, to enumerate a few.

As we all know, that aging clinically is a heterogeneous entity, with a decline in the functional reserve of a tissue & then in the function per se that is uniquely time dependent. For a blueprint, I have simply taken the example of a muscle (Please refer to the diagram below) which is subjected to a sustained inflammatory environment because of the grossly impaired myokine signalling process which is an effector to a drenched muscle homeostasis. I have touched the basic of Geriatrics for a comprehensive understanding of the articles that are to follow in this issue of our esteemed journal, suitable for all.



Our articles, as I see it, must be thorough enough to educate not only the clinicians but also the beautiful people around for assessing the disease that would occur, with its reporting to the clinic in due time & then subjected to the appropriate diagnostic tools, as these cohorts are more prone to the adversity of the methodologies needed to diagnose such, & then subjected to the specific treatment in the exact domain of the speciality, sub–speciality or super specialities. As in my arena of the countless valvotomy & the valve replacements that I have been performing at my workplace, where decisions are taken to effect the survival of the patient to the maximum possible limit, or as an addition, to harvest the organs from the patients who are declared "Brain Death", so as to infuse life into the needed. I add the last line to touch on the quintessence of the much sought after "Transplantation Medicine", which is widely described as a futuristic tool & a pinnacle in the health care systems.

I extend my best wishes for this edition of the journal, & wish it's imminent success, to be read solemnly by all the clinicians of the country thriving to set the perfect standards of healthcare for the ailing.

Regards,

Dr. Shilpa Basu Roy
Hony. Editor, IMA AMS

Dr. SHARAD KUMAR AGARWAL
National President, IMA

Message

Dear Esteemed Members of the IMA-AMS,

It gives me immense pleasure to extend my heartfelt congratulations to the IMA Academy Medical Specialties (AMS) for their remarkable endeavor in crafting the Annals on **"Geriatric Medicine."** The commitment of IMA AMS to delve into the realm of Geriatric Medicine is both commendable and timely.

Geriatric Medicine stands as a cornerstone in today's medical landscape, especially in a world witnessing a significant rise in the elderly population. The focus and dedication of the IMA AMS in elucidating this crucial specialty through the Annals are exemplary. Your dedication to advancing knowledge in this field and your pursuit of excellence are truly praiseworthy.

The decision to unveil the Annals during the upcoming IMA NATCON-2023 at Kovalam, Kerala, resonates profoundly. This esteemed gathering serves as a pivotal platform for exchanging insights, fostering collaborations, and elevating the standards of medical care. Launching the Annals amidst such a prestigious event amplifies its significance and ensures its reach among a diverse cohort of medical professionals.

I wholeheartedly support the noble efforts of IMA AMS in bringing forth this invaluable resource. The Annals on Geriatric Medicine will undoubtedly serve as a beacon, guiding practitioners, researchers, and caregivers in optimizing care for our elderly population.

My best wishes for a successful launch at the IMA NATCON-2023. May this publication pave the way for enhanced understanding, innovative approaches, and transformative advancements in Geriatric Medicine.

Warm regards,

Dr. Sharad Kumar Agarwal
National President
Indian Medical Association

INDIAN MEDICAL ASSOCIATION (HQs.)

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IMA/HSG/84/640

December 20, 2023

MESSAGE

Greetings from Indian Medical Association (HQs.)!

I am glad to learn that IMA Academy of Medical Specialties is releasing Annals on "Geriatric Medicine" during the NATCON-2023 at Kerala.

IMA AMS is doing a wonderful job by releasing it & I hope it would provide useful material to its members. I am sure, this will enhance the knowledge and expertise of its members in the latest advancements in medicine and medical technology.

IMA AMS is the only platform where all specialists meet with each other and can deliberate on issues which are relevant in providing holistic treatment to patients by discussing interdisciplinary management for better outcome.

I am sure, the interaction amongst the honoured members will go a long way in updating the fast growing advances and studies in the world of medicine and such exquisite experience can be utilized for the service of humanity.

I am confident that timely and precise inputs from the experts will prove to be of immense value to the medical fraternity.

As you all know that IMA Aao Gaon Chalen Project was relaunched on 25th June, 2023, all over the country by our Chief Patron Dr. Ketan Desai Sir. In this regard, I request all of you to adopt at least one village and conduct various activities on a regular basis under this project. You are also requested to send a village adoption activity report alongwith photographs to IMA HQs. so that a compiled document can be created. The Awards for this noble cause will be given by IMA HQs. either after the completion of one year on 24th June 2024 or on the occasion of Doctors Day next year.

Though, IMA had conducted Organ Donation Awareness Camp in the month of August, 2023, to continue it further I request all of you to create awareness about Organ Donation and motivate the donors to donate their organs after their death to save more lives.

I express my heartiest appreciation and congratulations to the whole editorial team of Annals.

Long Live IMA !!

Dr. Anilkumar J. Nayak
Hony. Secretary General, IMA

Dr R V ASOKAN
National President Elect
Indian Medical Association

Message

Dr. Shipa Basu Roy and Dr. Rajeev Ranjan Prasad

Thank you for asking me to provide a message to the Annals of IMA AMS on Geriatric Medicine. I am confident that the upcoming issue of the Annals also would be of the high caliber and standard for which it has always been known. IMA AMS has a niche amongst all specialty organizations because of its multispecialty nature and the credibility in bringing out simple reader friendly professional documents.

IMA AMS Headquarters has been proactive in keeping the members abreast of the scientific developments elsewhere. More so this year under the leadership of Dr Pankaj Mutneja and Dr Srirang Akbari. I congratulate the current team and wish them well.

With warm regards

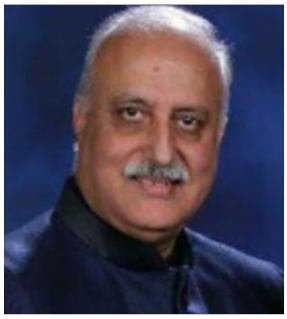
Thanking you

Dr R V ASOKAN

National President Elect IMA

20.12.2023

Punalur



Dr. PANKAJ MUTNEJA
Chairman, IMA AMS Hqrs

Message

Dear Esteemed Members of the IMA-AMS,

It gives me a great pleasure to announce the printing of Geriatric medicine monograph in the last edition of newsletter of IMA-AMS this year Geriatric patients are increasing keeping in mind this fact it becomes more imperative that we must delve in Geriatric medicine. The population of elderly patients steadily increasing. It is also fact that members of IMA-AMS and other clinician are not versed with treating the elderly. Knowledge of Geriatric medicine is limited. This monograph will go a long way not only creating interest but also increase knowledge which will have as helping in such patient.

I convey my appreciation for all those who have behind the scene bringing this monograph to light.

Dr. Pankaj Mutneja
Chairman, IMA AMS Hqrs

Dr. SHITIJ BALI
Hony. Finance Secretary, IMA

Message

Greetings from Indian Medical Association (HQs.)!

I am delighted to know that IMA Academy of Medical Specialties is bringing out its Annals on “Geriatric Medicine” during the NATCON-2023 at Kovalam, Kerala.

As a result of technology’s never-ending advancements, we are witnessing more and more innovations and inventions in the field of medicine. This has increased the need for information about these inventions to reach treating physicians, particularly specialists, so they can give patients the best care possible at the lowest possible cost and in the shortest amount of time. Publications like the “Annals” will significantly help the medical field meet the aforementioned needs.

By publishing Annals, IMA AMS is doing a great job, and I hope it will give its members access to information they can use. This will undoubtedly increase the members’ expertise and knowledge of the most recent developments in medicine and medical technology.

I convey my best wishes to the Advisory Board of Annals.

Long Live IMA!!

Dr. Shitij Bali
Hony. Finance Secretary, IMA

Dr. NOMEETA SHIV GUPTA
Chairman Elect, IMA AMS Hqrs

Message

Respected All,

It is a proud moment for us from IMAAMS to release Annals on "Geriartic Medicine".

I am sure that all the hard work put in by our authors and editors will help all our members in their daily practice.

Congratulations once again to all.

Dr. Nomeeta Shiv Gupta
Chairman Elect, IMA AMS Hqrs

Dr. SRIRANG ABKARI
Hony. Secretary, IMA AMS HQs.

Message

It gives me immense pleasure to be part of the release of yet another academic publication from IMA AMS - the Annals on Geriatric Medicine. This issue highlights a topic which is very relevant but often neglected. The physiological changes in the geriatric population lead to a constellation of effects and in turn predispose this vulnerable group to multiple risks. A clear understanding of their metabolism, nutritional needs, and the presentation of disease processes in them will help us to a focussed approach in maintaining good health and appropriately managing diseases. The Geriatric syndromes encompass entities specific to the elderly population and knowledge of these will surely go a long way in preventing morbidity and mortality.

As Abraham Lincoln had said, "In the end, it's not the years in your life that count. It's the life in your years." Thus enabling the elderly to lead comfortable, productive and healthy lives makes all the difference.

The blessings of our Chief Patron Dr. Ketan Desai throughout the year have helped us to do our work with sincerity and dedication and achieve many milestones. The guidance from our National President, Dr. Sharad Kumar Agarwal, the encouragement from our Hony. Secretary General Dr. Anilkumar J Nayak and the help and support from our Hony. Finance secretary Dr. Shitij Bali have ensured that we excel in our academic endeavours.

Our dynamic Chairman, Dr. Pankaj Mutneja has very ably led our IMA AMS team and inspired us to give our best. We thank our editorial team for their enthusiasm and support for bringing out this issue. I would like to thank all the office bearers of National IMA and IMA AMS for their unstinted support. Sincere thanks to our Office staff Mrs. Sarita and Mr. Rakesh for their commitment and hard work. Mr. Kantilal Shah and Mr. Murali of Atlas Printers deserve a special mention for transforming our efforts into a beautifully designed Annals issue on Geriatric Medicine.

Long live IMA!

Long Live IMA!

Dr. Srirang Abkari
Hony. Secretary
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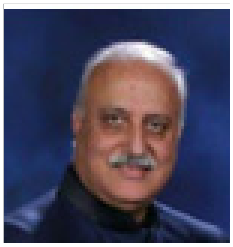

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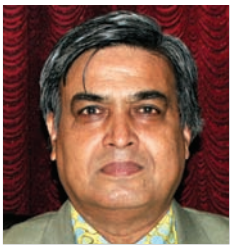

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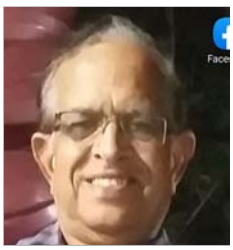

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The Science of Aging

Dr. Mahesh Marda
Chairman & Director
Premier Hospital
Hyderabad

Aging is arguably the most familiar yet least well-understood aspect of human biology.

Nevertheless, the intrinsic complexity of aging remains a significant challenge to understanding how aging is caused.

The rapid growth of the elderly population makes it increasingly important to understand the aging process and to promote lifestyle choices that maximize not only longevity, but also the quality of life during aging..

Aging is both inevitable and universal. As people age they change in a myriad of ways - biologically, psychologically and physiologically

When a person becomes old can be answered in different ways:

- **Chronologic age** is based solely on the passage of time. It is a person's age in years. Chronologic age has limited significance in terms of health. Nonetheless, the likelihood of developing a health problem increases as people age.
- **Biologic age** refers to changes in the body that commonly occur as people age. Because these changes affect some people sooner than others, some people are biologically old at 65 and others not until a decade or later.
- **Psychologic age** is based on how people act and feel. For example, an 80-year-old who works, plans, looks forward to future events, and participates in many activities is considered psychologically younger

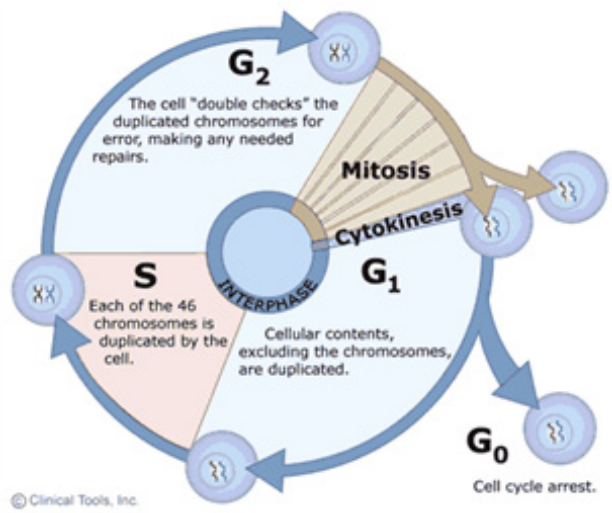
Aging is commonly characterized as a progressive, generalized impairment of function, resulting in an increasing vulnerability to environmental challenge and a growing risk of disease and death. It is also usually accompanied by a decline in fertility

Though inherently complex, aging is characterized by numerous changes that take place at different levels of the biological hierarchy.

The Birth and Death of Cells

The Cycle of Growth and Replication

The growth and replication of cells is often described as a cyclic process with two main phases: **interphase**, when the cell grows and replicates DNA in preparation for cell division, and **mitosis**, during which the actual division of the cell into two daughter cells occurs. Note that cells may also exit the cycle and enter a G_0 phase either temporarily or more or less permanently. In cells that are actively growing and dividing, such as those in an embryo, the cycle is completed frequently as cells divide over and over as the embryo grows and develops. In adults the need for growth and development has passed, and most cells remain in the G_0 phase during which they perform their specialized functions, but they no longer replicate (e.g., nerve and muscle cells). Nevertheless, even in fully developed adults certain progenitor cells retain the ability to replicate and give rise to new daughter cells to replace cells that are damaged or lost due to wear and tear. For example, Clara cells in the epithelium of the respiratory tract, hematopoetic stem cells in bone marrow.

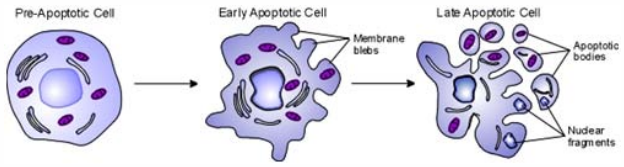


Regulation of the cell cycle is of critical importance to the aging process. Replication should only occur when there is a need for growth and development (in embryos and the young) or when there is a need to replace damaged or lost cells. Thus, the cycle is influenced by growth factors and by proto-oncogenes that favor replication and by anti-oncogenes that produce proteins that inhibit replication.

Underlying the aging process is a lifelong, bottom-up accumulation of molecular damage. Such damage is intrinsically random in nature, but its rate of accumulation is regulated by genetic mechanisms for maintenance and repair. As cell defects accumulate, the effects on the body as a whole are eventually revealed as age-related frailty, disability, and disease.

Apoptosis

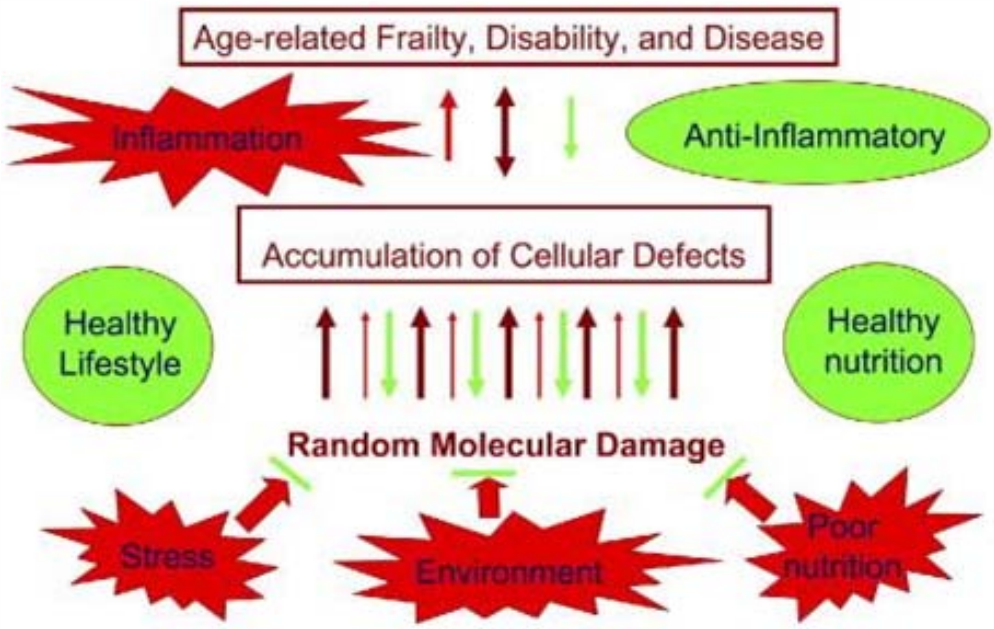
Apoptosis, also known as programmed cell death, is a regulated process that takes place throughout life and serves to eliminate necessary or damaged cells. Apoptosis takes place during embryonic development as a means of reshaping tissues during normal growth and development, and it provides a mechanism of eliminating worn out or damaged cells throughout life. Age-related diseases such as Alzheimer disease and Parkinson's disease have been linked to an increase in apoptosis where cells that might otherwise continue to support proper tissue functioning are eliminated. There are many pathways and proteins that regulate apoptosis, such as p53, that are able to sense cells that are damaged or no longer needed.



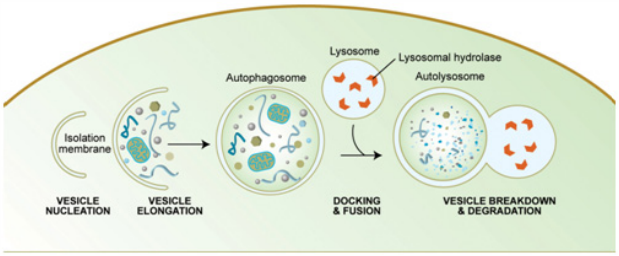
Cell Undergoing Apoptosis

Autophagy

Autophagy is another mechanism by which cell death can occur. Like apoptosis, it is a highly



regulated process that plays a normal role in cell growth, development and homeostasis. Autophagy allows a starving cell to reallocate nutrients from unnecessary processes to more essential ones, and it also plays an important housekeeping role by removing misfolded or aggregated proteins, clearing away damaged organelles, such as mitochondria and endoplasmic reticulum, as well as eliminating intracellular pathogens.



Summary of Autophagy

Theories on Aging

Why do we age? Although the question has been raised since hundreds of years ago, the mysteries that control human life span are yet to be discovered. During the last decades, many theories have been proposed to explain the process of aging, but neither of them seems to be fully satisfactory. Instead, these theories interact with each other and all of these together contribute to aging. The image below shows different mechanisms that have been proposed to explain aging. In this module, however, we will only discuss three major theories of aging: cellular senescence, DNA damage, and telomere shortening.

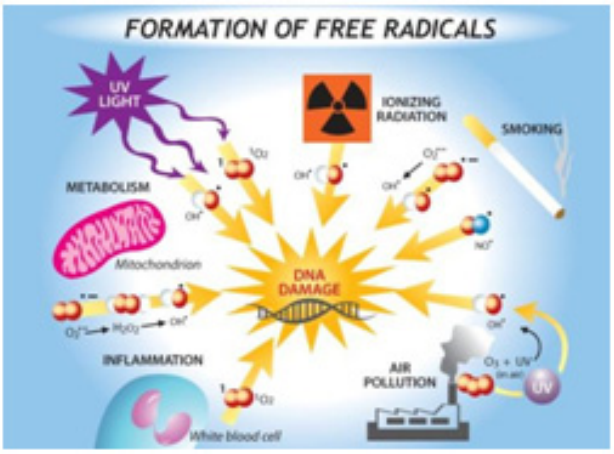
Cellular Senescence

Recent studies suggest that cellular senescence might be a cellular model of organismal aging. Accumulations of senescent cells were found in vivo in mammals with increasing age, and at sites of age-related pathology.

Cellular senescence is a state of irreversible growth arrest, which was first introduced by Hayflick and Moorhead in 1961. They found that normal human fibroblasts had a limited replicative potential and eventually entered a state of irreversible growth arrest, meaning that cells being cultured in vitro had lost the ability to divide, despite having ample space and nutrients in the culture medium. Two general models have been proposed to explain how cellular senescence may contribute to aging. First, senescent cells in tissues may accumulate to the point where the strength and functional capacity of tissues in compromised. A second model proposes that senescence in stem cells limit their regenerative potential which eventually leads to a progressive loss of tissue strength and functional capacity. Cellular senescence can be triggered by a number of mechanisms, such as telomere shortening and DNA damage a described below.

DNA Damage

Studies showed that cellular senescence is commonly triggered by various forms of DNA damage



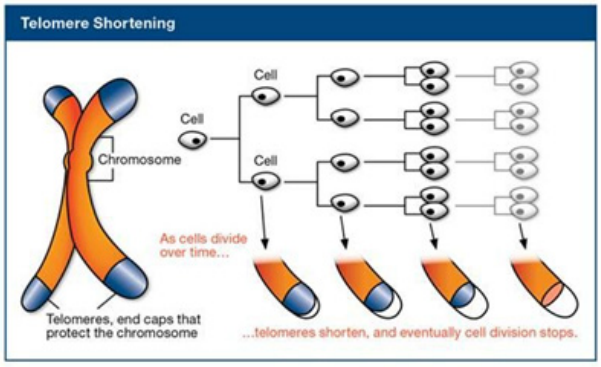
Sources of DNA damage include external sources, such as ionizing radiation, tobacco smoke, air pollution and genotoxic drugs, and cell-intrinsic sources, such as replication errors, programmed double-strand breaks, and DNA damaging agents—reactive oxygen species (ROS).

ROS can damage the mitochondria's DNA (mtDNA) and proteins, and the mutant mtDNA in turn are more liable to produce ROS byproducts. Therefore a positive feedback loop of ROS is established. With age the number of mutant mtDNA increase and the mitochondrial functions decline, leading to an increased production of

ROS.The increased generation of ROS can cause lipid peroxidation, protein damage, and several types of DNA lesions in cells. Therefore, ROS are considered important factors in the mechanisms of such diseases as diabetes, cancer, atherosclerosis, heart attacks, Alzheimer's disease, as well as in aging. Evidence has shown that species that live longer generally show higher cellular oxidative stress resistance and lower levels of mitochondrial ROS production compared to species that live shorter.

Telomere Shortening

Telomeres are repeated nucleotides sequences on the end of chromosomes that are believed to protect the DNA strands and prevent them from fusing with other strands. Telomeres lose a little bit of their length during each cell division. Since replicative DNA polymerases are not able to replicate telomeres, and telomerase (specialized DNA polymerase that could replicate telomeres) are not expressed in normal mammalian somatic cells, telomeres become too short to replicate after a fixed number of cell divisions. Eventually, the cell will stop growing and enter cellular senescence. The image below illustrates the telomere shortening as cells divide.



Autoimmune theory

Another theory of aging assumes that immune reactions, normally directed against disease-producing organisms as well as foreign proteins or tissue, begin to attack cells of the individual's own body. In other words, the system that produces antibodies loses its ability to distinguish between "self" and foreign proteins. This "autoimmune" theory of aging is based on clinical rather than on experimental evidence.

Glycation theory

"Glycation" theory suggests that glucose acts as a mediator of aging. Glycation, in which simple sugars (e.g., glucose) bind to molecules such as proteins and lipids, has a profound cumulative effect during life. Such effects may be similar to the elevated glucose levels and shorter life spans observed in diabetic humans.

Oxidative damage theory

Reactions that take place within cells can result in the oxidation of proteins and other cellular molecules. Oxidation entails the loss of electrons from these molecules, causing them to become unstable and highly reactive and leading to their eventual reaction with and damage of cell components such as membranes. Such reactive molecules are known as free radicals—any atom or molecule that has a single unpaired electron in an outer shell.

Oxidative damage (oxidative stress) accumulates with age, and this has given rise to the free radical theory of aging, which is concerned in particular with molecules known as reactive oxygen species (ROS).

Conclusions

Far from being programmed to die, organisms are programmed for survival. The reason that aging occurs is in essence quite simple. Life exists far from thermodynamic equilibrium. Its stability is constantly threatened by a wide array of internal and external stressors, and, in these circumstances, things tend to fall apart rather quickly unless actively maintained. Thus, programming for survival ultimately fails, and it is this that results in aging.

"Aging is a life-saving process," he says. "It is a process of lifelong adaptation to prevent us from developing cancers that would kill us."

– Kenneth Minaker, MD,

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Physiology of Aging

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All organ systems in our body witness physiological changes with ageing. There may be subtle irreversible changes which start in the third and fourth decades of life and deteriorate progressively with age. It is important to note that the rapidity of decline in function varies with a particular organ system under discussion but is relatively constant with a given organ system. We need to make a distinction between the normal decline in function in all individuals with advancing age and the loss of function which points to the onset of pathological changes from one or more illnesses encountered with increased prevalence in the elderly. If we fail to recognize this difference, it can lead to progressive disability from treatable diseases.

Pathophysiologically speaking, the production of free radicals, advanced glycation end products and reduced capacity for regeneration contribute to the aging process. To sum it up, the loss of cell turnover, decreased function of mucous membranes, cachexia and skeletal muscle mass wasting, increased atherosclerosis, decrease in vascular compliance, and cerebral atrophy eventually all contribute to the variety of changes we see in aging. Age-related physiological changes will result in a decline in homeostatic reserves. We observe that chronological and biological aging do not necessarily match, as aging is highly variable and individualized. Aging involves a great deal of interplay between lifestyle and genetics.

For many system-based ageing changes, the aetiologies are multifactorial or syndromic, and the geriatric syndromes such as pressure ulcers, incontinence, falls, dementia, and osteoporosis are good examples of the clinical consequences due predominately to ageing physiology in skin, the genitourinary system, muscle, central nervous system, and bone, respectively, but also secondary to contributions from physiologic ageing in other systems and extrinsic factors (e.g., polypharmacy, amount of daily activity, etc.). With ageing, disruption of circadian patterns cause phase advances (1-2 hours earlier) such as in the 24-hour body temperature trough and sleep onset.

The organ system related changes in physiology which occur with ageing are summarized below.

CARDIOVASCULAR SYSTEM:

Physiological changes

- Attenuated contractile and mechanical efficiency
- Arterial wall thickening
- Increased elastolytic and collagenolytic activity
- Increased smooth muscle tone
- Vessels stiffen with age – this increases systemic vascular resistance and cardiac afterload, which leads to increased workload
- Reduced plasma renin activity (PRA) and response to upright posture reduced or absent
- Reduced aldosterone concentration and response to sodium restriction
- Hypertrophy of myocytes lengthens contraction time
- Ventricular relaxation delayed at the time of mitral valve opening, which results in diastolic dysfunction
- Early diastolic filling rate decreases

- Late diastolic filling rate increases
- Left atrial size increases
- Left ventricle stiffens
- Aortic and mitral valves stiffen and develop calcific deposits
- Cardiac output falls
- Decreased responsiveness to catecholamines
- Reduced baroreceptor sensitivity
- Decline in atrial pacemaker cells leading to reduced intrinsic automaticity
- Resting cardiac output stable with age, but increase in cardiac output in response to exercise decreases
- Veins stiffen progressively with age, leading to reduced compliance, which results in the venous system having less capacity to buffer changes in intravascular volume
- Reduced maximum heart rate
- Dilatation of the aorta
- Reduced elasticity of conduit or capacitance vessels
- Reduced number of pacing myocytes in the sinoatrial node
- Endothelial dysfunction

Clinical Manifestations:

- Isolated systolic hypertension
- Higher resting blood pressure (BP)
- Left ventricular hypertrophy
- Diastolic dysfunction
- Increased risk of postural hypotension
- Slowing of intrinsic heart rate – falls of five to six beats per minute per decade
- Decline in maximum heart rate
- Reduction in maximum heart rate during exercise or stress (not modified by exercise training)
- Reduced heart rate variability
- Loss of sinus arrhythmia
- Increased likelihood of atrial fibrillation
- Increased risk of conduction defects
- Reduced cardiac rate response to exercise and stressors
- Reduced maximal oxygen consumption – aerobic capacity, cardiovascular fitness
- Reduced response to parasympathetic antagonists (atropine)
- Reduced response to â-adrenergic agonists
- Slowed heart rate response at exercise onset

Widening of aortic arch on X-ray

- Widened pulse pressure
- Increased venous stasis

NERVOUS SYSTEM

AGE RELATED PHYSIOLOGICAL CHANGES

Central nervous system:

- Neuronal loss
- Brain volume decreases after 65 years of age – greater amount of white matter than grey
- Cerebral blood flow decreases with deterioration of mechanisms that can maintain cerebral blood flow with fluctuation in blood pressure
- Reduction in neurotransmitter production, especially catecholamines, serotonin and acetylcholine
- Slowing of central processing
- Reduced dopamine uptake sites and transporters
- Reduced cortical á2-adrenergic, â-adrenergic and ã-aminobutyric acid (GABA) binding sites
- Neurofibrillary tangles and senile plaques (amyloid deposition) occur in normal ageing
- Anterior horn cell loss
- Dorsal column loss
- Slowed conduction times
- Increased ocular lens rigidity

- Increased ocular lens opacity
- Cochlear degeneration

Peripheral nervous system:

- Loss of motor, sensory and autonomic fibres
- Reduction in afferent and efferent conduction velocities
- Reduction in signal transduction rates within brain stem and spinal cord
- Number of muscle cells innervated by each axon decreases

Autonomic nervous system:

- Parasympathetic outflow decreases
- Sympathetic tone increases
- Increased sympathetic activity increases systemic vascular resistance
- Blunting of response to â-adrenergic stimulation
- Reduced ability of aortic arch and carotid sinus baroreceptors to transduce changes in arterial pressure

Associated clinical manifestations

- Cerebral atrophy
- Reduction in speed of processing, episodic and working memory, attention, and executive function
- Reduced mood
- Learning capacity and problem solving slows
- Increased risk of delirium
- Muscle weakness and wasting
- Reduced vibration sense, proprioception relatively preserved
- Increased risk of falls
- Reduced visual accommodation
- Presbyopia, abnormal near vision
- Reduced clarity of vision
- Reduced contrast sensitivity
- Impaired dark adaptation
- Presbycusis or high-tone hearing loss
- Increased sway during standing
- Reduced capacity to compensate for destabilising forces
- Reduced speed of simple and repetitive movements
- Altered control of precision movements
- Reduced gait velocity
- Reduced stride length
- Reduced time tolerated on single leg stand
- Slowed processing and reaction times
- Muscle atrophy and denervation
- Attenuated heart rate response to changes in arterial pressure
- Compromised hemodynamic homeostasis – care must be taken with the effects of diuretics and reduced fluid intake
- Increased postural and postprandial hypotension
- Sinus node depression
- Carotid sinus syncope
- Syncope

RENAL SYSTEM

Age-related physiological changes

- Reduction in renal mass or loss of nephrons
- Increased renal fat and fibrosis
- Increased glomerular membrane permeability
- Renal blood flow decreases from the age of 30 years
- Creatinine clearance reduces by about 10 ml/min every decade – creatinine clearance is influenced by nutritional status, protein intake, muscle mass and body weight
- Reduced creatinine production increases tubular secretion of creatinine, leading to stable creatinine

- Impaired fluid balance and regulation
- Impaired sodium and potassium acid excretion and conservation
- Reduced concentrating and diluting capacity
- Reduced serum renin and aldosterone
- Reduced vitamin D activation
- Decrease in the rate of urine flow and increase in urinary retention (benign prostatic hyperplasia [BPH] in men, but a decrease is also noted in women)
- Changes in urogenital mucosa
- Reduced tone in sphincters

Associated clinical manifestations

- Reduction in glomerular filtration rate (GFR)
- May overestimate creatinine clearance despite decreased GFR
- Declining GFR in older people is accompanied by lower rises in serum creatinine, compared with younger populations
- Microalbuminuria and proteinuria
- Increased susceptibility to acute kidney injury
- Reduced capacity to adapt to acute ischaemia
- Increased vulnerability to contrast dye
- Compromised volume regulation under conditions of stress
- Increased risk of dehydration or overload
- Impaired drug metabolism and excretion
- Increased risk of urinary tract infections (UTIs)

RESPIRATORY SYSTEM

Age-related physiological changes

- Reduced lung elasticity and alveolar support
- Increased chest wall stiffness
- Loss of elastic support of airways
- Enlargement of alveolar ducts
- Reduced alveolar gas exchange surface area
- Increased anatomic dead space
- Ventilation-perfusion mismatch
- Reduced arterial oxygen tension
- Loss of muscle mass and weakening of muscles of respiration
- Reduced pulmonary capillary blood volume
- Decrease in central nervous system responsiveness
- Pressure volume curve of an older lung is shifted upward and to the left due to reduction in elastic recoil
- Reduced cough and ciliary action
- Reduced intervertebral space – reduced height, increased anterior-posterior chest diameter
- Diaphragm flattens and becomes less efficient

Associated clinical manifestations

- Reduced forced vital capacity (FVC)
- Reduced peak expiratory flow (FEV1)
- Total lung capacity stable, but increased residual volume
- Reduced inspiratory reserve
- Limitation of expiratory airflow and dynamic hyperinflation during maximal exercise
- Reduced arterial oxygen saturation
- Maldistribution of ventilation and perfusion
- Blunted ventilation response to hypoxic or hypercapnic stimulus
- Increased risk of infection

GASTROINTESTINAL SYSTEM AND NUTRITION

Age-related physiological changes

- Reduced production of saliva
- Oesophageal contraction and relaxation become desynchronised
- Decreased lower oesophageal sphincter tone

- Half of all older people are infected with *Helicobacter pylori* where the presence of the bacteria increases with age
- Reduced secretion of hydrochloric acid and pepsin, and a small rise in gastric pH
- Age-related decline in the absorption of vitamin B12
- Reduced efficiency of calcium absorption because of reduced vitamin D receptors and circulating 25(OH) vitamin D
- Moderate intestinal villous atrophy
- Reduced gut contractility and slowed gastric emptying
- Prolonged gastrointestinal transit time because of attenuation of higher levels of neural control
- Increased colonic sensitivity to opioids
- Reduction in serum albumin
- Reduced liver mass – reduces by 20–40%
- Reduced blood flow – reduces by 50% between third and tenth decades
- Reduced cytochrome p450
- Reduced synthesis of vitamin K-dependent clotting factors
- Reduced low-density lipoprotein (LDL) receptors, reduced metabolism of LDL
- Decreased pancreatic mass and enzyme reserves
- Reduced lactase concentration
- Reduced basal metabolic rate
- Reduced energy requirements due to reduced muscle mass and activity levels

Associated clinical manifestations

- Increased risk of periodontal disease
- Increased risk of dental decay
- Less efficient deglutition due to less effective oropharyngeal food bolus transfer
- Increased risk of gastro-oesophageal reflux
- Aspiration more likely to contain organisms
- *H. pylori* infection
- Increased rates of gastritis
- Increased sensitivity to gastric irritants (eg nonsteroidal anti-inflammatory drugs [NSAIDs], bisphosphonates)
- Reduced absorption of micronutrients (eg vitamin B12 and folic acid)
- Reduced absorption of calcium
- Constipation
- Standard liver function tests (LFTs) minimally affected by age
- Lower serum albumin levels
- Reduction in clearance of drugs metabolised in the liver
- Lower amount of vitamin K antagonists required to anti-coagulate older people
- Increased serum LDL
- Reduced appetite

IMMUNE SYSTEM

Age-related physiological changes

- Innate and acquired immunity affected by ageing
- Macrophage function impaired
- Decreased cell-mediated immunity
- Complement pathway functions, which leads to blunted response to infection
- B-cell and T-cell responses attenuated, which are the mainstay of adaptive immunity
- Thymic involution virtually complete at around 65 years of age
- Helper T-cell activity impaired
- Humoral response mediated by B-cells is impaired
- Cytokine function and regulation, which leads to reduced capacity to generate tumour necrosis factor-á, interleukin-1 (IL-1) and nitric oxide
- Autoimmunity more pronounced

Associated clinical manifestations

- Predisposition to infection

- Delayed or ineffective recovery from infections
- Increased risk of reactivation of dormant viral and mycobacterial infections
- Reduced response to vaccines
- Increased risk of malignancy
- Increased frequency of autoantibodies
- Increased autoimmune disorders
- Cytokine profile consistent with chronic-low level inflammatory state

SKIN

Age-related physiological changes

- Impairment of barrier function
- Reduced epidermal cell turnover
- Decreased keratinocyte and fibroblast number
- Reduced vascular network especially around hair bulbs/glands
- Reduced vitamin D synthesis
- Immune senescence
- Decreased dermal thickness, cellularity and elastin fibres
- Photo-ageing
- Altered sweating as a result of reduced number and function of sweat glands
- Ageing of hair
- Reduced melanocytes and Langerhans cells
- Reduced nail growth
- Reduced oil and sebum production

Associated clinical manifestations

- Reduced wound healing
- Fibrosis and skin atrophy
- Stasis dermatitis
- Increased susceptibility to skin injuries, including pressure ulcers and skin tears
- Increased vulnerability to viral and fungal infections
- Increased risk of skin neoplasia
- Wrinkles, pigmentation, telangiectasia
- Altered thermoregulation
- Greying of hair
- Diffuse alopecia
- Frontotemporal balding
- Reduced photoprotection
- Dry skin

HAEMATOLOGICAL SYSTEM

Age-related physiological changes

- Reduced iron stores in the body
- Impaired reticulocytosis
- Lymphocyte count reduced; other white cell indices remain stable
- Qualitative changes in white cells (eg impaired neutrophil migration response to stress)
- Increased bone marrow fat
- Reduced functional reserve of bone marrow
- Propensity for clonal expansion of cells
- Decreased stem cells
- Platelet responsiveness to thrombotic stimulators increased
- Less responsive to erythropoietin
- Reduced total blood and plasma volume

Associated clinical manifestations

- Impaired bone marrow response to acute haemorrhage
- Slight decrease in haemoglobin and haematocrit
- Slight increase mean corpuscular volume (MCV) and osmotic fragility
- Increased risk of bleeding due to anticoagulants
- Increased risk of deep vein thrombosis
- Slowed erythropoiesis

ENDOCRINE SYSTEM

Age-related physiological changes

- Reduced target organ response to hormones
- Increased carbohydrate intolerance

- Reduced dehydroepiandrosterone (DHEA), testosterone secretion in older men
- Higher serum antidiuretic hormone
- Ovarian failure in women
- Deterioration in pancreatic â-cell function

Increased levels:

- Atrial natriuretic peptide
- Insulin
- Noradrenaline
- Parathyroid hormone
- Antidiuretic hormone
- Follicle-stimulating hormone (FSH)
- Luteinising hormone (LH)

Normal levels:

- Calcitonin
- Cortisol
- Adrenaline
- Prolactin
- Thyroxine

Decreased levels:

- Adrenocorticotropic hormone (ACTH)
- Thyroid-stimulating hormone (TSH)
- Growth hormone
- Insulin-like growth factor 1 (IGF-1)
- Renin
- Aldosterone
- Triiodothyronine (T3)
- Sex hormones

Associated clinical manifestations

- Contributes to sarcopenia
- Increased incidence of hyponatremia
- Increased bone resorption
- Increased risk of insulin resistance
- Impaired glucose tolerance

MUSCULOSKELETAL SYSTEM

Age-related physiological changes

- Decline in muscle mass – mainly type II (fast-twitch) fibres, which causes a reduction in VO2 max and force of contraction
- Type II muscle fibres are more affected than type I
- Loss of muscle mass in legs is greater than in arms
- Recovery of muscle following injury is slowed and incomplete
- Reduced oxidative capacity of muscle and greater fat mass
- Change in collagen fibres in joints – loss of elasticity
- Reduction in bone mass – cortical and trabecular bone; 3–5% loss of cortical bone per decade (10–20% during immediate post-menopausal period in women)
- Trabecular bone loss starts earlier and progresses faster
- Decreased osteoblast number and activity, but unchanged osteoclasts
- Resorption of bone exceeds formation
- Reduction in activity levels
- Weight-bearing exercise is frequently reduced in older people, which contributes to the negative calcium balance and loss of bone mineral
- Articular cartilage thins
- Joint flexibility decreases
- Decreased tensile stiffness of cartilage
- Decreased fatigue resistance of cartilage
- Reduced water content of cartilage

Associated clinical manifestations

- Progressive loss of muscle mass – 1–2% per year from the age of 40 years
- Contributes to sarcopenia and frailty
- Loss of 30–50% muscle mass by 80 years of age
- Longer and slower rehabilitation time following injury
- Rapid muscle mass loss when confined to bed

- Muscle strength declines – isometric, concentric, eccentric strength decline
- Age-related insulin resistance
- Increased risk of metabolic syndrome
- Altered volume of distribution for water-soluble drugs
- Osteopenia, osteoporosis, fracture, loss of height (1 cm per decade in those aged older than 50 years)
- Increased rate of falls and risk of fracture
- Reduced rate of repair post fracture
- Need to recommend weight-bearing exercise – increase weight-bearing time and increased loading forces
- Reduced flexion at hip, spine and ankle
- Osteoarthritis – pain, reduced joint mobility and strength

THERMOREGULATION

Age-related physiological changes

- Reduced thermoregulation
- Reduction of skin contribution to conserving or losing heat
- Reduced shivering threshold
- Reduced hepatic thermogenesis
- Temperature response to pro-inflammatory cytokines IL-1, tumor necrosis factor (TNF) and interleukin 6 decreases with age

Associated clinical manifestations

- Increased risk of adverse effects from hot and cold environments
- Reduced diurnal variation in body temperature
- Fever in older people is more subtle
- Oral temperature e"37.8°C
- Persistent oral or tympanic temperature e"37.2°C
- Rectal temperature e"37.5°C
- Rise in temp e"1.1°C baseline

Following are the measures to be taken in care of elderly:

- Be vigilant when older patients are unwell, experience trauma or have surgery. Older people have slowed or poor recovery from stressors.
- Consider the whole person always – multiple organ systems are deteriorating; always think beyond the system of the presenting complaint and how your management will impact on other systems.
- Encourage early mobilisation and avoid prolonged periods confined to bed where possible. Older people experience rapid deconditioning.
- Recognise that signs and symptoms may be attenuated in older people – an older person may have a significant infection without manifesting a fever.
- Fluid and electrolyte homeostasis may be impaired – stress to patients and carers the importance of ensuring adequate hydration and avoiding hot environments.
- Older people are not hemodynamically robust – avoid rapid postural changes, make slow and gradual changes to blood pressure, take care with activities in the immediate postprandial period.
- Allow enough time in your consultation – to be effective, your communication will need to adjust to any cognitive and perceptual changes the patient is experiencing and examination of the patient will take longer due to reduced mobility of the older person.
- Due to poorer thermoregulation, temperature extremes should be avoided.
- Regularly review medications and consider which may be impacted by ageing physiology.
- Consider reducing the dose and increasing the interval of medication prescribing due

to changes in renal function, liver function and reduced albumin.

- Avoid aggressive treatment changes and monitor the impact of treatment changes carefully.
- Regularly review the medical history and decide what remains relevant and whether the treatment or management remains appropriate.
- Actively promote healthy ageing where possible in your practice.
- Encourage older people to remain physically and socially active.
- Always consider interventions that maintain a patient's functionality.
- Recommend health and wellbeing preserving strategies including preventive activities in older age (eg immunisation, physical activity, falls, visual and hearing impairment, dementia).
- In making recommendations, take time to understand an older person – what they consider to be their problems, what is important to them and how their living circumstances can be optimised.

In conclusion, a thorough knowledge of the physiological changes in the geriatric population will enable us to take care of them in a better way ensuring a happy and healthy life. I would like to end with a beautiful quote " *Respect the old when you are young, help the weak when you are strong, confess the fault when you are wrong, because one day in life you will be old, weak and wrong.*"

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5. https://www.racgp.org.au/silverbook : Part B, Physiology of ageing

Aging and Nutrition

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Introduction

The World Health Organization and the United Nations have declared 2021-2030 as the UN decade of healthy ageing, aiming to improve the well-being of the older population and support their pursuit of independent living [(1)] Optimal nutritional status is an important determinant of overall health, good quality of life, reduced disease burden and longevity of an elderly population. The requirements for specific nutrients may increase, decrease or remain the same with aging. When a well-balanced diet according to the body's metabolic needs is not maintained, malnutrition may develop. The prevalence of malnutrition in the elderly varies from 3% to 50% in the community and about 23% to 60% among institutionalized adults [(2)] Understanding the pathophysiology of malnutrition in the elderly is crucial for developing effective prevention and intervention strategies, aiming to promote healthy aging.

Aging and Nutrition

Nutrition can influence the aging process and the process of aging also affects the nutritional status. Each amplifies the impact of other on the health status of an elderly person adversely [(3)]

Effects of nutrition on aging:

1) Optimal nutritional status affects aging process.

2) Affects age-related alteration in body composition -undernutrition will lead to loss of muscle mass leading to a reduction in muscle strength and exercise capacity contributing to functional impairment, disability and frailty.

3) Influences onset and management of chronic conditions.

4) Affects physiologic systems and functions of body organs.

Effects of aging on nutrition:

The aging process affects the nutritional status by various means which may further accelerate the aging process by setting a vicious cycle of physiological and pathological changes. With aging, changes in financial status and social support system further contribute to decreased food access, food choices, nutrient deficiency and poor nutritional status leading to increased risk of illness and poor health.

Table :1 Aging-related changes and factors of inadequate nutrition

1) Physiological

- Body composition changes
- Changes in the gastrointestinal tract (decreased appetite, anorexia, altered metabolism)
- Impaired sensory input (smell, taste, vision, hearing)
- Poor dentition, Poor oral hygiene• Swallowing difficulties
- Physical limitations (arthritis, stroke)

2) Psychosocial

- Anxiety, depression, fear, paranoia
- Loneliness, Bereavement
- Dementia• Dependence on others

(caretakers, institution)

- Poor knowledge of nutrition
- Economic aspect, retirement
- Reduced access to food
- Inadequate facilities for storage and cooking

3) Pathological

- Acute illness / Hospitalization (delay in start of nutritional support, failure to consider increased metabolic requirement)
- Chronic diseases like CHF, COPD, CKD ,DM (Inadequate food choices, restricted diet, anorexia, altered metabolism)
- Malignancy
- Drugs (Digitalis, penicillin, spironolactone, anticonvulsants etc.)
- Alcohol

Nutritional requirements of elderly

Adequate nutrient intake should be ensured by determining an individual's nutritional requirements. A reduction in resting metabolic rate and activity-related energy expenditure decreases the total energy requirement of an elderly individual in proportion to rising age.

1) Energy

The average energy requirement is 20-25 kcal/kg/day. The requirement increases to 22-25 kcal/kg/day in critically ill patients. If weight gain is required in an individual, the calories should be increased to 30 kcal/kg/day. For the elderly population with obesity, it is recommended to reduce calorie intake by 500-750 kcal/day, with a protein intake of 1g/kg/day. It is recommended to consume 25-30 grams of dietary fiber per day, with a proportion of complex carbohydrates comprising 45 to 65% of the daily intake.

2) Protein

The suggested daily protein intake is recommended to be between 1 to 1.2 grams of protein/kg of body weight. This amount is higher than what is typically needed by an adult male to mitigate the loss of muscle mass associated with ageing. In individuals who are undernourished and have gastrointestinal diseases, protein intake should be increased to 1.2-1.5 g/kg/day. However, high protein diet should be avoided in those with renal disease.

3) Fats

It is also recommended to avoid saturated and trans fats and replace them with monounsaturated fats. However, higher fat intake may be overlooked for meeting the energy requirements of older adults such as intake of whole milk.

4) Water and sodium

The elderly population faces an increased risk of dehydration due to age-related declines in the body's fluid reserves, diminished water intake, and underlying conditions such as vomiting. The recommended intake is 30ml/kg/day to meet adequate water requirements. Sodium intake to be limited to 1500mg/day.

5) Vitamins and Minerals

Though the energy needs decreases ,vitamins and mineral needs of the elderly increases with age such as folate, vitamin B6 and B12. The recommended intake of calcium is 1200mg/day to reduce bone loss. Vitamin D deficiency is especially higher in the elderly. Dietary intake reference suggests vitamin D intake of 5- 10 µg for individuals between 51-60 years of age and 5 – 15 µg for those above 70 years. Excess intake of vitamin D may cause more falls and increase the risk of hospitalization. Around 30% of adults over the age of 50 years are deficient in vitamin B12 and hence they need to either consume more or supplement their diet.

Nutritional Status Assessment

Initial screening:

Screening of nutritional status for the risk of malnutrition is recommended for all older

individuals, whether in institutions or the community. Screening should be done at admission or initial contact and at regular intervals, regardless of their diagnosis, overweight or obesity status.

The Mini Nutritional Assessment (MNA) is the most common and validated screening tool designed for older individuals and is applicable across various geriatric settings [4].

Table 2: Mini Nutritional Assessment

A) Has food intake declined over the past three months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1= moderate decrease in food intake
2= no decrease in food intake

B) Weight loss during the last three months
0 = weight loss greater than 3 kgs
1 = does not know
2 = weight loss between 1 and 3 kgs
3 = No weight loss

C) Mobility
0 = Bed or chair bound
1 = able to get out of bed/ chair but does not go out
2 = goes out

D) Has suffered psychological stress or acute disease in the past three months
0 = Yes
1 = No

E) Neuropsychological problems
0 = Severe dementia or depression
1 = Mild dementia
2 = No psychological problems

F1) BMI
0 = <19kg/m2
1 = 19 to less than 21
2 = 21 to less than 23
3 = 23 or greater

F2) Calf circumference in cm
0 = < 31
3 = 31 or greater

Screening score

Maximum – 14 points

- 12-14 – Normal nutritional status
- 8-11 – At risk of malnutrition
- 0-7 – Malnourished

Comprehensive Nutritional Assessment:

Individuals identified by screening to be at risk of having or developed nutritional disorders should undergo a comprehensive general assessment for clinical functional and dietary evaluation followed by anthropometric and biochemical tests.

A) Comprehensive general assessment includes

1. The severity of nutritional compromise and the rate of weight decline.
2. The patient's living situation, whether they reside independently, alone, in an assisted living facility, or in a skilled nursing facility.
3. Mental and psychological status, including an assessment of depression and any changes in memory or cognition.
4. Medical and surgical history, covering gastrointestinal, cardiac, respiratory, and renal diseases, recurrent infections, and psychiatric illnesses.
5. Current use of medications.
6. A dietary assessment, examining the intake of food and fluids in the past day, the availability and types of food consumed, methods used for meal preparation, and the identity of those responsible for preparing the patient's meals.
7. The functional status can be assessed by the person's activities of daily living like bathing, feeding and toileting as well as

instrumental activities of daily living like cooking and shopping.

8. The physical examination should include present weight and body mass index (BMI), an examination of the oral cavity with particular attention to dentition and swallowing ability, and an evaluation of the gastrointestinal and respiratory systems.

B) Anthropometric measurements

- Body weight, Height, Body Mass Index
- Skin fold thickness
- Upper arm circumference
- Waist circumference, Waist to hip ratio [5]

C) Biochemical tests

1) Indicators of visceral protein status

- Serum albumin
- Thyroxine binding prealbumin
- Serum transferrin
- Retinol binding protein

2) Measurement of lipid status

- Total cholesterol
- High-density lipoprotein
- Low-density lipoprotein
- Serum triglycerides

3) Measures of iron status

- Hemoglobin
- Hematocrit
- Mean cell volume
- Mean cell hemoglobin concentration
- Total iron binding capacity [6]

Nutritional Problems

Elderly individuals are vulnerable to malnutrition due to a myriad of physiological, pathological, psychological, and social factors. The imbalance in nutrient intake and requirement causes malnutrition which includes

1) Undernutrition-Protein energy malnutrition and micronutrient deficiencies
2) Overnutrition-Obesity
3) Dehydration

Clinical Indicators of Malnutrition -Minimum of two or more characteristic is required for diagnosis

1. Weight loss -BMI <18.5 (18-69 years), BMI <20 (70 years and above)
2. Unintentional weight loss >10%in six months or >5% in one month
3. Loss of muscle mass (temporal wasting, reduced pectoralis, deltoid, quadriceps etc.)
4. Loss of subcutaneous fat (orbital, triceps fat overlying ribs)
5. Localized or generalized fluid accumulation (edema feet, ascites)
6. Decreased functional status (reduced hand grip strength) [7]

Pathological conditions due to malnutrition

1) Sarcopenia and Hip fractures

Malnutrition leads to protein catabolism, causing the wasting of skeletal muscles, and reduced muscle strength. The decline in muscle mass and strength known as sarcopenia, contributes to compromised physical health and frailty. It leads to impaired overall physical status, a loss of independence, and an elevated risk of falls. Subsequent fractures resulting from falls can have a profound and debilitating impact on the quality of life for these individuals.

2) Immune functions

Malnutrition adversely affects immune function, leading to a decrease in cell-mediated immunity. This increases vulnerability to infection and delays healing. It also increases the risk of pressure sores.

3) Dementia

Neurodegenerative diseases and impaired cognitive functions can both be a cause and

a consequence of malnutrition. Studies show an association between cognitive deficits and depression in the elderly and low levels of vitamin B6, folate, vitamin B12, and polyunsaturated fatty acids (PUFAs).

4) Cardiac Cachexia

The heart is susceptible to various micronutrient deficiencies, including vitamin A, vitamin C, vitamin E, thiamine, B vitamins, vitamin D, selenium, zinc, and copper. Deficiencies in these micronutrients can lead to heart failure, and in severe cases, even myocardial infarction. Chronic heart failure may result in cardiac cachexia, presenting as a severe malabsorption syndrome and significant weight loss.

5) Chronic obstructive pulmonary disease

Prevalence of malnutrition is 20 to 70% in patients with COPD causes are multifactorial and include high metabolic rate due to increased work of breathing but less caloric intake due to dyspnea, chronic sputum (can alter taste), flattened diaphragm (early satiety) and medication side effects.

6) Obesity-related

There is an increased incidence of hypertension, type 2 diabetes, dyslipidemia, atherosclerosis, cardiovascular and cerebrovascular diseases with obesity. The increased body weight to muscle mass causes osteoarthritis, chronic backache and increased disability [8].

Nutritional Management

Addressing nutrition and weight loss issues requires a collaborative team approach. Nurses, dietitians, speech therapists, occupational therapists, and social services staff all play crucial roles in providing essential components for the treatment of malnutrition. The algorithm provides an approach to the management.

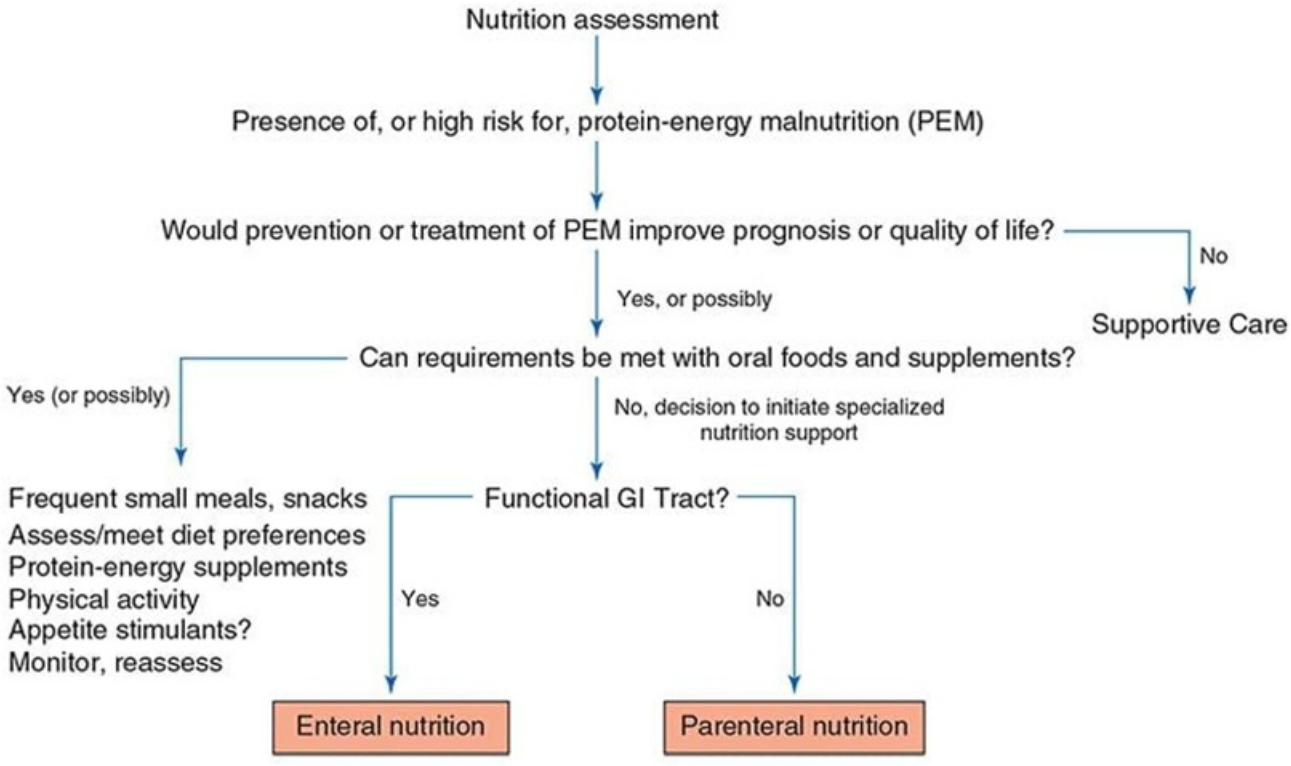

Fig 1: Approach to nutritional support

Nutritional Counselling

Older individuals who are malnourished or at risk, as well as their caregivers, are advised to receive personalized nutritional counselling. This counselling, conducted by a qualified dietitian, typically involves several sessions aimed at enhancing their comprehension of nutritional importance and promoting healthy eating habits. The format of these sessions includes individual consultations, group sessions, telephone follow-ups, and written advice.

A) Interventions in community settings involve the following measures

1. Increase meal frequency to a minimum of three times per day, supplemented by snacks.
2. Integrate fortified foods into the diet.
3. Boost nutrient density by incorporating traditional foods.
4. Include nourishing liquids like milk drinks, juices, and smoothies.
5. Prepare foods with textures suitable for the oral health of elderly patients.
6. Increase protein intake by adding meat, peanut butter, or protein powder to the diet.
7. Introduce Oral Nutritional Supplements (ONS) that offer a range of both macro- and micronutrients, which are available in the form of ready-to-drink liquids, semi-solids, or powders that can be prepared as beverages or added to foods. It provides a minimum of 400 kcal and at least 30 g of protein per day. It should be given for a minimum of one month, followed by monthly assessments to evaluate its benefits and compliance (9).
8. Address depression using antidepressants that do not exacerbate nutritional issues.
9. Replace or eliminate medications with side effects that induce anorexia.
10. Evaluate both swallowing and functional capabilities related to eating.
11. Conduct a social services evaluation of living conditions for adults in the community.

B) Interventions in institutional settings involve the following measures

1. Ensure patients have all necessary sensory aids (glasses, dentures, hearing aids).
2. Position the patient upright at a 90° angle, preferably out of bed and in a chair.
3. Have patients in long-term care facilities eat in the dining room.
4. Place food and utensils within the patient's reach after removing them from wrapped or closed containers.
5. Minimize unpleasant sights, sounds, and smells.
6. Allow for slower eating and avoid removing the patient's tray too soon.
7. Consider and accommodate ethnic food preferences, allowing families to bring specific foods.
8. If the patient requires assistance with feeding, provide adequate time for chewing, swallowing, and clearing the throat before offering another bite (10)

KEY POINTS

Balanced nutrition is essential for healthy aging and a good quality of life since nutritional disorders increases with advanced age.

Nine D's causing malnutrition are -Disease, Dentition, Diarrhea, Drugs Dysphagia, Dementia, Depression, Dysgeusia and Dysfunction.

The energy requirement of an elderly person decreases with age but the protein, vitamin and mineral requirements increases with age.

Screening tools for the assessment of nutrition should be simple, standardized and validated. The Mini Nutritional Assessment tool is one among them.

Nutritional disorders increase with age and lead to pathological conditions like sarcopenia, hip

fracture, neurodegenerative disorders and several other diseases.

A multidisciplinary team involving nurses, dieticians, speech and occupational therapists and social services staff is required to address nutrition-related issues in the elderly.

Fortification of food, oral nutritional supplements, vitamin D, B12 and calcium supplementation is advised in the elderly, especially in those with malnutrition.

Nutritional counselling of caretakers in both community and institutional set-ups is necessary to promote healthy eating habits and nutritional awareness.

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Geriatric Syndromes in Clinical Practice

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INTRODUCTION

The term "geriatric syndromes" has been used to describe clinical conditions in the elderly that are not necessarily attributed to a specific, isolated underlying disease. The conditions included under geriatric syndromes share many common features and are commonly seen in the elderly, especially the frail older adults. The impact of these geriatric syndromes on quality of life (QoL) and disability is substantial. Geriatric syndromes are heterogeneous and several underlying factors involving various organ systems, contribute to, and define these geriatric syndromes (1).

EVOLUTION OF THE CONCEPT OF GERIATRIC SYNDROMES

Aetiological causes underlying the development of geriatric syndromes are thought to be multifactorial in nature. Unlike the experience with conventional clinical approach, in older adults, the "chief complaint" does not represent the specific disease condition that had resulted in a change in the health status of the elderly subject. So, the presenting "symptom" of a geriatric syndrome is the result of accumulation of impairments in multiple systems and the inability of the geriatric subject to compensate for these due to limited amount of "reserve" to tolerate physiologic stressors (2). This can be understood with the example of an elderly patient with urinary tract infection (UTI) who develops delirium. This clinical scenario exemplifies two processes (infection in the urinary tract and delirium manifesting as cognitive and behavioural changes) involving distant and distinctly different organ systems with a disconnect between the site of disease and the resulting clinical symptom. Thus, geriatric syndromes cross the boundaries of organ systems and are beyond the conventional discipline-based boundaries. Being multifactorial in nature, these geriatric syndromes challenge conventional view of geriatric clinical care and research. Thus, the concept of "geriatric syndromes" had emerged.

PATHOPHYSIOLOGY

In mechanistic research addressing the pathophysiology of complex multifactorial geriatric syndromes several models have been proposed (3). The traditional "linear model" (e.g., inborn errors of metabolism) does not capture the multifactorial nature of geriatric syndromes. The "concentric model" developed by cancer researchers also does not seem to be suitable for geriatric syndromes since interventions targeting only one risk factor would address only a small portion of the overall risk for such conditions. An "interactive concentric model" as a means of reconciling the need for mechanistic research with the multifactorial complexity associated with geriatric syndromes has been proposed. This interactive concentric model focusses on pathways associated with risk factor synergisms and offers a locus for the design of targeted interventions (4).

DEFINITION

There is no consensus regarding criteria for defining geriatric syndromes. This has limited the usefulness of this term in areas of clinical care, research and policy development. Certain risk factors like older age, baseline cognitive and functional impairment, and impaired mobility have been found to be central to the geriatric syndromes.

The term "syndrome" refers to a combination of symptoms and signs with a single underlying cause that may not yet be known (5). In geriatric medicine, usage of the term "syndrome" emphasizes multiple causation of a unified manifestation and the term geriatric syndromes aligns with the concept of "phenotype". The term phenotype refers to observable characteristics, at the physical, morphologic, or biochemical level, of an individual and is determined by the genotype and environment.

EPIDEMIOLOGY

Reliable epidemiological data regarding geriatric syndromes are not available. Available epidemiology of geriatric giants has to be interpreted with caution as various case definitions have been applied while documenting data on this conditions.

CLINICAL SIGNIFICANCE

In the elderly, geriatric syndromes have been found to be associated with a greater likelihood of hospitalization, increased health care use and cost, and increased overall mortality. Clinical significance of some of the common geriatric syndromes (Table 1) are discussed below.

Falls

Falls are a common clinical condition in the elderly. It has been reported that nearly one-third of community dwelling adults aged > 65 years or older sustain a fall each year; in the age group > 85 years, this figure increases to 50% (6). Inmates of nursing homes have an average of 1.6 falls from their beds each year. Fall-related injury is evident in 12%-42%; 20% of these will require medical intervention. Only 50% of the elderly who fall are able to get up from the ground or floor following a fall (7). Many elderly people are 'silent fallers' and do not report the fall or seek medical care unless they happen to be injured.

A fall that is not addressed constitutes an important risk factor for recurrent falls; almost one-third of elderly who fall will fall again (8). Falls and even a "near fall experience" are associated with a fear of falling. This is called "post-fall anxiety syndrome" and is constituted by self-inflicted reduction in activity or function, anxiety and even depression. Post-fall anxiety syndrome is more frequently encountered in elderly who are living alone, those with cognitive and mobility impairments, poor balance and history of falls.

Cognitive impairment and delirium

The burden of cognitive issues has been observed to increase with increasing age. When cognitive impairments interfere with a patient's independence and social existence and functioning, dementia is considered as a diagnostic possibility. Dementia has been observed in 13.9% of subjects older than 70 years (9). Nearly 22.2% of patients in this age range have cognitive impairment without overt dementia (9).

Delirium, an acute change in attention, alertness, cognition, and/or behaviour is a commonly encountered geriatric syndrome. Older age, pre-existing cognitive impairment constitute risk factors for the development of delirium. Screening tools, such as, the Mini-Mental Status Evaluation (MMSE) (10), Montreal Cognitive Assessment tool (11) and the Confusion Assessment Method (12).

Polypharmacy

Polypharmacy is a commonly encountered geriatric syndrome in the elderly who use several medications concurrently. A systematic review identified 138 definitions of polypharmacy and found that 80% of these definitions had considered use of five or more daily medications as polypharmacy. Inappropriate polypharmacy refers to use of medications lacking evidence-based indications, use of medications with treatment risks that outweigh benefits, use of medications frequently associated with adverse drug reactions (ADRs), or those with drug-drug interactions (DDIs).

Clinical consequences of polypharmacy in the elderly occur due to ADRs, depression, disability, falls, frailty, health care use, with ensuing mortality, and caregiver burden as well. Declining

physiological function, with advancing age, influence of pharmacodynamics of medications render the elderly vulnerable to the consequences of polypharmacy. Increased occurrence of DDIs enhances the possibilities of ADRs in the elderly. The brown bag medication review method is which involves the patient bringing in all medicines and supplements from home to the hospital visit, several tools like Beers criteria (13), the Medication Appropriate Index (14), the Screening tool of older persons' potentially inappropriate prescriptions (STOPP), and the Screening tool to alert doctors to right treatment (START) criteria (15), have been used to assess polypharmacy. But, there is no consensus as to which of these would be most preferred to use.

Depression

Depression is a commonly encountered geriatric syndrome. Depression is is characterized by a combination of depressed mood, loss of interest or pleasure, changes in weight and sleep, psychomotor agitation or retardation, fatigue, feelings of worthlessness or guilt, difficulty concentrating, and recurrent thoughts of suicide or death (16). Depression is a major risk factor for suicide in older adults (17).

Accurate assessment and effective treatment are needed to mitigate depression and its adverse effects. However, assessment of depression in older adults with cancer is complex because of unique characteristics of older adults and overlap between somatic symptoms of depression, cancer, and cancer treatment (18). Multiple strategies for overcoming these assessment challenges have been proposed. One strategy is to remove or replace questions about somatic symptoms when assessing depression. Other strategies include use of the Geriatric Depression Scale–Short Form, the Hospital Anxiety and Depression Scale, and the Center for Epidemiologic Studies Depression Scale–Revised. These measures have cutoff scores validated in geriatric and medical populations (19). Psychopharmacology approach and psychotherapy approaches (cognitive-behaviour therapy and problem-solving therapy) have been tried in elderly presenting with depression with varying results. However, the expenditure involved in providing mental health services to the elderly and limited resources in health care settings, especially in developing countries like India often constitute barriers to providing psychosocial care to the elderly.

CONCLUSIONS AND FUTURE DIRECTIONS

Geriatric syndromes constitute a major clinical problem with serious consequences in the elderly. Further, the presence of a geriatric syndrome may suggest the limited reserve to withstand additional stressors. Occurrence of common geriatric syndromes (Table 1) may influence overall ability to tolerate therapy as well as quality of life and potentially survival. There is a need for implementing screening programmes for geriatric syndromes to identify potential areas for interventions to improve quality of life and other related outcomes. There is also a need for evolving a consensus case definition for geriatric syndromes that will facilitate research in this area.

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Table 1: Common geriatric syndromes

- Falls
- Cognitive syndromes and delirium
- Depression
- Polypharmacy
- Urinary incontinence
- Frailty
- Pressure ulcers

Appropriate Prescribing Practices in the Geriatric Population

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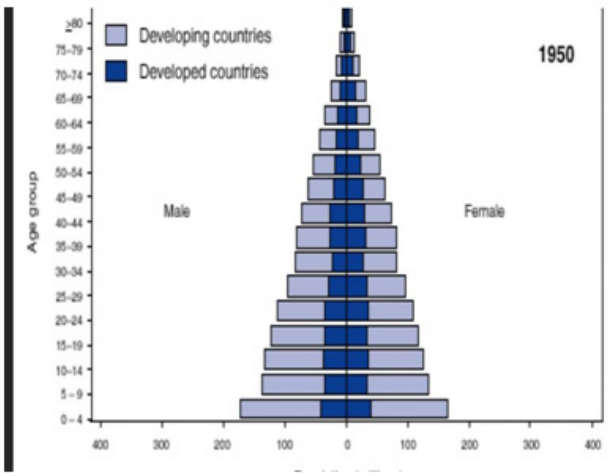
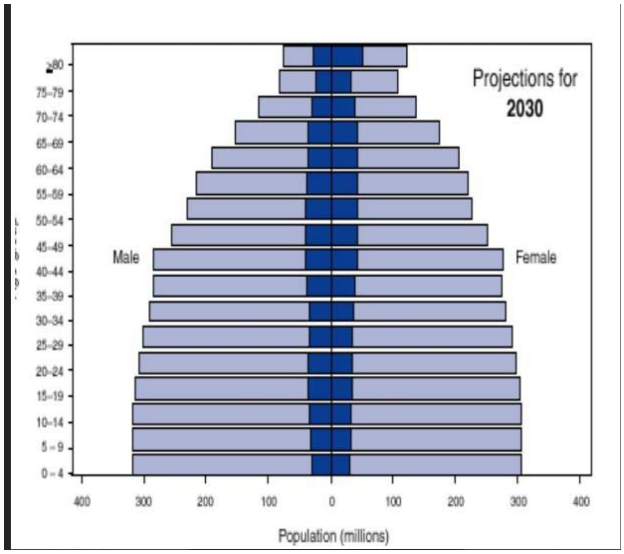
In the early 2000, the worldwide population of persons aged >65 years was an estimated 420 million, a 9.5 million increase from 1999. During 2000—2030, the worldwide population aged >65 years is projected to increase by approximately 550 million to 973 million , increasing from 6.9% to 12.0% worldwide, from 15.5% to 24.3% in Europe, from 12.6% to 20.3% in North America, from 6.0% to 12.0% in Asia, and from 5.5% to 11.6% in Latin America and the Caribbean (2). During 2000—2030, the number of persons in developing countries aged >65 years is projected to almost triple, from approximately 249 million in 2000 to an estimated 690 million in 2030, and the developing countries' share of the world's population aged >65 years is projected to increase from 59% to 71%.

It has been a common observation amongst practicing doctors involving the geriatric population to include medicines against acute, chronic or acute on chronic ailments , involving drugs of different groups & often harboring a tendency to escalate the doses . although , it is a widely conceived notion that targeting a particular disease, with pharmacotherapy , based on its pathophysiology ,at various check- points (We can take hypertensive nephrosclerosis to be a summation of different cascades vis - a -vis the RAAS system , endothelial or epithelial damages to the renal vasculature as a result of chronic inflammatory mediators , the cardiovascular system en - bloc vividly known as the primary culprit or any existing inflammatory / neoplastic lesions which in the body contributing to the same) , yield better outcomes , or for an instance , combination therapies do reduce the frequency of the dosing hence are well tolerated by patients , it may often result in an over enthusiastic leverage by clinicians when it comes to the paradigm of 1. THE CHOICE OF MOLECULES 2. THE FREQUENCY OF DOSING 3. AFFORDIBILITY OF SUCH 4. THE CLINICAL INDICATIONS . in this era of a burdened investigative approach as seen on a maximal where the diagnostic yield do have a greater precision , the era where the quantum of medical knowledge is on timely transpositions , the





physician has an extensive orbit to be on the lines of error. Henceforth , an explicit tailored approach may be provided where a greater conscientious therapeutics may be provided , with some fewer adverse effects or cons as the GERIATRIC cohort as per the nature ,do need a strictly measured pharmacology.

Risk Factors for Polypharmacy

Patient

Age older than 62 years
Cognitive impairment
Developmental disability
Frailty
Lack of a primary care physician
Mental health conditions
Multiple chronic conditions (e.g., pain conditions, diabetes mellitus, coronary artery disease, cerebrovascular disease, cancer)
Residing in a long-term care facility
Seeing multiple subspecialists

Health care system

Poor medical record keeping
Poor transitions of care
Prescribing to meet disease-specific quality metrics
Use of automated refill systems

As stated earlier , polypharmacy on the elderly (not to be confused with the multi drug approach for conditions like tuberculosis , leprosy or endocarditis) , has been a global heath burden with involving a whooping 49 % (https:// www.ncbi.nlm.nih.gov/) of the population of India . It has been vividly described to be based in the pillars of 1. OVER- PRESCRIBING - EXCESSIVE DOSAGES / DURATION OF MEDICINES (Ex- starting dose of Sacubitril Valsartan to be at 97mg / 103 mg against a titration from 49 mg / 51 mg) 2. MIS - PRESCRIBING - THE UNFAVOURABLE CHOICE OF THE MEDICINE ALONGWITH IT' S DOSE & DURATION (OR prescribing SERTRALINE , an SSRI , on patients with a failing heart OR prescribing SOTALOL on patients with an arrhythmogenic heart OR starting Calcium-channel Blockers (CCB ' s) on patients below 55 years of age as a first line antihypertensive agent) 3.UNDER- PRESCRIBING - AMOUNTS TO REFRAINING FROM PRESCRIBING A MEDICINE WHICH WOULD SUPPOSEDLY HAVE A CLINICAL INDICATION TO THE DISEASE CONCERNED IN THE ABSENCE OF A CONTRAINDICATION (prescribing the lesser known or practiced , the STEROID PULSE therapy , where the benefits of adding a steroid on doses WITHOUT TAPERING for short durations convincingly outweighs the risk). To overcome the problem, as pharmacologists, state the following tools such as the AGS Beers Criteria, Screening tool of the Older Persons' prescription (STOPP), DE-PRECRIBING .

Whereas the AGS Beers criteria demarcates drugs with documented adverse reactions , takes into account the drug - drug interactions , drugs to be avoided on an under functioning / nonfunctioning kidney & drugs to be avoided in specific health conditions , like Sympathomymetics or Alpha blockers in the hypertrophic obstructive cardiomyopathy (HO CM).on the application of this tool in my research , it was seen that 30 odd groups of molecules were better to be avoided , 40 groups MUST be used with extreme caution ,25 groups could be dropped straightaway from the prescriptions thus . on using the STOPP tool , which is accumulating the momentum for a colossal paradigm shift in the research literature for the above , and thought to be a better tool for evaluation than the others with 17 -CVS , 13-CNS, 5- GIT ,3 - respiratory system ,8 - musculoskeletal system ,6 – uro- genital system , 4- endocrine system ,3- analgesics criterions assessing the need of medicines , deciphered the solution so have to harbor resultants to improve medication appropriateness, prevention of adverse effects , engineering pre evidence based rules to refrain from prescribing in- appropriate agents. the STOPP tool may also be sought to as a guide to asses medicine review with it' s integration & subsequent practice into geriatric medicine .

DE- PRECRIBING as known in the literature & used in my work , focuses to reduce polypharmacy & potentially inappropriate medications (the PIM) , withdrawal of medicine where the risk outweighs the benefits , & all may lead to a subsequent RE - PRESCRIPTION . This was affirmed by me extensively for a period of 6 months in the Geriatric Medicine OPD , in - patient departments & the department of pharmacology , Medical College Kolkata, including patients above 60 years of age and the study being a cross - sectional one .The

figure below outlines an algorithm of desprescribing (Fig . 2)

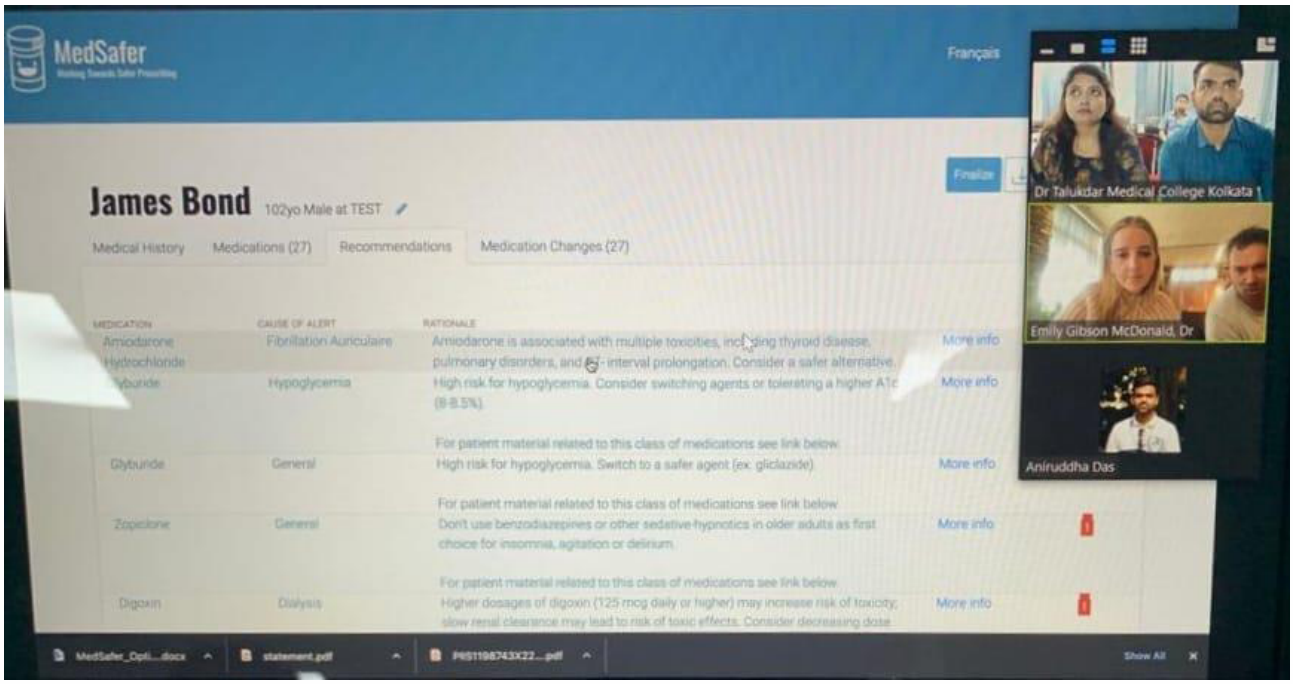
Deprescribing, an important component of medication reconciliation, is the planned and supervised process of dose reduction or stopping of prescribed medications, aimed at correcting inappropriate polypharmacy and improving patient outcomes. For certain medications the dose reduction should be done slowly to avoid withdrawal effects. Informed reconciliation for potential deprescribing need should be a norm in all patients receiving many medications for multiple chronic co morbidities and is best done in partnership with the prescribing physician. Judicious deprescribing through clinical pharmacological review ensures better patient outcomes.

Fig 2 . Demonstrates the algorithm of Deprescription

The study was mechanized using a software from MEDSAFER CORP. where they would charge $ 50 for desprescribing a particular participant of the study , & the same was approved by the Regional Geriatric Centre ,Medical College & Hospital Kolkata , funded by the National Programme for Health Care of the Elderly (NPHCE), Govt. of India.

Deprescription and prevention of PIM S' though ,would be superior to the todays ' frequent erroneous prescribing & supposedly would impart the better healthcare , has it's own pitfalls .the issues of the time constraint , patient resistance or lacks on the behalf of systematic support retard deprescribing ."The patient bias " where even after being educated about the adversities , decline to stop the medicine. The patient, often , declines such on the grounds of anxious delusions of a deteriorating health when asked to hold a drug .on a milder note , patients may often refuse to contradict the original plan of treatment , which they would perceive as a complete approach towards their ailment. When the aspect of the physicians are taken into account,here again, time limits for the ailing where a biased history / opinion of the patient is often taken into account & thus a wrong molecule may be prescribed . on a different day , a patient reviewed by multiple physicians , has a high probability to receive a wrong drug as there are conflicts of interests in practicing medicine , seen vividly. such are the problems to this "problem of de- prescriptions" but they may tend to zero against some strict rules of prescribing .

To deduce, "You may have needed the medicine then; it might not be the best choice now!" Optimizing medication use through targeted deprescribing is crucial for better and safer management of chronic conditions, so let us all appreciate the fact that in the modern day era & in the days to come , where population demographics & indices have been found to improve, the "PILL" ,which is the cornerstone , must have it ' s own justifications for the maximal outcome . Prescribing is always a risky proposition with a varied degree of vulnerability embedded in the act. It is therefore important to do a perfect



balancing in favor of benefit against harm. A trained clinical pharmacologist has the necessary expertise to practice de-prescribing when it indicated and is likely to serve the patient interests best.

Furthermore, if we may think to affix the "PILL" with the "CLINICAL JUDGEMENTS OR THE CLINICAL EYE " , PHYSICIANS would transform into CLINICIANS with negligible margins of error in practicing along with imparting the BETTER health care , in modern medicine.

Vaccination in the Elderly: A Comprehensive Analysis

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Abstract:

Vaccination is a cornerstone of public health, playing a pivotal role in preventing infectious diseases and promoting overall well-being. While vaccinations are essential across all age groups, their significance becomes even more pronounced in the elderly population. As individuals age, their immune systems undergo changes that make them more susceptible to certain infections. This article delves into the importance of vaccination in the elderly, exploring the unique challenges, benefits, and considerations associated with immunizing this demographic.

INTRODUCTION

Background

Vaccination has long been recognized as a powerful tool in the prevention of infectious diseases. With advancements in medical science, vaccines have played a crucial role in controlling and eradicating various diseases that once posed significant threats to public health.

Significance of Vaccination in the Elderly

The elderly population, typically defined as individuals aged 65 and older, faces increased vulnerability to infectious diseases due to age-related changes in the immune system. Vaccination becomes a vital strategy to safeguard the health and well-being of older adults. [1,2]

AGE-RELATED CHANGES IN THE IMMUNE SYSTEM

Immunosenescence

As individuals age, their immune system undergoes changes collectively known as immunosenescence. This process involves alterations in both the innate and adaptive immune responses, leading to diminished immune function.

Impact on Vaccine Efficacy

Immunosenescence can compromise the effectiveness of the immune response to vaccines, making elderly individuals more susceptible to infections. Understanding these changes is crucial in designing effective vaccination strategies for this demographic.

COMMON VACCINATIONS FOR THE ELDERLY

1. INFLUENZA VACCINE

Influenza, commonly known as the flu, poses a significant health risk, particularly for the elderly population. Due to age-related changes in the immune system and a higher susceptibility to complications, vaccination against influenza is crucial for this demographic. [3]

Indications:

A. Age Criteria:

The influenza vaccine is recommended for all individuals aged 65 and older. This age group is at an increased risk of severe complications, hospitalization, and mortality associated with influenza.

B. Underlying Health Conditions:

Elderly individuals with chronic medical conditions such as cardiovascular disease, diabetes, respiratory disorders, and immunosuppression are particularly

vulnerable to influenza-related complications. Vaccination is strongly indicated for these individuals.

C. Long-Term Care Facility Residents:

Seniors residing in long-term care facilities or nursing homes are at a higher risk of influenza outbreaks due to close living quarters. Routine vaccination is crucial in preventing the spread of the virus in these settings.

D. Healthcare Workers and Caregivers:

Healthcare personnel and individuals providing care to the elderly should also receive the influenza vaccine to protect both themselves and the vulnerable population they serve.

Dosing Considerations:

A. High-Dose Influenza Vaccine:

The high-dose influenza vaccine, containing four times the antigen of standard-dose vaccines, is specifically designed for individuals aged 65 and older. This formulation aims to enhance the immune response in older adults, providing better protection against influenza.

B. Adjuvanted Influenza Vaccine:

Adjuvanted vaccines, which include an additional immune-stimulating component, are another option for the elderly. These vaccines are designed to improve the body's immune response and effectiveness, offering enhanced protection against influenza.

C. Standard-Dose Influenza Vaccine:

In the absence of high-dose or adjuvanted vaccines, standard-dose influenza vaccines are still recommended for the elderly. The standard vaccine remains effective in reducing the risk of influenza-related complications and hospitalizations in this age group.

D. Timing of Vaccination:

Vaccination should ideally occur before the onset of the influenza season. Healthcare providers should administer the vaccine as soon as it becomes available, typically in the early fall, to ensure optimal protection before the peak of flu activity.

2. PNEUMOCOCCAL VACCINES

Pneumococcal disease, caused by the bacterium Streptococcus pneumoniae, poses a significant health risk for the elderly population. To mitigate the potential severe outcomes associated with pneumococcal infections, vaccination is a crucial preventive measure. This article discusses the indications and dosing guidelines for the pneumococcal vaccine in the elderly. [4]

Indications for Pneumococcal Vaccination in the Elderly:

The Advisory Committee on Immunization Practices (ACIP) and other global health organizations recommend pneumococcal vaccination for all adults aged 65 and older. Additionally, individuals aged 19-64 with certain underlying medical conditions, such as chronic heart disease, diabetes, chronic lung disease, and immunocompromising conditions, should also receive the vaccine.

VACCINE TYPES

Two types of pneumococcal vaccines are available for clinical use: pneumococcal polysaccharide vaccine **(PPSV)** and pneumococcal conjugate vaccine **(PCV)**. The active components of both kinds of vaccine are capsular polysaccharides from pneumococcal serotypes that commonly cause invasive disease.

PPSV is composed of partially purified pneumococcal capsular polysaccharides. The only available formulation contains 23 pneumococcal polysaccharides **(**PPSV23**)**

Available **PCV** formulations include the the 13-valent (PCV 13; Prevnar 13), and the 20-valent PCV (PCV20; Prevnar 20). Prevnar 20 is not yet

available in India.

Dosing Guidelines:

- The ACIP recommends a single dose of 20-valent PCV (PCV20) for all adult > 65 years of age.

Where PCV 20 is not available -

- Adults aged 65 and older who have not previously received PCV13 or whose vaccination history is unknown should initiate vaccination with a single dose of PCV13.
- After receiving the PCV13, individuals aged 65 and older should receive a single dose of PPSV23. The ideal timing for PPSV23 administration is at least one year after PCV13.
- Those who received both the PCV13 and PPSV23 prior to age 65 years should receive PCV20 or PPSV23 (if PCV20 is not available) e"5 years after their last pneumococcal vaccine dose.

3. HERPES ZOSTER VACCINE

Herpes zoster, commonly known as shingles, is a viral infection caused by the reactivation of the varicella-zoster virus, which also causes chickenpox. This reactivation can occur later in life, especially among the elderly, leading to a painful and debilitating rash. Vaccination plays a crucial role in preventing herpes zoster and its associated complications. The herpes zoster vaccine, also known as the shingles vaccine, is recommended for individuals aged 50 and older, with specific dosing guidelines to ensure optimal protection. [5]

Indications:

The herpes zoster vaccine is indicated for the following groups of individuals:

A. Age 50 and Older:

The vaccine is recommended for all individuals aged 50 and older, regardless of their prior history of chickenpox or shingles.

B. Individuals with a History of Shingles:

Even if an individual has previously experienced an episode of shingles, vaccination is still recommended to reduce the risk of recurrent episodes.

C. Individuals with a History of Chickenpox:

Individuals who have had chickenpox in the past are at risk of developing shingles, making vaccination a valuable preventive measure.

D. Individuals with Chronic Medical Conditions:

Individuals with certain chronic medical conditions, such as diabetes or autoimmune disorders, may be at an increased risk of developing shingles. The vaccine is recommended for this population to reduce the likelihood and severity of the condition.

E. Individuals with Weakened Immune Systems:

Immunocompromised individuals, including those undergoing chemotherapy or with HIV/AIDS, may be more susceptible to herpes zoster. Consultation with a healthcare provider is essential to determine the appropriateness of vaccination in this population.

Dosing Guidelines:

The herpes zoster vaccine is available in the following formulation:

Recombinant Zoster Vaccine (RZV):

RZV is administered in two doses, with the second dose given 2 to 6 months after the first dose. It is recommended for individuals aged 50 and older.

4 . Respiratory Syncytial Virus (RSV) Vaccine (RSV) :

RSV vaccine can prevent lower respiratory tract disease caused by **respiratory syncytial virus**

(RSV). RSV is a common respiratory virus that usually causes mild, cold-like symptoms , but RSV can be especially serious for infants and older adults.

- Adults at highest risk for severe RSV disease include older adults, adults with chronic medical conditions such as heart or lung disease, weakened immune systems, or certain other underlying medical conditions, or who live in nursing homes or long-term care facilities.

CDC recommends **adults 60 years of age and older** have the option to receive a single dose of RSV vaccine, based on discussions between the patient and their health care provider.

Arexvy and Abrysvois are approved by US FDA in 2023 for the prevention of lower respiratory tract disease caused by RSV in individuals 60 years of age and older .

4. TETANUS, DIPHTHERIA, AND PERTUSSIS (TdaP) VACCINE

The Tdap vaccine, which combines protection against tetanus, diphtheria, and pertussis (whooping cough), is commonly associated with adolescent and adult immunization. While the focus is often on younger populations, there are specific indications for administering the Tdap vaccine in the elderly, emphasizing the importance of maintaining immunity against these preventable diseases throughout one's life.

Indications for Tdap Vaccination in the Elderly:

A. Tetanus Protection:

- The Tdap vaccine is crucial for providing ongoing protection against tetanus, a potentially serious and life-threatening disease caused by the bacterium Clostridium tetani.
- Elderly individuals may be at an increased risk of exposure to tetanus due to factors such as outdoor activities, gardening, and potential injuries that can introduce tetanus spores.

B. Diphtheria Prevention:

- Diphtheria, caused by Corynebacterium diphtheriae, can lead to severe respiratory complications and even death.
- The Tdap vaccine ensures continued immunity against diphtheria, offering a preventive measure for elderly individuals who may have incomplete or waning immunity.

C. Pertussis (Whooping Cough) Control:

- Pertussis is a highly contagious respiratory disease caused by Bordetella pertussis, and its incidence has been on the rise in recent years.
- Vaccination with Tdap helps protect elderly individuals from pertussis and reduces the risk of transmission to vulnerable populations, such as infants who are at a higher risk of severe complications.

Dosage Recommendations for Tdap Vaccine in the Elderly:

A. Primary Vaccination:

- Elderly individuals who have not previously received a Tdap vaccine are recommended to receive a single dose.
- This primary dose helps establish or boost immunity against tetanus, diphtheria, and pertussis.

B. Booster Doses:

- For ongoing protection, booster doses are recommended every 10 years.
- Booster doses are essential to maintain adequate immunity levels, especially considering the potential waning of immunity over time.

C. Special Considerations:

- Individuals aged 65 and older may receive Tdap regardless of the interval since their last tetanus-containing vaccine.

- Healthcare providers should assess the vaccination history of elderly individuals and recommend Tdap as needed.

CHALLENGES IN VACCINATING THE ELDERLY

A. Access and Awareness

Ensuring that elderly individuals have access to vaccines and are aware of their importance is a critical challenge. Strategies for improving vaccination rates in this population will be discussed. [6]

B. Vaccine Hesitancy

Vaccine hesitancy can affect individuals of all ages, including the elderly. Addressing concerns and misconceptions is essential for promoting vaccine acceptance. [7]

C. Immunization Schedules and Recommendations

The complexity of immunization schedules and evolving recommendations can pose challenges for healthcare providers and older adults. Streamlining information dissemination is crucial for effective vaccination programs. [8,9]

CONCLUSION

In conclusion, vaccination in the elderly is a cornerstone of preventive healthcare. Despite the challenges, the benefits of immunization in this population far outweigh the risks. As we navigate the complexities of an aging population and evolving infectious threats, prioritizing vaccination in the elderly remains a fundamental strategy for promoting health and longevity.

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Understanding the Challenges Faced by Women During Menopause

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Abstract:

Menopause, a natural biological transition marking the end of a woman's reproductive years, brings about a myriad of challenges that significantly impact various aspects of her life. Physiologically, women often grapple with vasomotor symptoms such as hot flashes and night sweats, genitourinary symptoms like vaginal dryness, and an increased risk of osteoporosis, all of which contribute to a complex interplay of physical discomforts. Beyond the physiological realm, menopause presents substantial psychological challenges, including mood swings, emotional fluctuations, and cognitive changes that may affect memory and concentration. Sexual health is another dimension profoundly influenced by menopause, with alterations in libido, vaginal atrophy, and shifts in intimate relationships. Moreover, social and cultural factors contribute to the complexity of the menopausal experience, as societal perceptions, workplace dynamics, and cultural influences shape how menopause is perceived and managed. Recognizing the multifaceted nature of the challenges women face during menopause is crucial for developing comprehensive strategies that address the diverse aspects of this transitional phase in a woman's life.

Top of Form

1. Introduction:

Definition of menopause and its stages.

Brief overview of hormonal changes during menopause.

Menopause is permanent cessation of menstruation following loss of ovarian function.

Menopause is derived from Greek word mens (month) and pausis (cessation). The average age of menopause is 51 y with the range of 45-55years.clusion of the menstrual cycle and fertility. Menopause typically occurs in women in their late 40s to early 50s, but the age of onset can vary. The transition to menopause is a gradual

Understanding the stages of menopause is crucial for healthcare professionals and women alike to navigate the challenges associated with this natural life transition. It allows for the implementation of targeted interventions and support to manage symptoms and promote optimal health during and after the menopausal transition.

Hormonal changes during menopause are primarily characterized by a decline in the production of estrogen and progesterone, two key hormones that play crucial roles in the female reproductive system. The ovaries, which are the primary source of these hormones, gradually reduce their activity, leading to significant physiological changes. The hormonal shifts during menopause can be summarized as follows:

Decline in Estrogen: Estrogen, a hormone responsible for regulating the menstrual cycle and supporting various bodily functions, experiences a gradual decrease during menopause. This decline is most pronounced during the perimenopausal stage, leading to irregular menstrual cycles and the eventual cessation of menstruation.

Reduced Progesterone Production: Progesterone, another hormone produced by the ovaries, also declines during menopause. This hormone is involved in preparing the uterine lining for a fertilized egg. As menopause progresses,

the levels of progesterone decrease, contributing to changes in menstrual patterns.

Impact on Follicle-Stimulating Hormone (FSH) and Luteinizing Hormone (LH): The declining levels of estrogen and progesterone trigger an increase in the secretion of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) by the pituitary gland. Elevated levels of FSH and LH are characteristic of menopause and contribute to various symptoms, including hot flashes and night sweats.

Effects on Other Hormones: The hormonal changes during menopause also affect other hormones, such as testosterone.The decline in estrogen during menopause can impact testosterone levels, influencing libido and overall sexual well-being.

These hormonal fluctuations contribute to the diverse range of symptoms experienced during menopause, including hot flashes, mood swings, changes in libido, and alterations in bone density. Understanding these hormonal changes is essential for healthcare professionals to provide effective management strategies, such as hormone replacement therapy (HRT) or lifestyle interventions, to alleviate symptoms and support women during this transitional phase.

2. Physical Challenges:

Vasomotor symptoms (hot flashes, night sweats).

Vasomotor symptoms (VMS) are a prominent and often challenging aspect of menopause, affecting a significant number of women undergoing this natural life transition.

The most common vasomotor symptoms include hot flashes and night sweats.

Hot Flashes: Hot flashes, or hot flushes, are sudden, intense sensations of heat that typically start in the upper torso or face and may spread throughout the body. They are often accompanied by rapid heartbeat, sweating, and a flushed or reddened appearance of the skin. The exact cause of hot flashes is not fully understood, but hormonal fluctuations, particularly changes in estrogen levels, are believed to play a central role.

Night Sweats: Night sweats are episodes of excessive sweating that occur during sleep, often leading to the drenching of bedclothes and disruptions in sleep patterns. Similar to hot flashes, night sweats are linked to hormonal imbalances, particularly the fluctuation and decline of estrogen during menopause.

These vasomotor symptoms can vary widely in intensity and frequency among women. While some may experience mild and infrequent episodes, others may find these symptoms to be severe and disruptive to daily life and sleep. The duration of vasomotor symptoms can also vary, persisting for several years in some women.

Management of vasomotor symptoms typically involves a combination of lifestyle modifications and, in some cases, medical interventions. Lifestyle changes may include maintaining a cool sleep environment, dressing in layers, managing stress through relaxation techniques, and avoiding triggers such as spicy foods and caffeine. For women with more severe symptoms, hormone replacement therapy (HRT) or other medications may be considered under the guidance of a healthcare professional.

Understanding and addressing vasomotor symptoms are crucial aspects of supporting women through the menopausal transition, enhancing their quality of life and overall well-being.

Genitourinary symptoms (vaginal dryness, urinary incontinence).

Genitourinary symptoms are common during menopause . These symptoms affect the reproductive and urinary systems and can significantly impact a woman's quality of life. The genitourinary symptoms most commonly experienced during menopause include:

Vaginal Dryness: The decrease in estrogen levels during menopause can lead to a reduction in the moisture and elasticity of the vaginal tissues. This

often results in vaginal dryness, which can cause discomfort, itching, and pain during sexual activity. Vaginal dryness may also contribute to an increased susceptibility to irritation and infection.

Vaginal Atrophy: The tissues of the vagina may become thinner, drier, and more easily irritated. This condition, known as vaginal atrophy or atrophic vaginitis, can lead to symptoms such as pain during intercourse, bleeding, and an increased risk of urinary tract infections.

Urinary Incontinence: Changes in the genitourinary tract can impact urinary function. The weakening of pelvic floor muscles and changes in the urethra may contribute to urinary incontinence, which can manifest as stress incontinence (leakage during activities such as coughing or sneezing) or urge incontinence (sudden, intense urge to urinate).

Frequency and Urgency: Some women may experience increased frequency of urination and a sense of urgency, which can be related to changes in the bladder and urethra. These symptoms can disrupt daily activities and quality of life.

Management of genitourinary symptoms during menopause may involve various approaches:

Topical Estrogen Therapy: This can be applied directly to the vaginal tissues to alleviate dryness and atrophy while minimizing systemic absorption.

Vaginal Moisturizers and Lubricants: Over-the-counter products can help relieve symptoms of vaginal dryness and discomfort during sexual activity.

Pelvic Floor Exercises: Kegel exercises and other pelvic floor exercises can strengthen muscles and improve urinary control.

Behavioral Strategies: Managing fluid intake, avoiding irritants, and developing regular voiding habits may help alleviate urinary symptoms.

It's important for women experiencing genitourinary symptoms during menopause to seek guidance from healthcare professionals, who can provide tailored advice and recommend appropriate interventions to address their specific needs.

Bone health becomes a significant concern levels decrease during menopause,

Regular monitoring of bone health through bone density scans (DEXA scans) is essential for early detection of bone loss and timely intervention. Healthcare providers can offer personalized recommendations based on an individual's risk factors and overall health.

3. Psychological Challenges:

Mood swings and emotional fluctuations.

Mood swings and emotional fluctuations are common symptoms experienced by many women during the menopausal transition. The impact of menopause on mood and emotions can vary widely among individuals, but several emotional and psychological symptoms are commonly associated with this life stage:

Irritability and Mood Swings: Fluctuations in estrogen levels can influence neurotransmitters in the brain, such as serotonin and norepinephrine, which play a role in regulating mood. This hormonal imbalance may contribute to irritability, mood swings, and increased emotional sensitivity.

Anxiety and Tension: Some women may experience heightened anxiety during menopause. This can manifest as feelings of worry, restlessness, or a sense of tension. Changes in sleep patterns and other menopausal symptoms may contribute to increased feelings of anxiety.

Depression: While not everyone experiences depression during menopause, some women may be more susceptible to depressive symptoms. Hormonal changes, coupled with other life stressors, can contribute to feelings of sadness, hopelessness, and a lack of interest in activities.

Cognitive Changes: Menopause may also be associated with cognitive changes, including difficulty concentrating and memory lapses. These changes can contribute to feelings of frustration

and may impact daily functioning.

Several factors can influence the severity and duration of mood swings and emotional fluctuations during menopause

Hormonal Fluctuations: Estrogen plays a role in regulating mood, and its decline during menopause can contribute to emotional changes.

Sleep Disturbances: Menopausal symptoms such as hot flashes and night sweats can disrupt sleep, leading to fatigue and irritability.

Life Stressors: Menopause often coincides with other life changes, such as children leaving the home or adjustments in career roles, which can contribute to emotional stress.

Personal and Social Support: Adequate support from family, friends, and healthcare professionals can help women navigate the emotional challenges of menopause.

Management strategies for mood swings and emotional fluctuations during menopause may include:

Regular Exercise: Physical activity can have positive effects on mood and help alleviate stress.

Stress Management Techniques: Practices such as meditation, deep breathing exercises, and yoga can be beneficial in managing stress and promoting emotional well-being.

Counselling or Therapy: Talking to a mental health professional can provide support and coping strategies for managing emotional challenges.

Hormone Replacement Therapy (HRT): In some cases, hormone replacement therapy may be considered to address hormonal imbalances and alleviate mood-related symptoms. However, the decision to use HRT should be individualized and made in consultation with a healthcare provider.

4. Impact on Sexual Health:

Changes in libido.

Changes in libido, or sexual desire, are a common aspect of the menopausal transition for many women. Fluctuations in hormonal levels can contribute to shifts in sexual function and desire. Here are key factors associated with changes in libido during menopause:

Vaginal Dryness and Discomfort:

Mood Changes: Mood swings, anxiety, and other emotional changes associated with menopause can impact libido. Hormonal fluctuations may influence neurotransmitters in the brain that play a role in sexual arousal and desire.

Fatigue and Sleep Disturbances: Menopausal symptoms like hot flashes and night sweats can disrupt sleep, leading to fatigue and reduced energy levels. Fatigue and lack of sleep may contribute to a decreased interest in sexual activity.

Body Image and Self-Esteem: Changes in body composition and appearance, such as weight gain and alterations in skin and hair texture, can influence body image and self-esteem. These factors may impact sexual confidence and desire.

It's important to note that while many women experience a decline in libido during menopause, others may find that their sexual desire remains unchanged or even increases. Individual experiences vary widely, and factors such as relationship dynamics, personal attitudes toward sexuality, and overall health can also influence libido.

Addressing changes in libido during menopause may involve a combination of lifestyle modifications, communication with a partner, and, in some cases, medical interventions. Here are some strategies that may help:

Communication: Open and honest communication with a partner about changes in libido and sexual satisfaction is crucial. Understanding each other's needs and concerns can help strengthen the emotional connection.

Lubricants and Moisturizers

Hormone Replacement Therapy (HRT)

Healthy Lifestyle Habits: Regular exercise, a balanced diet, and stress management can contribute to overall well-being, which may

positively impact libido.

If changes in libido are causing significant distress or impacting the quality of life, seeking guidance from a healthcare professional, such as a gynecologist or a sex therapist, can provide tailored advice and interventions to address specific concerns.

Relationship dynamics during menopause.

Menopause can have a significant impact on relationship dynamics, affecting various aspects of intimacy, communication, and emotional connection between partners.

Tips for Navigating Relationship Dynamics During Menopause:

Open Communication: Encourage open and honest communication about feelings, concerns, and needs related to menopause. Discussing these topics can strengthen emotional bonds and foster understanding.

Educate Each Other: Learn about the physical and emotional aspects of menopause together. Understanding the changes and challenges can help both partners navigate this transition more effectively.

Seek Professional Guidance: Consider seeking guidance from healthcare professionals or counselors who specialize in women's health and relationship dynamics. Professional support can provide additional tools and strategies for coping with the challenges of menopause.

Explore Intimacy: Explore new ways to express intimacy and maintain a connection. This may involve trying different forms of physical affection, prioritizing emotional connection, and being open to adjusting to changing needs and desires.

Patience and Empathy: Practice patience and empathy. Menopause is a unique experience for each woman, and partners may need time and understanding to adjust to the changes.

Remember that maintaining a healthy relationship during menopause requires mutual understanding, flexibility, and a commitment to supporting each other through this transitional period. As partners navigate the challenges together, they can build a stronger and more resilient connection that contributes to long-term relationship satisfaction.

5. Social and Cultural Factors:

Stigma and societal perceptions of menopause.

Menopause, despite being a natural and universal phase in a woman's life, is often surrounded by stigma and societal perceptions that can influence how individuals experience and discuss this transition. Here are some aspects of stigma and societal perceptions of menopause:

Silence and Lack of Open Discussion: Menopause has historically been a topic surrounded by silence and secrecy. The societal norm of not openly discussing menopause can contribute to feelings of isolation and discomfort for women going through this transition.

Negative Stereotypes and Aging Stigma: Menopause is sometimes associated with negative stereotypes related to aging, such as diminished attractiveness or a decline in vitality. These stereotypes can perpetuate ageism and impact how women perceive themselves and are perceived by others.

Cultural Variations: Societal perceptions of menopause can vary across cultures, contributing to different attitudes and expectations surrounding this life stage. In some cultures, menopause may be viewed more positively, while in others, negative stereotypes and taboos may persist.

Impact on Professional Life: Stigma and societal perceptions of menopause can extend into the workplace. Women may feel reluctant to discuss menopausal symptoms or seek accommodations due to fear of being perceived as less competent or capable.

Media Influence: Media portrayals of menopause can reinforce stereotypes and contribute to societal perceptions. Unrealistic portrayals or lack of accurate representation in the media may contribute to misunderstandings and perpetuate stigma.

Addressing Stigma and Changing Societal Perceptions:

Education and Awareness: Promoting education and awareness about menopause is essential to dispel myths and misconceptions. Providing accurate information about the biological, psychological, and social aspects of menopause can help challenge stigma.

Open Dialogue: Encouraging open dialogue about menopause in families, communities, and workplaces can contribute to breaking down barriers. Creating safe spaces for discussions helps normalize the conversation and provides support for those experiencing menopausal symptoms.

Cultural Sensitivity: Recognizing and respecting cultural variations in perceptions of menopause is important. Tailoring educational efforts to address specific cultural beliefs and practices can foster understanding.

Media Representation: Advocating for accurate and positive media representation of menopause is crucial. Promoting realistic portrayals in movies, TV shows, and other media can contribute to changing societal perceptions.

Workplace Policies: Implementing workplace policies that support employees going through menopause can help combat stigma. This may include providing accommodations for symptoms and fostering a supportive work environment.

Community Support Groups: Establishing community support groups or online forums where women can share their experiences and support each other can be empowering. Creating a sense of community helps women feel less isolated in their menopausal journey.

Challenging stigma and changing societal perceptions of menopause requires a collective effort. By fostering understanding, providing accurate information, and promoting open dialogue, society can contribute to creating a more supportive and inclusive environment for women going through this natural life transition.

8. Treatment Options:

Hormone replacement therapy (HRT)

Estrogen- oral, transdermal patch, vaginal creams.

Estrogen-Progestin sequential and continuous regimens.

The addition of progestin is to protect the endometrium from the effects of unopposed estrogens.

Progestin intrauterine device.

Testosterone- mostly in women with Hypoactive Sexual Desire Disorder.

Selective estrogen receptor modulators (SERMS)- Raloxifene, Ospemifene.

Tibolone

It is structurally related to 19 nor testosterone progestin with favourable safety profile of its metabolites on breast, bones and cardiovascular system.

Alternative therapies and complementary approaches.

Phytoestrogens- Isoflavones (soyabeans, lentils,chickpeas)

Lignans- Flaxseed, cereals,vegetables, fruits

Coumestans- Sunflower seeds, bean sprouts

Evening primrose- used for mastalgia.

Ginkgo Biloba- used to prevent dementia

9. Conclusion:

Menopause is the phase in a woman's life where she experiences physical, emotional and cognitive changes starting in the fourth/fifth decade of life. A healthy lifestyle, a robust support system, education about the symptoms and HRT if required can go a long way in women navigating through this skillfully.

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1. Menopause and the Perimenopausal transition. Chapter 17.Clinical Gynecologic Endocrinology and Infertility. Eight edition. 2012.Marc A Fritz, Leon Spereoff.

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Anorectal Problems in Elderly (Geriatric)

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Anorectal Physiology/Pathophysiology in the Elderly

In the medical disorders facing the elderly, anorectal problems are not only highly prevalent, but cause significant morbidity and mortality, and have deleterious effects on health care burden and quality of life. These include disorders such as **fecal incontinence, fecal impaction with overflow fecal incontinence, chronic constipation, dyssynergic defecation, hemorrhoids, anal fissure, and pelvic floor disorders**. Here, we discuss the latest advances in age-related changes in anal sphincter morphology and function, changes in cellular and molecular biology, alterations in neurotransmitters and reflexes, and their impact on functional changes of the anorectum in the elderly.

Introduction

Anorectal disorders such as fecal incontinence, chronic constipation, dyssynergic defecation, fecal impaction, and overflow are highly prevalent in the elderly although a benign condition, constipation can result in chronic illness with potentially serious complications associated with significant social stigma and psychological distress, leads to dependency, poor health, a high caregiver burden, and is a lead. It is reason for nursing home placement in the elderly.

Functional Anatomy and Physiology

The colon has a well-established circadian rhythm, with a significant increase in motility after meals and after waking. During waking hours, the transverse/descending colon exhibits more activity, attributed to its role of mixing, storage, and salvaging digestive residue, while nocturnal activity is predominated by periodic rectal motor activity, which presumably acts as an intrinsic nocturnal brake that helps to maintain continence during sleep. Between 3 to10 times a day, intermittent high amplitude (>100 mm Hg) prolonged duration propagating contractions (HAPC's) sweep through the colon, delivering fecal material into the rectum. The numbers of HAPC's are significantly decreased or absent in patients with slow transit constipation, but whether their characteristics are different in the elderly is not known.

There is significant increase in colonic motility after meals and after waking. From Rao SS, et al. Ambulatory 24-hour colonic manometry in slow-transit constipation. American journal of gastroenterology, 2004; with permission.

The rectum acts as a reservoir for stool and as a pump for emptying stool, and has three involutions known as the valves of Houston. The lateral angulations of the sigmoid colon and valves of Houston provide a mechanical barrier that helps retard progression of stool, with the weight of the stool enhancing this barrier effect. Stool volume and consistency are important because patients with a weakened continence mechanism may be continent for firm stool but incontinent for liquid feces. The adaptive compliance of the rectum along with rectal capacity are important for its reservoir function.

The anus is a muscular tube 2 to 4 cm in length, and the upper anal canal is lined with mostly columnar epithelium, the same tissue that lines the rectum. About 1 cm above the dentate line, there is a change from columnar to squamous

epithelium in an area 1 to 1.5 cm, called the transitional zone. The anal sphincter consists of the internal anal sphincter, a 0.3 to 0.5 cm thick expansion of the circular smooth muscle layer of the rectum, which is under involuntary control, and the external anal sphincter, a 0.6 to 1 cm thick expansion of the striated levator ani muscles, which is under voluntary control. The anus forms an angle with the axis of the rectum, approximately 90 degrees at rest. With voluntary squeeze, it becomes more acute, around 70 degrees, and during defecation it becomes more obtuse, at 110 to 130 degrees.

This profile shows the arrangement of the 3 anal muscles during rest, normal defecation, and the impairment that occurs with fecal incontinence and dyssynergic defecation.

The anus is normally closed by the tonic activity of the internal anal sphincter, which keeps the canal in the collapsed position to maintain continence. When the rectal ampulla fills and induces distention, the sensory stimulus for evacuation releases the state of tonic contraction, and begins the process of defecation. If volume increases rapidly over a short period of time, the accommodation response fails and leads to urgent emptying.

The pelvic floor consists of the pubococcygeus, iliococcygeus, and puborectalis, a group of muscles that forms the levator ani. The pubococcygeus and iliococcygeus participate in continence by applying lateral pressure to narrow the levator hiatus. The external anal sphincter is composed of multiple interrelated skeletal muscle loops that lie in close approximation to the levator ani and the muscles of the pelvic floor, and is under voluntary control. This sphincter system contains three muscular loops that surround the anal canal.

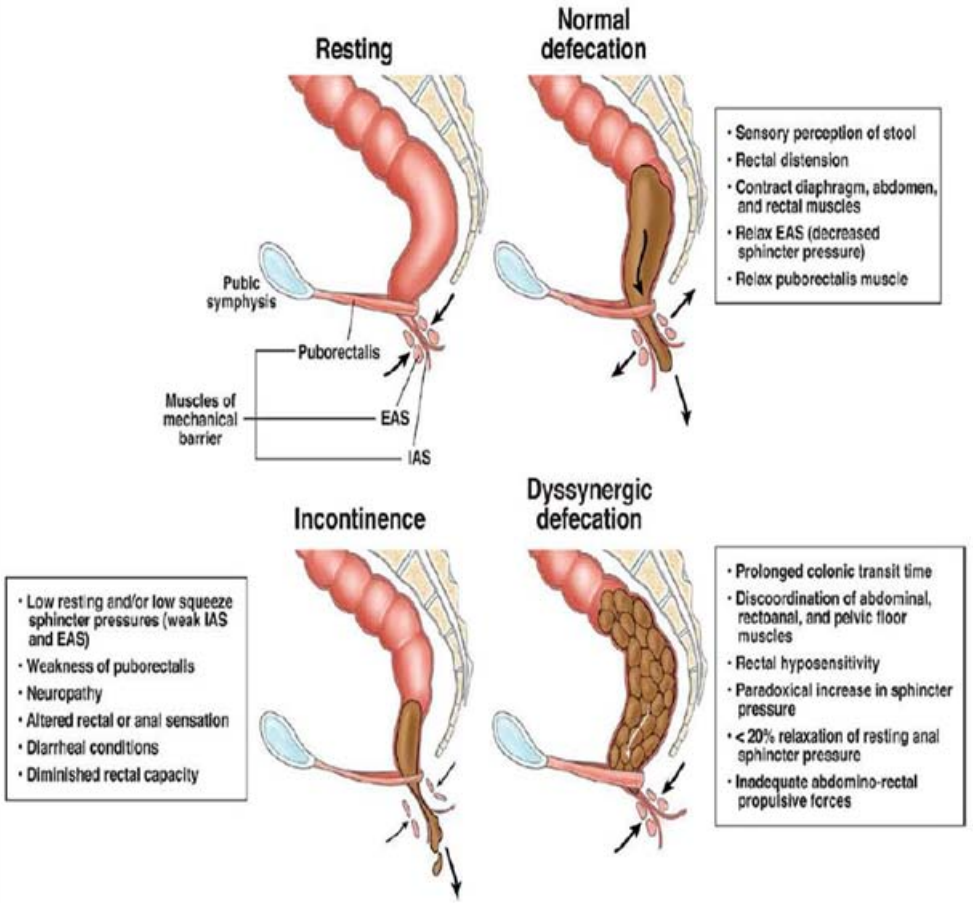


Figure 2 : Normal Anatomy and Physiology of the Pelvic Floor in the Sagittal Plane at Rest, During Defecation, and the Key Pathophysiologic Changes in Subjects with Fecal Incontinence and Dyssynergic Defecation

The external anal sphincter is innervated by the inferior hemorrhoidal branch of the pudendal nerve. Continuous tonic activity of the external anal sphincter and pelvic floor muscles has been recorded at rest and during sleep, which helps maintain fecal continence.

The internal anal sphincter has both sympathetic and parasympathetic innervation. The parasympathetic nerves are inhibitory to the internal anal sphincter, while the sympathetic outflow mediates contraction and relaxation. Activity of the sphincters is the most important factor in maintaining anal continence. The internal anal sphincter is estimated to account for 52 to 85% of the pressure recorded in the high-pressure zone of the anal canal. The hemorrhoidal cushions also play a significant physiologic role in protecting the anus, augmenting closure of the anal canal in response to increased abdominal pressure by engorging with increased inferior vena cava pressure, and contributes 15 to 20% of resting anal canal pressure—another important mechanism preserving fecal continence.

Three anal reflexes have been described and include the Recto-anal Inhibitory Reflex (RAIR), the Recto-anal Contractile Reflex (RACR), and the Sensorimotor Response (SMR). These reflexes are probably mediated by the pudendal nerve and subserved by the sacral spinal cord segments S1-S4. The RAIR is characterized by differential anal relaxation along the anterior–posterior axis, longitudinally along the length of anal canal, and is dependent on the rectal distention volume. Multidimensional analyses demonstrate that there is specific asymmetry in the RAIR. The SMR is a transient anal contraction that is primarily induced by the activation and contraction of the puborectalis muscle in response to sensation of a desire to defecate. It usually overlies the initial relaxation phase of the RAIR, and normally coincides with the onset of a sensation to defecate. The RACR is a primordial reflex that prevents accidental release of rectal contents and is mediated by the pelvic splanchnic and pudendal nerves.

Biophysiologic and Molecular effects of Aging on Neuromuscular Function

In the colons of human patients, age-related neuronal loss is also associated with an increased proportion of abnormal appearing myenteric ganglia with cavities, which may contribute to disturbed colonic motility with aging. Study of inhibitory innervation of human descending colon obtained at surgery has shown an age-related decrease in inhibitory junction potentials, suggesting a decrease in inhibitory nerves, neurotransmitter, density of binding's sites, and alternatively, a possible change in the interaction of inhibitory neurotransmitters with the smooth muscle membrane. Rectal sensory thresholds have been reported to be higher in aged healthy human volunteers, despite absence of changes in colorectal smooth muscle compliance and tone, and age is therefore suggested to be a potential confounding factor when studying rectal sensitivity. It is possible that this observation may point to potential alterations in the normal accommodation reflexes involved in defecation.

The distribution of elastin and collagen has also been found to be increased around the myenteric plexus in the aging human colon, and may affect the ability to accommodate gut contents.

In summary, significant alterations in age-related enteric neuronal structure and function have been observed and could explain some of the disorders seen in the elderly.

Aging is associated with a variety of effects on anorectal function. Healthy elderly women have demonstrated thinning of the internal anal sphincter resulting in decreased resting and maximum squeeze pressure in the anal canal. Thickening of the external sphincter is also observed, but does not correlate with increased continence. In the absence of disease, age-related changes in the sphincter function of aging males appears minimal. Increasing age is also associated with a more positive rectoanal gradient during simulated evacuation and a shorter balloon expulsion time in asymptomatic women. There is an increase in collagen in the colon wall that is accompanied by a decrease in tensile strength,

which may predispose to mucosal herniation, and decreased reservoir function. Age- related reductions in basal and maximum anal sphincter tone, decreased compliance of the rectal vault, reduced rectal sensation, and increased perineal descent also occur.

Constipation and Dyssynergic Defecation

Slow colonic transit and increased frequency of segmenting contractions may result in increased water resorption and hard feces. Decreased fiber intake also predisposes to the production of hard feces and excessive straining. When traditional approaches, including a high fiber diet and over the counter laxatives have not helped, and obstruction, secondary to things such as colon cancer, has been excluded, an assessment of colonic transit time (CTT) with radiopaque markers (ROM) and/or anorectal manometry should be performed. Although widely available, the utility of ROM's in assessing CTT for slow transit constipation (STC) in the elderly is limited. Furthermore, there is significant overlap between STC and dyssynergia with approximately 60% of patients with dyssynergic defecation showing delayed CTT. A newer technology, the wireless motility capsule (WMC), which measures pH, temperature, and pressure, has emerged as a useful test in the evaluation of slow transit constipation. It has better sensitivity compared with ROM (86% versus 28%), and good specificity (89%). A recent study using this modality showed that older constipated patients had slower transit than older healthy controls.

Fecal Incontinence is defined as the involuntary passage of fecal matter through the anus, or the inability to control this discharge. In elderly hospitalized patients, contributing factors to FI include fecal loading (57%), functional disability (83%), loose stools (67%), and cognitive impairment (43%). Contributing factors in both inpatients and outpatients include traumatic anal injury, neurologic deficits, inflammatory conditions, and defecatory disturbances associated with constipation and diarrhea. There is an important connection between FI and urinary incontinence (UI), or dual incontinence, and the strongest association is age older than 80 years, followed by depression, neurologic disease, functional limitation, multiparity, and heavier fetal birth weight.

Constipation plays an integral role in the development of FI, which can result from fecal impaction and subsequent overflow FI, internal anal sphincter incompetence, decrease rectal or anal sensation, and from other structural pelvic floor or anorectal neuromuscular dysfunction caused by prior trauma from surgery or irradiation. Loss of the endovascular cushions, impaired anorectal sensation, poor rectal compliance, compromised accommodation, or neuropathy affecting the pudendal, sacral, spinal, or central nervous system may also contribute to incontinence. Failure to perceive stool in the rectum may produce severe urgency to defecate or leakage of stool, especially when access to toileting is limited. Other problems that are common in the elderly and need more study include neuropathy, excessive perineal descent, rectocele, rectal mucosal intussusceptions and prolapse.

Summary of GERIATRIC CONTINENCE

1. The key mechanisms underlying age-related cellular dysfunction include oxidative damage affecting the nucleotide pool and biochemical pathways associated with cell structure and function, and epigenetic alterations in gene expression that affect the plasticity of senescent cells.

2. In the colons of human patients, age-related neuronal loss is also associated with an increased proportion of abnormal appearing myenteric ganglia with cavities, which may contribute to disturbed colonic motility with aging.

3. Aging is associated with a variety of effects on anorectal function. Healthy elderly women have demonstrated thinning of the internal anal sphincter resulting in decreased resting and maximum squeeze pressure in the anal canal. Thickening of the external sphincter is also observed, but does not correlate with increased continence. In the absence of disease, age-related changes in

the sphincter function of aging males appears minimal.

Clinical Manifestations of Anorectal Problems in the Elderly:

Introduction

Anorectal problems are common and often distressing conditions affecting older adults. Their prevalence increases with age, impacting quality of life and potentially leading to social isolation and depression. Recognizing and effectively managing these problems is crucial for improving the well-being of this vulnerable population. This monograph delves into the complexities of anorectal issues in the elderly, addressing their etiology, clinical presentations, diagnostic approaches, and treatment options.

Common Anorectal Problems in the Elderly

Fecal Incontinence: Loss of bowel control is a significant concern, affecting 10% to 30% of elderly individuals. It can be caused by various factors, including weakened pelvic floor muscles, neurological disorders, and rectal prolapse.

Fecal Impaction: This condition involves hardened stool obstructing the rectum, causing pain, constipation, and overflow incontinence. It is often associated with chronic constipation and inadequate dietary fiber intake.

Chronic Constipation: Difficulty passing stool affects up to 30% of older adults. It can arise from various reasons, including inactivity, medications, and dyssynergic defecation (incoordinated muscle contractions during bowel movements).

Hemorrhoids: Swollen and inflamed veins around the anus or rectum are common, especially in those with chronic constipation or straining during bowel movements. They can cause pain, bleeding, and discomfort.

Anal Fissures: Painful tears in the lining of the anus can develop due to constipation, straining, or trauma. They can lead to chronic pain and bleeding.

Pruritus Ani: Anal itching can be debilitating and have various causes, including poor hygiene, skin conditions, and hemorrhoids.

Malignancy: Bleeding, alternatic constipation and diarrhea, feel of some blockage, occasional mass feel, need to evacuate fease with finger are common manifestations seen in the elderly. They feel it is a age related issue and needs regular examination, sigmoidoscopy, USG-Endo anal to assess the situation and likewise treatment will follow.

Etiology and Risk Factors

Several factors contribute to the development of anorectal problems in the elderly:

Age-related changes: Decreased muscle strength and nerve function, particularly in the pelvic floor, can impair bowel control and rectal emptying.

Chronic conditions: Neurological disorders, diabetes, and chronic constipation can disrupt normal bowel function.

Medications: Certain medications, including opioids, diuretics, and antidepressants, can contribute to constipation and fecal impaction.

Diet and hydration: Inadequate dietary fiber intake and insufficient fluid consumption can lead to constipation and hard stool.

Immobility: Physical inactivity weakens the pelvic floor muscles and slows down digestion.

Cognitive impairment: Dementia or other cognitive impairments can affect the ability to recognize and respond to bowel urges.

Mental health: Anxiety and depression can contribute to altered bowel habits.

Clinical Presentation

The symptoms of anorectal problems in the elderly can be diverse and may vary depending on the specific condition:

Fecal incontinence: Leakage of liquid or solid stool, often unintentional and uncontrollable.

Fecal impaction: Difficulty passing stool, abdominal pain, rectal fullness, and sometimes overflow incontinence.

Chronic constipation: Straining during bowel movements, infrequent bowel movements (less than 3 per week), and hard, lumpy stool.

Hemorrhoids: Pain, bleeding, itching, and prolapse (bulging) around the anus.

Anal fissures: Severe pains, especially during bowel movements, visible tear in the anal lining, and bleeding.

Pruritus ani: Intense itching around the anus, often worsened by scratching.

Diagnosis

A thorough medical history and physical examination are essential for diagnosing anorectal problems. Additional investigations may include:

Digital rectal examination: To assess rectal tone, sphincter function, and presence of masses.

Anoscopy: Visualization of the anal canal and rectum using a small scope.

Proctoscopy: A more detailed examination of the rectum using a longer scope.

Manometry: Measures the pressure and coordination of muscles involved in bowel movements.

Defecography: X-ray study to assess rectal emptying and identify any functional abnormalities.

Laboratory tests: May be needed to rule out underlying medical conditions.

Treatment Options

Treatment approaches for anorectal problems in the elderly should be individualized and tailored to the specific condition and severity of symptoms.

Lifestyle modifications: Dietary changes, increased fluid intake, regular exercise, and managing stress can significantly improve bowel health.

Pelvic floor muscle exercises: Strengthening the pelvic floor muscles can enhance bowel control and reduce incontinence.

Biofeedback: This therapy uses visual or auditory cues to help patients learn to control their pelvic floor muscles.

Medications: Laxatives, stool softeners, and medications for specific conditions like diarrhea or pruritus ani can be helpful.

Surgery: In some cases, surgery may be necessary for conditions like severe hemorrhoids, anal fissures, or rectal prolapse.

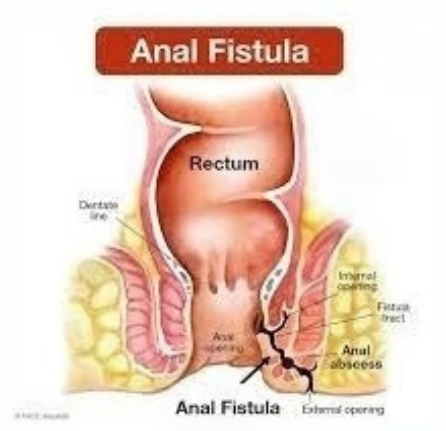
Modern daycare minimal invasive surgical procedures practiced in today's anal canal diseases.

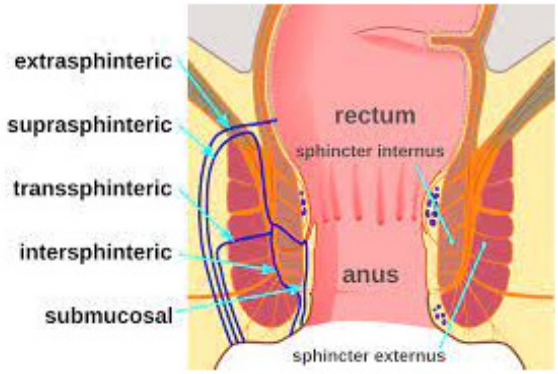
Lasers, DG HAL – RAR, IRC, ULTROID, Anum Anal Sphintrometry, Micro Wave

CONCLUSION

There are exciting advances in our understanding of the physiology and cellular biology of aging and anorectal neuromuscular function. However, much work remains: this includes a better characterization of common disorders and their phenotypes, a better understanding of the clinical factors that contribute to the burden of anorectal disorders, and more knowledge of the underlying genetic, molecular and biologic changes that occur with aging. There is also an urgent need for further longitudinal physiologic, structural, and neurophysiologic studies in women following obstetric trauma and/or pregnancy to better understand the impact of trauma and the aging process. Continued progress in this field, and a clear understanding of what is currently known, will pave the way for more accurate diagnosis and a rational approach to the treatment of these disorders.

"The Author is a senior surgical practitioner and as started a daycare hospital specifically for the anal canal disease i.e. proctology, one of its kind in the Hyderabad which scatters to specific problems and has maximum series of day care surgeries and specifically use of lasers in fistula with high success rate."


Anal Fistula
Rectum
Dentate line
Internal opening
Fistula tract
Anal opening
Anal abscess
Anal Fistula
External opening


extrasphinteric
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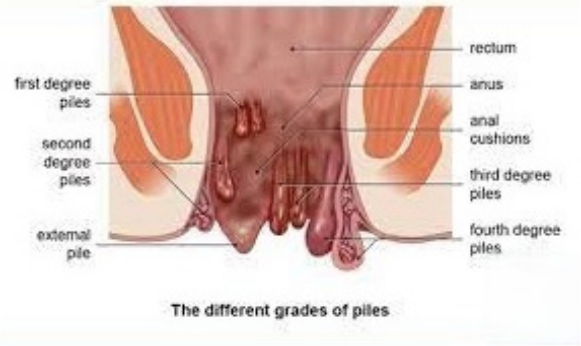
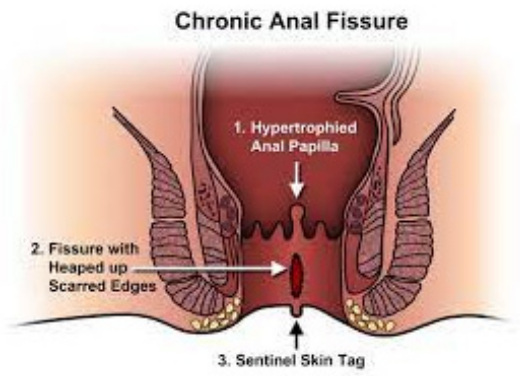
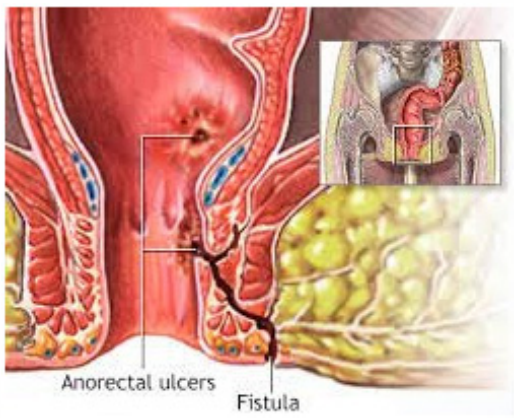
submucosal
rectum
sphincter internus
anus
sphincter externus

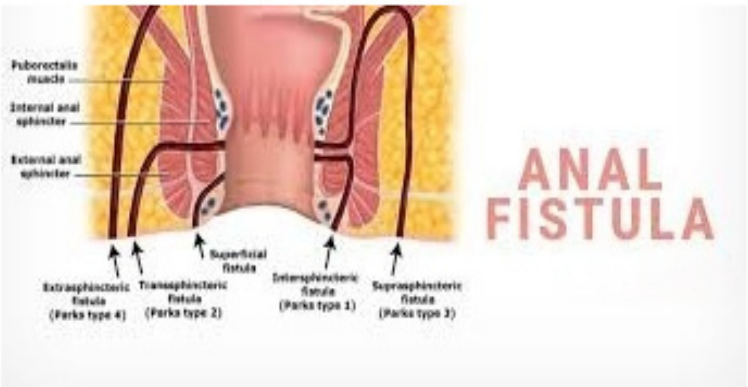

first degree piles
second degree piles
external pile
rectum
anus
anal cushions
third degree piles
fourth degree piles
The different grades of piles


Types of Intrenal Piles or Hemorrhoids
Grade-i
Grade-ii
Grade-iii
Grade-iv


Chronic Anal Fissure
1. Hypertrophied Anal Papilla
2. Fissure with Heaped up Scarred Edges
3. Sentinel Skin Tag


Rectum
Anal Fissure


Anorectal ulcers
Fistula


Puborectalis muscle
Internal anal sphincter
External anal sphincter
Superficial fistula
Extrasphincteric fistula (Parks type 4)
Transsphincteric fistula (Parks type 2)
Intersphincteric fistula (Parks type 1)
Suprasphincteric fistula (Parks type 3)
ANAL FISTULA

Neurological disorders in the elderly

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Neurological disorders in the elderly

Neurological disorders are pervasive across all age groups, presenting with a varying spectrum of diseases from the neonatal to the elderly populations. The burden of neurological disorders is especially high in the elderly, and contribute significantly to mortality and morbidity. These range from the acute events such as stroke, to the chronic progressive neurodegenerative disorders such as Alzheimer disease. It is imperative to diagnose and treat these disorders at the earliest. However, often associated with comorbidities and polypharmacy, their management becomes quite challenging. In this chapter, the author provides a brief overview of the common neurological disorders in the elderly.

Stroke

Stroke is the second leading cause of death, and affects 13.7 million people per year globally. Stroke may be ischemic or hemorrhagic (intracerebral hemorrhage (ICH) or subarachnoid hemorrhage (SAH)). A transient ischemic attack (TIA) is caused by the brief interruption of blood flow without a permanent lesion. While the duration of the deficit is important, currently the identification and description of ischemic stroke is usually tissue-based, whereby a clinically transient attack with evidence of permanent lesion on magnetic resonance imaging (MRI) is considered to be a stroke.

Risk factors

Age is the most important nonmodifiable risk factor for stroke, and the risk of stroke doubles for each successive decade over the age of 55 years. Hypertension is one of the most important modifiable risk factors for both ischemic and hemorrhagic strokes. A general goal of keeping the blood pressure less than 140/90 mmHg (or 150/90 mmHg for frail persons aged 80 years or older) is advisable. Diabetes mellitus and dyslipidemia are other significant risk factors for ischemic stroke.

In the INTERSTROKE study, 10 factors accounted for 91.5% of the population-attributable risk for ischemic stroke worldwide, and it included hypertension, diabetes mellitus, diet, low levels of regular physical activity, high waist-to-hip ratio, psychosocial stress and depression, high apolipoprotein B (ApoB)-to-ApoA1 ratio, cardiac causes (atrial fibrillation), smoking, and high alcohol consumption. Recently focus is also on other possible contributory factors such as sleep apnea, chronic inflammation, and periodontal disease. Appropriate risk factor modification such as hypertension, diabetes mellitus, and hyperlipidemia are useful for primary prevention of stroke.

Clinical features

The clinical presentation of stroke involves the sudden onset of a focal clinical deficit, referable to a specific site in the CNS. Symptoms can include

- Hemiparesis
- Hemianesthesia (numbness on one side of the body)
- Aphasia (language disorder)
- Homonymous hemianopia (loss of the same half of the visual field in each eye)
- Hemispatial inattention

- Ataxia
- Dysphagia, dysarthria

A quick guide for the prompt detection of stroke is BEFAST or FASTER which includes-

- B- Balance
- E- Eyes
- F- Face
- A- Arm
- S- Speech
- T- Time

The diagnosis of stroke requires differentiation from common mimics including migraine, seizures, vestibular disturbances, metabolic disturbances, and functional disorders, and is assisted by neuroimaging.

Etiology of stroke

The TOAST system for ischemic stroke has five major subtypes

- Large artery atherosclerosis
- Cardioembolism
- Small artery occlusion
- Stroke of other determined cause
- Stroke of undetermined cause

Some of the causes of ischemic stroke are-

- Atherosclerosis (artery-to-artery embolism and intracranial atherosclerosis)
- Cardioembolism (atrial fibrillation, left ventricular akinetic segment, infective endocarditis, patent foramen ovale)
- Small vessel disease
- Arterial dissection
- Cerebral vasculitis
- Moyamoya disease
- Antiphospholipid syndrome

Neuroimaging

It is imperative to differentiate ischemic stroke from intracerebral hemorrhage, and brain imaging is the key to diagnosis. The initial imaging modality is usually computed tomography (CT) scan or MRI. CT scan is quicker, whereas MRI is more sensitive for hyperacute changes of ischemic stroke. In addition to its use for diagnosis, brain imaging now has an important role in identifying patients with stroke who are likely to benefit from reperfusion therapies (Figure 1).

Non-contrast CT of the brain has high sensitivity for the detection of intraparenchymal and extra-axial (within the skull but outside the parenchyma) hemorrhage. Traditionally, a CT brain scan excluding hemorrhage in a patient with clinical signs of a stroke has formed the basis of thrombolysis treatment decision making. In some patients it is possible to make a positive diagnosis of stroke based on early ischemic changes such as loss of grey matter–white matter differentiation.

Diffusion MRI becomes abnormal within minutes of ischemic stroke onset. Over the next few hours, further blood–brain barrier injury leads to ionic and vasogenic oedema, which is visible on T2-based MRI sequences. Time of flight magnetic resonance angiography is useful to visualize the vessels. Susceptibility-weighted imaging is highly sensitive for bleeding.

Management

Reperfusion therapies in ischemic stroke

- o Intravenous thrombolysis- two main drugs are available for intravenous thrombolysis- alteplase and tenecteplase. There is a clear clinical benefit (a significant reduction in disability and neutral mortality) with alteplase administration up to 4.5 h after symptom onset.
- o Endovascular thrombectomy- in general, endovascular thrombectomy has few contradictions in patients with a suitable large artery occlusion target and good premorbid function.

Antiplatelet therapy in ischemic stroke

- o Aspirin given acutely within 48 h reduces the risk of recurrent stroke and improves outcome

- The combination of aspirin and clopidogrel started within 12 h of minor stroke and TIA and continued for ~3 weeks reduced the incidence of recurrent stroke in patients
- High-dose, high-potency statins have an established role in preventing recurrent stroke in patients with potential atherosclerotic mechanisms of ischemic stroke
- Management of hypertension is important in stroke, both ischemic and hemorrhagic, although the target blood pressure varies according to the type of stroke
- Management of raised intracranial pressure
- Monitoring of vitals, blood glucose level, electrolytes, metabolic parameters, and supportive and nursing care
- Neurosurgical intervention- in SAH, and other selected cases
- Prevention of early complications- dysphagia assessment, and deep vein thrombosis and pulmonary embolism prophylaxis, prevention of aspiration, and pressure sores
- Physiotherapy and rehabilitation
- Long-term secondary stroke prevention

Epilepsy

Epilepsy is the third most common neurological disorder in older people (aged >65 years) after stroke and dementia. Given the shifts in demographics, the number of older people who develop epilepsy is set to rise substantially worldwide and in high-income countries, epilepsy incidence is already highest in those older than 65 years. People aged older than 65 years represent the fastest growing age group globally. People who developed epilepsy at a young age (<18 years) are now living longer, meaning that in the future, epilepsy prevalence in older people will escalate.

The most optimal to definition of late-onset epilepsy appears to have an age cut-off of 65-70 years. Epilepsy incidence is highest in the youngest and oldest age groups. Incidence increases steadily after 50 years of age, with the greatest incidence in people aged older than 75 years (Figure 2). There is a bimodal distribution to the incidence of epilepsy, with the rate being highest in older adults, not children.

Causes of new-onset epilepsy in older people

The causes of epilepsy vary across the lifespan. In the older population the most common cause of epilepsy is stroke, which constitutes the underlying pathology in almost half of the cases (Figure 3). Dementia is also an important substrate for seizures. Genetic epilepsy, relatively common in earlier life, is rare for those older than 65 years.

Diagnosis of epilepsy

Most seizures in this age group are focal in origin and often do not conform to a typical presentation. In younger people, there is a preponderance of temporal lobe seizures. In older people, most seizures are of extratemporal onset, diverse in semiology, and convulsions are relatively rare. An atypical seizure presentation and lack of awareness that an unusual episodic event might be ictal in origin can delay diagnosis.

Paroxysmal confusion or episodes of behavioral arrest in an older adult should always lead to a suspicion of seizures. Likewise, non-convulsive status epilepticus, a condition associated with high morbidity in older people, should be suspected in those who present with confusion, fluctuating awareness, and behavioral changes. Persistent headache or disorientation after an episode of impairment of consciousness are suggestive of a seizure, as are stereotypical events.

The most common differential diagnoses of a potential seizure in older people include conditions that cause episodes of impairment of consciousness or alterations of mental state. Recurrent focal seizures are often misdiagnosed as transient cerebral ischemia, particularly if the stereotypical nature of the symptoms is not recognized. Differentiating between syncope,

fluctuating cognitive impairment, migraines, delirium, or impairment of cerebral circulation are essential. Multi-comorbidity and polypharmacy are the norm in the older age group and present further diagnostic challenge.

Investigations

- Basic blood work (complete blood count, urea, creatinine, electrolytes, liver function tests, and glucose)
- Brain imaging (CT or MRI)
- Prolonged electroencephalogram (EEG) and electrocardiogram recording
- Older people with explosive-onset epilepsy (sudden emergence of frequent seizures, up to several times daily, with no background history of a seizure disorder), particularly if associated with substantial cognitive and psychological comorbidity, should be screened for autoantibodies- especially LGI1, CASPR2, and paraneoplastic antibodies- in their serum and cerebrospinal fluid.

Management

Mainstay of management for older people with epilepsy is antiseizure medication. It has been argued that even a single unprovoked seizure in people aged older than 65 years might warrant initiation of an antiseizure medication owing to the enduring propensity of the underlying pathology (stroke or dementia) to generate further seizures (Figure 4). Treatment is usually required after a first unprovoked seizure in the presence of a brain lesion or epileptiform abnormalities. For a first unprovoked seizure of unknown origin, the decision to treat should be individualized, after the evaluation of the vital risk induced by comorbidities, the increased risk of status epilepticus in elderly population, the risk of serious injuries especially bone fracture in osteoporotic patients, and the potential adverse events of antiepileptic drugs.

The choice of an appropriate antiseizure medication in older people is more restricted than for younger people, owing to potential side-effects and interactions with concomitantly taken medication (Table 1). Older antiseizure medications, such as carbamazepine and phenytoin, should probably be avoided owing to their effects on bone health, lipid metabolism, balance, and their propensity to enzyme induction.

Newer antiseizure medications-

- Lamotrigine has a limited effect on cognition in older people and offers a possible mood-stabilizing effect. Lamotrigine was, however, associated with a lower probability of seizure freedom than levetiracetam.
- Given levetiracetam's favorable pharmacological profile and low potential for drug interactions, it can be a beneficial drug for older people. Side-effects from levetiracetam in older people include difficulty concentrating, drowsiness, depression, and altered behavior (agitation and irritability).
- Brivaracetam, gabapentin, perampanel, and topiramate might be efficacious and tolerated in older people.

Antiseizure medications can sometimes adversely affect cognition. Older people taking antiseizure medication polytherapy had, on average, more cognitive deficits than those taking a single drug, whereas those on monotherapy had similar outcomes to people with mild cognitive impairment.

The incidence of status epilepticus is greater in older people, mortality associated with status epilepticus also increases with age, with highest occurring in those aged 85 years or older. Sudden unexpected death in epilepsy is another important cause of death in those with epilepsy and is underestimated in older people.

Dementia

Dementia is any disorder where significant decline from one's previous level of cognition causes interference in occupational, domestic, or social functioning. Generally, dementia should be

considered to be an acquired syndrome, with multiple possible causes, rather than a specific disease itself. A classic way to conceptualize dementia is to consider 2 broad categories of disease- those that are "neurodegenerative" and non-neurodegenerative (many being potentially "reversible") (Table 2). The DSM-5th edition has created two diagnostic classifications based on the severity of the cognitive syndrome, Mild and Major Neurocognitive Disorder.

Epidemiology

There have been significant advances in the determination of prevalence and incidence of dementia, especially Alzheimer disease (AD), over the past decades. The prevalence of dementia doubles every 5 years in individuals between the ages of 65 and 85 and continues increasing after age 90. It is estimated that, globally, 4.7 million individuals aged 65 years or older have AD. The age-standardized prevalence of dementia ranges from 5% to 7% in most countries. The rates have increased in Africa and Asia over the last few years. Dementia, especially AD, is present in all populations around the world. 58% of the individuals with dementia are living in low-middle income countries. Dementia has been increasingly reported as a common cause of death in older adults in industrialized and nonindustrialized countries.

Clinical and neuropathologic studies have shown that cerebrovascular disease is considered the second most common cause of dementia in the elderly. It is traditionally recognized that vascular dementia (VaD) can develop after a single or multiple strokes and can have a stepwise progression. However, VaD can also develop in individuals without clinical strokes and have a gradual progression, and can have concomitant AD. The prevalence and incidence of VaD tend to be higher in Asian than in Western populations.

Frontotemporal dementia (FTD) is characterized by behavioral, executive, and language deficits, and is considered the third most frequent form of neurodegenerative dementias across all age groups. FTD accounted for 2.5% of the dementias across all age groups, and 10.2% in those aged <65 years. Dementia with Lewy bodies (DLB) is considered the second most frequent form of neurodegenerative dementia in the elderly. The prevalence of DLB range from 0.3% to 24% in the general population, and 3%–7% of the patients with dementia were found to meet criteria for DLB.

Clinical and diagnostic evaluation

The initial evaluation and diagnosis of dementia should include at least the following 4 elements-

- Thorough clinical history
- Neurological examination, with an emphasis on the assessment of mental status
- Selective labs to screen for selected metabolic/ physiologic abnormalities (eg, basic chemistries, thyroid panel, vitamin B12)
- A structural brain scan, with MRI preferable to CT scan

In certain patients, sending serological studies like antinuclear antibody, erythrocyte sedimentation rate, Treponema pallidum antibody or venereal disease research laboratory, HIV serology, and heavy metal screen are warranted.

Emphasis in the clinical interview should be placed on determining the pace of symptom onset (eg, sudden vs gradual) and symptom progression (eg, decline over months, or over years). For example, human prion diseases, such as Creutzfeldt-Jakob disease, typically have a rapid progression over weeks to months. Diseases like Alzheimer disease and frontotemporal lobar degeneration, on the other hand, usually progress gradually over years (Table 3).

A detailed mental status examination should assess multiple domains of mental function, including basic attention, memory, visuospatial abilities, executive function, and socio-behavioral aptitude (Table 4). The 30-point Mini-Mental Status Examination remains a helpful tool to screen for and assess dementia severity, although it is probably less informative in some populations,

like high functioning elders and those with low formal education. Other tests, like the Montreal Cognitive Assessment, offer a broader assessment of cognitive domains and can be more sensitive. Further testing, including neuropsychological evaluation, may be helpful.

Along with the MRI, neuroimaging in dementia comprises positron emission tomography (PET) scan. PET may be used to detect amyloid and tau, in addition to the FDG-PET which detects areas of hypometabolism corresponding to cortical dysfunction. CSF determination of amyloid and tau abnormalities acts as important biomarker in dementia, assisting in an early diagnosis. The measurement of blood amyloid and tau protein levels also has the potential to be used as a biomarker to confirm the clinical diagnosis of AD as the cause of the dementia syndrome.

Alzheimer Disease

Alzheimer disease is the most common neurodegenerative dementia from middle age to the elderly. Alzheimer disease has a prevalence of 5%-6% of all individuals age 65 years and above, and up to 30% in those over age 85 years. The disease typically begins with slowly progressive memory decline, although behavioral, visuospatial, or language symptoms dominate in less common variants. The mean survival after symptom onset in Alzheimer disease tends to be 10-12 years.

Current models of Alzheimer disease include a "preclinical" stage, which is characterized by the gradual accumulation of neuritic plaques and neurofibrillary tangles, beginning at least 20 years prior to symptom onset. Early on patients may show subtle forgetfulness or occasionally repeat stories and can also exhibit irritability, apathy, or low mood. Patients or family members often first notice symptoms before any functional decline occurs, a stage that has been termed mild cognitive impairment (MCI).

As the disease advances, brain MRI can show medial temporal lobe atrophy, involving the hippocampi and surrounding structures (Figure 5). An FDG-positron emission tomography (PET) scan classically shows bilateral temporoparietal hypometabolism, and amyloid-PET reveals plaque deposition in multiple regions.

Management

Cholinesterase inhibitors (donepezil, rivastigmine, galantamine) and N-methyl-d-aspartate receptor antagonist (memantine)- although they do not alter the overall course of decline, these medications may improve cognitive and behavioral symptoms. Management of the behavioral and psychological symptoms are equally important.

Evidence suggests that regular aerobic exercise, adherence to a Mediterranean-style diet, and participation in socially and cognitively stimulating activities can decrease one's risk of Alzheimer disease and impact the rate of progression along the disease continuum.

Lecanemab and aducanumab- these are monoclonal antibodies that target amyloid beta (Aâ) to help reduce amyloid plaques, which are the pathologic hallmark of Alzheimer disease. Although approved for use, data regarding their safety and efficacy is still getting updated.

Reversible dementia

Reversible dementia is caused by a readily treatable and potentially curable underlying disease (Figure 6). The prevalence of reversible dementias is difficult to estimate because many go undetected, but it is thought to range from 5% to 40%, with a decreasing likelihood of full reversibility with advancing age. One person may have multiple reversible and irreversible causes of memory loss and functional impairment, so it is important to be thorough in the evaluation stage of disease management. Many of the treatable causes of dementia can be excluded clinically with a good history and physical examination that includes a comprehensive geriatric assessment; however, most people who present with cognitive impairment should at least have basic laboratory work and imaging. It is essential to detect such a cause as it is potentially treatable.

Rapidly progressive dementia

Rapidly progressive dementia (RPD) denotes a cognitive disorder with fast progression leading to the clinical syndrome of dementia within a relatively brief time period, which is commonly considered to be less than either 1 or 2 years. This rather vague definition encompasses a large group of heterogeneous disorders, including immune- mediated, infectious and metabolic encephalopathies, as well as prion diseases and atypically rapid presentations of other neurodegenerative diseases (Figure 7). According to a Brazilian study from a tertiary care centre, 3.7% of all patients referred to a neurological unit over 3 years were diagnosed with RPD. In other single- centre studies, around one- quarter of hospitalized patients with dementia were classified as RPD (24% in Greece and 27% in India). As RPD is one of the typical clinical characteristics of Creutzfeldt–Jakob disease (CJD) and has long been part of the diagnostic criteria for this condition, prion diseases have been considered to be prototypical RPDs. However, the growing recognition of immune- mediated encephalitis, rapidly progressive subtypes of classic dementias such as Alzheimer disease and various other mimics of prion diseases demands a thorough consideration of differential diagnoses, especially potentially reversible conditions. Although general definitions usually consider less than 1 or 2 years as the time span from the first disease- related symptom to development of the dementia syndrome, some causes of RPD, such as encephalitis or metabolic encephalopathies, can lead to dementia within weeks. Moreover, the potential infectivity of some diseases underlying RPD, such as HIV or prion diseases, must be considered as a matter of public health.

Parkinson disease

Parkinson disease (PD) is the second most common neurodegenerative disease, with a global prevalence of more than 6 million individuals. This results from a 2.5-times increase in prevalence over the past 30 years, making PD one of the leading causes of neurological disability. Age is the most important risk factor for developing PD. In industrialized countries the estimated prevalence of PD is 0.3% in the general population, 1.0% in people older than 60 years and 3.0% in people older than 80 years; incidence rates of PD are estimated to range between 8 and 18 per 100 000 person-years.

The pathological hallmark of PD consists of neural inclusions in the form of Lewy bodies and Lewy neurites, with cell loss in the substantia nigra and other brain areas. Given that aggregated and misfolded á-synuclein species are the major constituents of Lewy bodies, Parkinson's disease is classified as a synucleinopathy. A strong genetic component to disease risk has been identified, with more than 90 associated loci.

Clinical features

The term "parkinsonism" refers to a clinical syndrome, including bradykinesia, cogwheel rigidity, resting tremor, a slow shuffling gait, and imbalance. The most common cause of parkinsonism is PD but there is a lengthy differential diagnosis and the challenge is to determine if the patient has PD or another cause of parkinsonism such as

- Atypical parkinsonian syndrome (dementia with Lewy bodies (DLB), multiple system atrophy (MSA), progressive supranuclear palsy (PSP), corticobasal degeneration (CBD))
- Secondary parkinsonism (drug induced, vascular, toxic, neoplastic, infective, normal pressure hydrocephalus, trauma)

There are four cardinal features of PD that can be grouped under the acronym TRAP-

- T- Tremor at rest
- R- Rigidity
- A- Akinesia (or bradykinesia)
- P- Postural instability

In addition, flexed posture and freezing (motor blocks) have been included among classic features of parkinsonism, with PD as the most common

form.

Motor features

Bradykinesia refers to slowness of movement and is the most characteristic clinical feature of PD. The initial manifestation is often slowness in performing activities of daily living and slow movement and reaction times. Other manifestations of bradykinesia include loss of spontaneous movements and gesturing, drooling because of impaired swallowing, monotonic and hypophonic dysarthria, loss of facial expression (hypomimia) and decreased blinking, and reduced arm swing while walking.

Rest tremor is the most common and easily recognized symptom of PD. Tremors start unilateral, occur at a frequency between 4 and 6 Hz, and almost always are prominent in the distal part of an extremity. Hand tremors are described as supination–pronation ("pill-rolling") tremors that spread from one hand to the other. Rest tremor in patients with PD can also involve the lips, chin, jaw and legs but, unlike essential tremor, rarely involves the neck/head or voice. In addition to rest tremor, many patients with PD also have postural tremor.

Rigidity is characterized by increased resistance, usually accompanied by the ''cogwheel'' phenomenon, particularly when associated with an underlying tremor, present throughout the range of passive movement of a limb. Rigidity may be associated with pain, and painful shoulder is one of the most frequent initial manifestations of PD although it is commonly misdiagnosed as arthritis, bursitis, or rotator cuff injury. In addition, rigidity of the neck and trunk (axial rigidity) may occur, resulting in abnormal axial postures (anterocollis, scoliosis). Postural deformities resulting in flexed neck and trunk posture and flexed elbows and knees are often associated with rigidity. Other skeletal abnormalities include extreme neck flexion ("dropped head" or "bent spine''), truncal flexion (camptocormia) and scoliosis.

Postural instability due to loss of postural reflexes is generally a manifestation of the late stages of PD and usually occurs after the onset of other clinical features. The pull test, in which the patient is quickly pulled backward by the shoulders, is used to assess the degree of retropulsion. Postural instability (along with freezing of gait) is the most common cause of falls in PD.

Nonmotor symptoms

Non-motor symptoms are a common and underappreciated feature of PD. These include autonomic dysfunction, cognitive/ neurobehavioral disorders, sensory and sleep abnormalities.

- Cognitive / neurobehavioral- Mild cognitive impairment, executive dysfunction, dementia, hallucinations, delusions, depression, anxiety, fatigue, apathy
- Autonomic- Constipation, neurogenic bladder, orthostatic hypotension, erectile dysfunction, diaphoresis, drooling, dysphagia
- Sleep- REM behavioral disorder, insomnia, excessive daytime sleepiness, restless legs syndrome, periodic limb movements of sleep
- Sensory- Pain, frozen shoulder, hyposmia

The nonmotor symptoms cause significant disability, and should be adequately managed in patients of PD.

Prodromal disease

Several non-motor symptoms associated with PD, such as smell loss or constipation, are commonly reported by patients before the onset of classic motor symptoms—sometimes preceding the occurrence of motor features by years or even decades. The period when these symptoms arise has been conceptualized as the prodromal phase of Parkinson's disease (Figure 8), corresponding to a stage of disease when neurodegenerative changes involve extranigral sites, such as the lower brainstem, the olfactory bulb and tracts, and the peripheral autonomic nervous system. Identification of prodromal disease is required,

given that future disease-modifying therapies will have their greatest chance for success at this stage. An even earlier period when future patients are still free of any symptoms, but disease-specific pathology is assumed to be present and there is biomarker evidence of disease, has also been postulated for Parkinson's disease (termed preclinical Parkinson's disease). In addition to non-motor symptoms, subtle motor signs such as decreased facial mobility, voice changes, loss of finger dexterity, a mildly stooped posture, or decreased arm swing when walking might also antedate the evolution of definitive motor symptoms. However, such mild parkinsonian signs might be difficult to distinguish from unspecific mobility changes associated with normal ageing.

Atypical Parkinsonism

The atypical parkinsonism or "Parkinson-plus" syndromes are diseases that accompany Parkinson's disease under the broader heading of "parkinsonism". The primary atypical parkinsonism are dementia with Lewy bodies (DLB), multiple system atrophy (MSA), progressive supranuclear palsy (PSP), and corticobasal degeneration (CBD). DLB and MSA are synucleinopathies. PD and pure autonomic failure also fall under the synucleinopathy umbrella. PSP and CBD are tauopathies and part of the frontotemporal dementia (FTD) spectrum of diseases. Atypical parkinsonism should be in the differential diagnosis each time a clinician evaluates an individual with parkinsonism. Red flags for atypical parkinsonism include presence of characteristics not common in PD (with "plus" symptoms varying by atypical parkinsonism), progression faster than expected for idiopathic PD, and lack of a robust response to dopaminergic medication, particularly levodopa. The reliance on longitudinal clues (progression over time, response to medication) means that diagnosis of an atypical parkinsonism can be difficult at the initial visit. For some patients, however, history and physical examination suggest an atypical parkinsonism at first presentation.

Multiple system atrophy (MSA) is a neurodegenerative disorder characterized by autonomic failure and parkinsonism and/or cerebellar signs. Motor signs of MSA include an akinetic-rigid parkinsonism, with – differently from PD – a symmetric distribution and no or minimal response to levodopa; pyramidal signs (extensor plantar responses and hyperreflexia), cerebellar signs. Depending on the predominant symptom, MSA can be classified as MSA-P (Parkinsonian type) and MSA-C (cerebellar type).

The classic PSP phenotype is known as Richardson syndrome; it usually presents with an axial akinetic-rigid parkinsonism with no or mild response to levodopa, postural abnormalities (head and trunk hyperextension/ retrocollis), gait abnormalities (broad-based gait and freezing), postural instability and falls since an initial stage of the disease (rather than in a later stage as in PD). The typical sign of PSP is the supranuclear palsy of vertical gaze; other oculomotor dysfunction signs include slowing of vertical saccadic movements (especially downward).

The common features of corticobasal degeneration (CBD) are asymmetric rigidity and bradykinesia together with dystonia and myoclonus, and apraxia and other cognitive deficits. A characteristic sign of CBD is the 'alien limb phenomenon', reported by approximately 50% of patients- the limb may involuntarily assume positions, grab objects, or interfere with the actions of the unaffected limbs.

The core clinical features of DLB include cognitive decline with fluctuations in alertness and attention, parkinsonism, visual hallucinations and RBD. Importantly, cognitive impairment begins before, simultaneously, or within 1 year of onset of parkinsonism.

Investigations

In the practical setting, the diagnosis of PD and atypical parkinsonism is mostly clinical (Table 5), assisted by neuroimaging. Detailed autonomic, cognitive, and behavioral assessments are essential. When a secondary parkinsonism is suspected, additional investigations are required according to the list of differential diagnosis.

MRI brain is useful in secondary and atypical parkinsonism (Figure 9). The characteristic features of MSA-P are atrophy of the putamen with a bilateral "putaminal rim sign", which represents a T2 hyperintense border of the dorsolateral putamen. Atrophy of the middle cerebellar peduncle, the cerebellum, and the pons, and the hot-cross bun sign indicating T2 hyperintensity of the pons are the main characteristic features of MSA-C. Based on the atrophy pattern occurring primarily in the midbrain in PSP, special signs that can be visualized on conventional MR imaging can be defined. Sagittal sequences through the brain stem and mesencephalon make it possible to detect the hummingbird sign. An axial slice of the tegmentum of the midbrain in corresponding sequences reveals laterally pronounced volume loss in this region, resulting in a silhouette resembling Mickey Mouse in the midbrain. Additionally, functional neuroimaging can detect striatal dopaminergic denervation using SPECT (^{123}I-FP-CIT-SPECT), or PET (^{18}F-Dopa-PET) scans. ^{18}FDG-PET can detect hypometabolism.

Management

Levodopa- Levodopa coupled with a DOPA decarboxylase inhibitor (carbidopa) is the most effective therapy for PD, and is also used in atypical parkinsonism, although its effect in the latter may be restricted. Initiation of therapy begins with a pill containing 25 mg of carbidopa and 100 mg of levodopa (25/100) titrated up to at least 3 times a day. Other considerations with the initiation of levodopa therapy include side effects such as dizziness and gastrointestinal (GI) upset. Protein intake reduces levodopa efficacy by competing with its transport ultimately into the brain, and patients should be aware of this when eating meals containing high-protein loads. With advancing disease, levodopa dosing is increased in both dose strength and frequency. As these doses increase other side effects such as hallucinations, delusions, motor complications including levodopa-induced dyskinesia, and orthostatic hypotension become more common.

Dopamine agonists- Dopamine agonists mimic the effect of dopamine at the dopamine receptor. They have the benefit of less frequent dosing with pramipexole and ropinirole dosed 3 times a day or once a day if the long-acting preparation is used.

Catechol-O-methyl transferase inhibitors (entacapone)- This class of medication inhibits the metabolism of both levodopa and dopamine, therefore prolonging the action of each.

Monoamine oxidase B inhibitors- These medications impair the metabolism of dopamine and include selegiline, rasagiline, and safinamide. As a class they reduce wearing-off when added to levodopa.

Amantadine- Amantadine has a mild anti-parkinsonian effect but is more often used to reduce levodopa-induced dyskinesia (LID)

Deep brain stimulation- In a patient whose motor fluctuations are refractory and in those with poorly controlled disabling tremor, stimulation of deep structures of the brain offers significant relief.

Neuropathy

The presence of peripheral neuropathy in people aged over 65 years contributes significantly to morbidity, especially by the frequency of falls, but also by the existence of pain, deformity of the feet, amputations, and skin ulcerations. The prevalence of peripheral neuropathies in adults is between 3.3% and 8% beyond 55 years; it increases with age and doubles if there is a potential etiological factor such as diabetes, vitamin deficiencies, autoimmune diseases, toxic drugs. Between 60 and 74 years, the prevalence is 22%, but drops to 7% if diabetes and carbohydrate tolerance are eliminated. In this population, the proportion of polyneuropathies with a defined etiological diagnosis is 73 to 90%.

Clinical features

Sensory symptoms (eg, numbness, tingling), weakness, autonomic symptoms (eg, early satiety, impotence, orthostatic hypotension, sweat abnormalities), or neuropathic (burning, stabbing, electrical) pain may suggest the presence of a peripheral neuropathy. Once a neuropathy is

suspected (from patient history or screening examination in at-risk patients), the clinical history and a detailed examination (including strength, sensation, reflexes, and gait) allow the neuropathy to be categorized by either clinical symptom distribution (length dependent, length independent, or multifocal), or by which clinical modality is affected (motor, sensory, autonomic, or some combination).

The most common pattern of clinical involvement is that of a length-dependent peripheral neuropathy. This form of neuropathy is symmetric, and symptoms begin in the longest nerves at their terminals (ie, distal foot). Negative (lack of feeling) or positive (prickling, tingling, burning) sensory symptoms usually precede motor weakness. The symptoms ascend insidiously up the leg, with hand symptoms often becoming evident around the time leg symptoms approach the knee (stocking and glove pattern).

Diabetic neuropathies

The prevalence of diabetic neuropathy increases with time and poor glycemic control. The prevalence of peripheral neuropathy in patients with type 2 diabetes is 26.4%. One in two diabetics will develop peripheral neuropathy and beyond 25 years of diabetes duration, the incidence of neuropathy is 50%. Several types of neuropathies can be observed in diabetes. The most common is a symmetrical distal sensory polyneuropathy, associated with dysautonomic signs. This neuropathy can be progressive or remain relatively stable for years. Other types of neuropathies, such as distal and symmetrical sensorimotor polyneuropathy, multiple mononeuropathy, truncal radiculopathy, plexopathy, proximal motor neuropathy, can be observed. The involvement of the cranial nerves is not uncommon, especially the oculomotor nerves, which occurs in 1% of diabetic patients, an age-dependent phenomenon occurring in the elderly with longstanding diabetes. A small proportion of patients, generally over 50 years of age, have a more or less symmetrical proximal neuropathy of the lower limbs, with motor deficit and amyotrophy. This is usually accompanied by a clear weight loss. These neuropathies are often associated with inflammatory vasculitis at nerve biopsy. Screening is desirable (annual practice of a few simple electrophysiological clinical tests, especially to detect signs of autonomic damage), as the complications of this neuropathy are responsible for 50 to 75% of non-traumatic amputations worldwide.

Other causes of neuropathy

- Chronic inflammatory polyradiculo-neuropathies or CIDP
- Neuropathies associated with monoclonal gammopathy of undetermined significance (MGUS)
- Neuropathies by primary or secondary vasculitis- In a series of 100 patients older than 65 years with disabling neuropathy, vasculitis was found in 23% of cases. Thus, in the elderly patient, with a recent, multifocal, and progressive neuropathy, a neuromuscular biopsy should be considered to diagnose vasculitis. Secondary vasculitis can be observed in other conditions such as cryoglobulinemia associated with hepatitis C virus, human immunodeficiency virus, or cytomegalovirus infections.
- Paraneoplastic neuropathies- Subacute sensory neuropathy is the most typical, most often related to small-cell lung carcinoma and associated with the presence of anti-Hu antibodies
- Alcoholic and nutritional neuropathies- They are considered frequent in the elderly. Approximately 15% of subjects over 60 years of age have vitamin B12 deficiency with or without abnormal blood count, most often as a result of malabsorption. Half of these patients have moderate sensory polyneuropathy.
- Uremic polyneuropathies- These are one of the most common neurological complications of chronic renal failure in the

dialysis population. It is primarily an axonal length-dependent neuropathy, followed by secondary segmental demyelination.

Other disorders

The diseases described here form the majority of neurological disorders in the elderly. However, the list is quite long and several other disorders are encountered in this age group, which is beyond the scope of discussion in the current chapter. Importantly, pain and balance disorders constitute important aspects leading to significant disability. The imbalance and falls in the elderly are often multifactorial. The concept of presbystasis has been introduced in this regard. Pain in the elderly is also multifactorial. Neck pain and low back pain significantly impairs functional ability of the patients and contribute to a reduced performance of daily activities.

Conclusion

With the demographic shift and increased life expectancy, the elderly population is increasing. The elderly age group is vulnerable to several neurological disorders, both acute and chronic. Early identification and management are imperative for a good outcome. Accordingly, increase in the awareness of these disorders is essential. Hence, these neurological disorders form an important aspect in the care of the elderly population.

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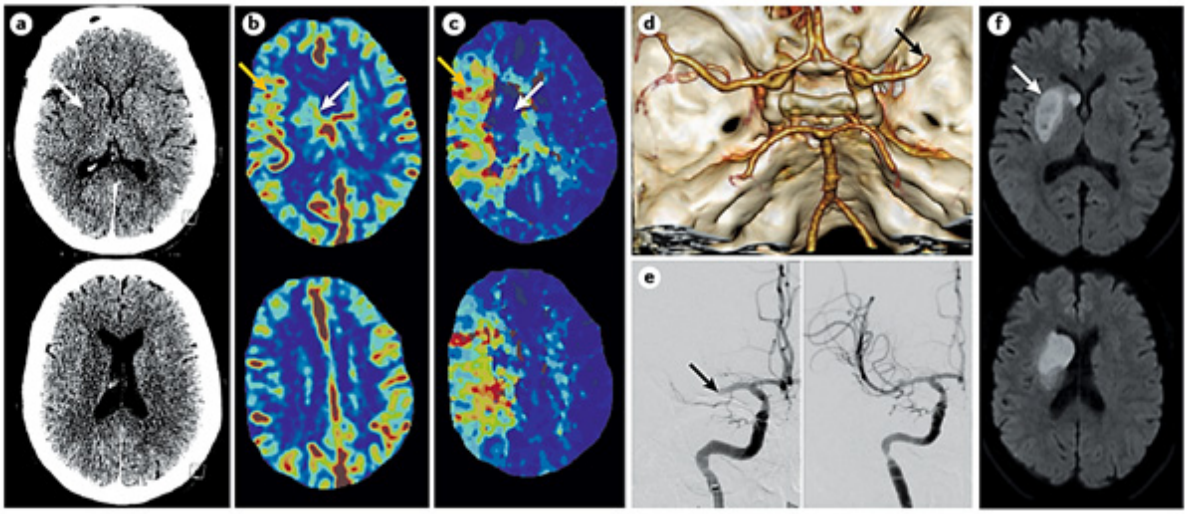

Figure 1 : **Brain imaging to diagnose ischaemic stroke and identify salvageable brain tissue.**[1] Imaging from a 66-year-old woman presenting with left hemiparesis, dysarthria and inattention 16 h after she was last seen to be healthy. Non-contrast CT (panel **a**) showing loss of grey–white differentiation in the right basal ganglia (white arrow) indicating proximal right middle cerebral artery occlusion at some stage. However, CT perfusion processed with RAPID (iSchemaView , Menlo Park , CA , USA) automated software (panels **b**,**c**) demonstrates reperfused basal ganglia (white arrows) with increased cerebral blood flow (panel **b**) indicating post-reperfusion hyperperfusion. In the right middle cerebral artery (MCA) territory (yellow arrows), time to maximum (Tmax) (panel **c**) shows delayed arrival of contrast (retrograde via collateral vessels). The preservation of cerebral blood flow (panel **b**) within the region of delayed Tmax indicates likely salvageable ischaemic penumbra. CT angiography (panel **d**) and digital subtraction catheter angiogram (panel **e**) confirm occlusion of the right MCA (at the distal M1 segment, black arrows). The patient had successful endovascular thrombectomy with reperfusion 2 h after the CT perfusion. MRI diffusion (panel **f**) the following day shows the expected infarct in the basal ganglia (white arrow) with salvage of the cortical regions.[1]

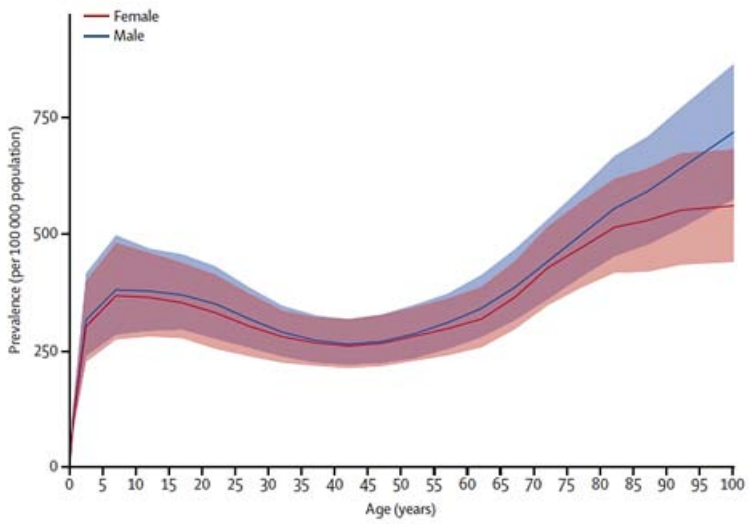

Figure 2 : **Incidence and prevalence of epilepsy across the lifespan**.[6] There is a bimodal distribution to the incidence of epilepsy, with the rate being highest in older adults, not children.

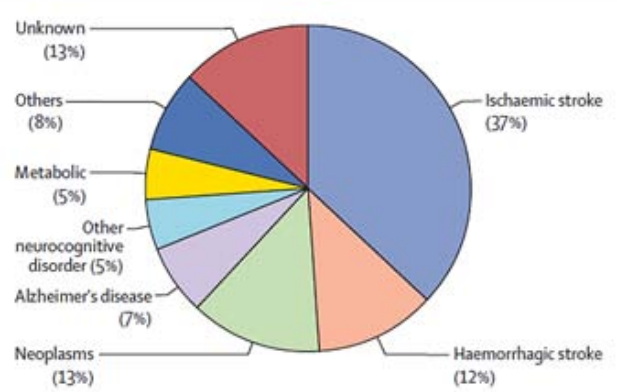

Figure 3 : Causes of new-onset epilepsy in older people[6]

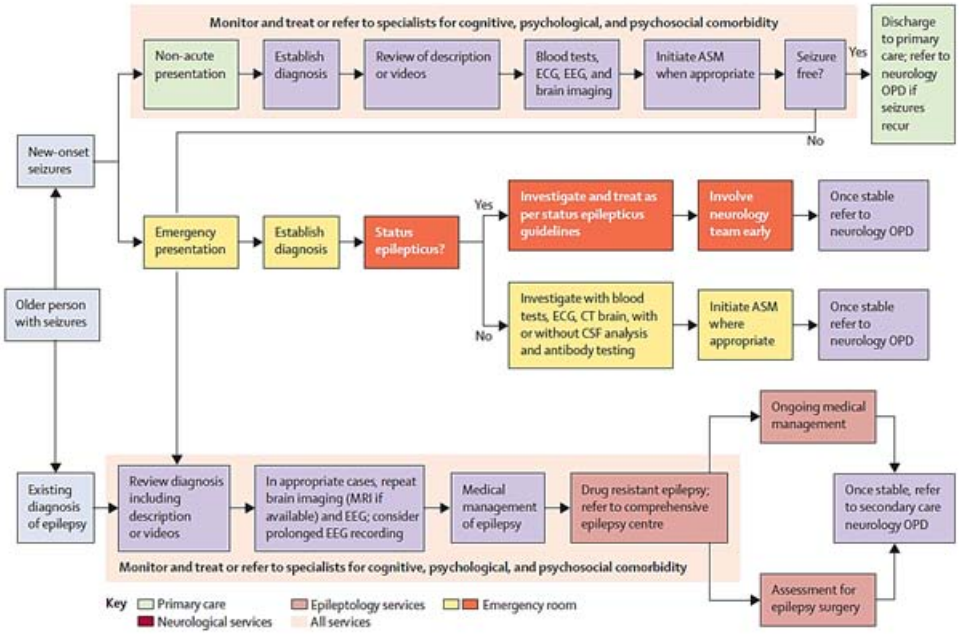

Figure 4 : Optimising care pathways for epilepsy in older people[6]

Table 1 Antiseizure medication in older people[6]

Antiseizure medication	Potential effect on cognition	Potential effect on mood	Specific considerations in older people
Brivaracetam	Usually cognitively neutral	Might have adverse effects on mood	Not enzyme inducing, few drug–drug interactions
Carbamazepine	Cognitive side-effects can be more marked in older people	Mood stabiliser	Enzyme inducing: high propensity for drug–drug interaction; side-effect of dizziness can lead to falls; negative effects on lipid metabolism and can increase cardiac markers; enzyme inducing medications can have greater adverse effect on bone health than other antiseizure medications
Clobazam	Might be associated with cognitive slowing	Generally neutral; occasional adverse effect on mood, especially in patients with learning difficulties	Drowsiness is main side-effect
Gabapentin	Usually cognitively neutral	Can be anxiolytic and benefit mood	Lack of drug–drug interaction
Lamotrigine	Usually cognitively neutral	Mood stabiliser	Risk of rash around 1:30; can be associated with insomnia, vivid dreams, and nightmares; might associate with tremor
Levetiracetam	Usually cognitively neutral	Can have adverse effects on mood (irritability, anxiety, low mood)	Lack of drug–drug interaction
Lacosamide	Usually cognitively neutral	Generally thought to have a benign psychological profile, but can occasionally have adverse effects on mood	Possibility of palpitations and prolongation of PR interval (all patients); rarely atrial fibrillation and atrial flutter (usually with higher intravenous loading of drug); check electrocardiogram before initiating
Oxcarbazepine	Can be associated with hyponatraemia which could result in confusion, apathy, and lethargy	Probably no substantial adverse effect on mood	Enzyme-inducing agent; enzyme-inducing medications can have greater adverse effect on bone health than other antiseizure medications; dizziness could result in falls
Perampanel	Likely to be cognitively neutral	Can have adverse effects on mood with risk of unusual thoughts especially at higher doses	Few drug–drug interactions

Phenytoin	Can be associated with adverse effects on cognition	Can sometimes have adverse effects on mood	Narrow therapeutic window; extensive drug–drug interactions (eg, apixaban); negative effects on lipid metabolism and cardiac markers; dizziness can result in falls; enzyme-inducing medication can have greater adverse effects on bone health than other antiseizure medications
Sodium valproate	Can affect cognition; also hyperammonaemic encephalopathy	Mood stabiliser	Thrombocytopenia; weight gain; tremor, especially at higher doses
Topiramate	Can have adverse effects on cognition; word-finding difficulty in particular	Can have adverse effects on mood	Nephrolithiasis; weight loss; complex side-effect profile

Table 2 Dementia Syndromes[8]

Neurodegenerative	Non-neurodegenerative
Alzheimer disease	Vascular dementia
Frontotemporal lobar degeneration	Normal pressure hydrocephalus
Dementia with Lewy bodies	Toxic causes
Parkinson disease dementia	Infectious causes (syphilis, HIV-associated neurocognitive disorder)
Progressive supranuclear palsy	Autoimmune causes (limbic encephalitis, Hashimoto encephalopathy)
Corticobasal syndrome	Neoplastic/paraneoplastic causes
Chronic traumatic encephalopathy	Vasculitides
	Metabolic causes (hypothyroidism, chronic uremia, malnutrition)
	Vitamin deficiency (B12, thiamine, niacin, folic acid)

Table 3 Clinical clues for the diagnosis of selected dementias[8]

Common Clinical Sign / Symptoms	Suggestive Diagnosis
Progressive memory impairment	Alzheimer disease
Stepwise cognitive decline, sensorimotor signs, vascular risk factors	Vascular cognitive impairment
Hallucinations, mental status fluctuations, parkinsonism	Dementia with Lewy bodies
Behavioral disinhibition, loss of empathy, hyperphagia/ hyperorality, ± aphasia	Behavioral variant frontotemporal dementia
Multiple falls, axial rigidity, vertical gaze palsy, levodopa unresponsiveness	Progressive supranuclear palsy
Asymmetric motor examination, apraxia, alien limb syndrome	Corticobasal syndrome
Recent fall or head acceleration/deceleration, psychomotor slowing	Subdural hematoma
Urinary incontinence, "magnetic" gait, cognitive impairment	Normal pressure hydrocephalus

Table 4 Important Domains to Assess in the Cognitive Examination[8]

Mental Function/Domain	Explanation for Testing
Arousal level	Response to light physical or verbal stimulation
Basic attention	Maintaining focus and being able to concentrate on examiner
Executive function	Multi-tasking; interpreting similarities and idioms; inhibiting automatic responses
Memory	Learning new information and recalling past events and facts
Language	Understanding and following complicated commands; writing and reading a sentence; speaking fluently
Visuospatial ability	Interpreting a complicated visual scene; copying basic and complex shapes
Social/behavioral	Ability to interpret and respond to verbal and non-verbal social cues during conversations

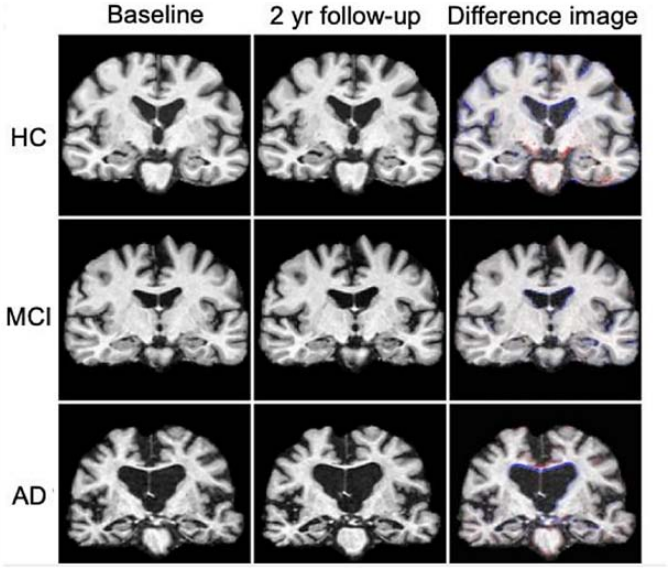

Figure 5 : MRI images of healthy control (HC) subject, mild cognitive impairment (MCI) subject who converted to AD after three years, and an AD patient[13]

Figure 6 : DEMENTIAS mnemonic for potentially reversible causes of dementia[11]

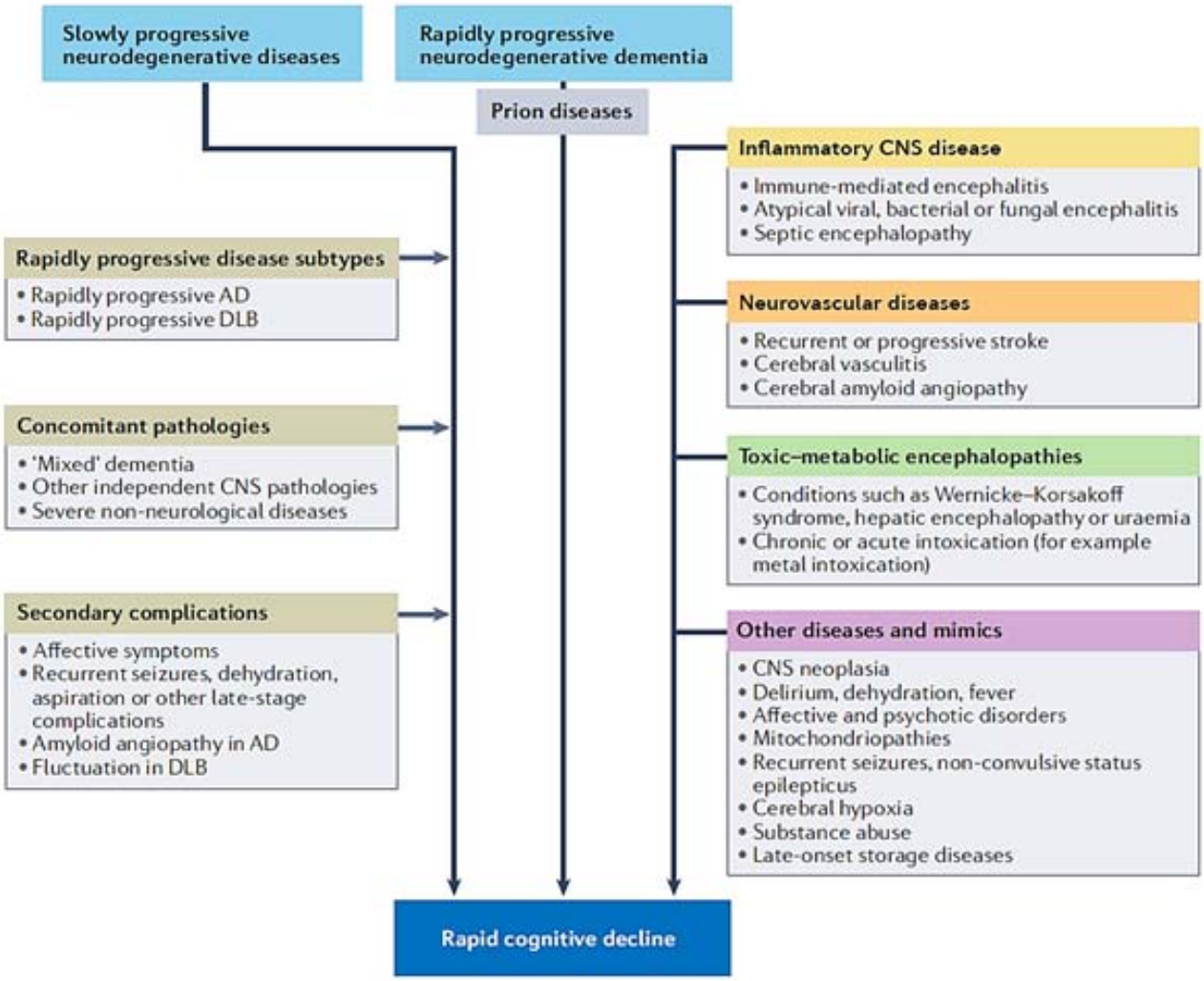

Figure 7 : Rapidly progressive dementia[12]

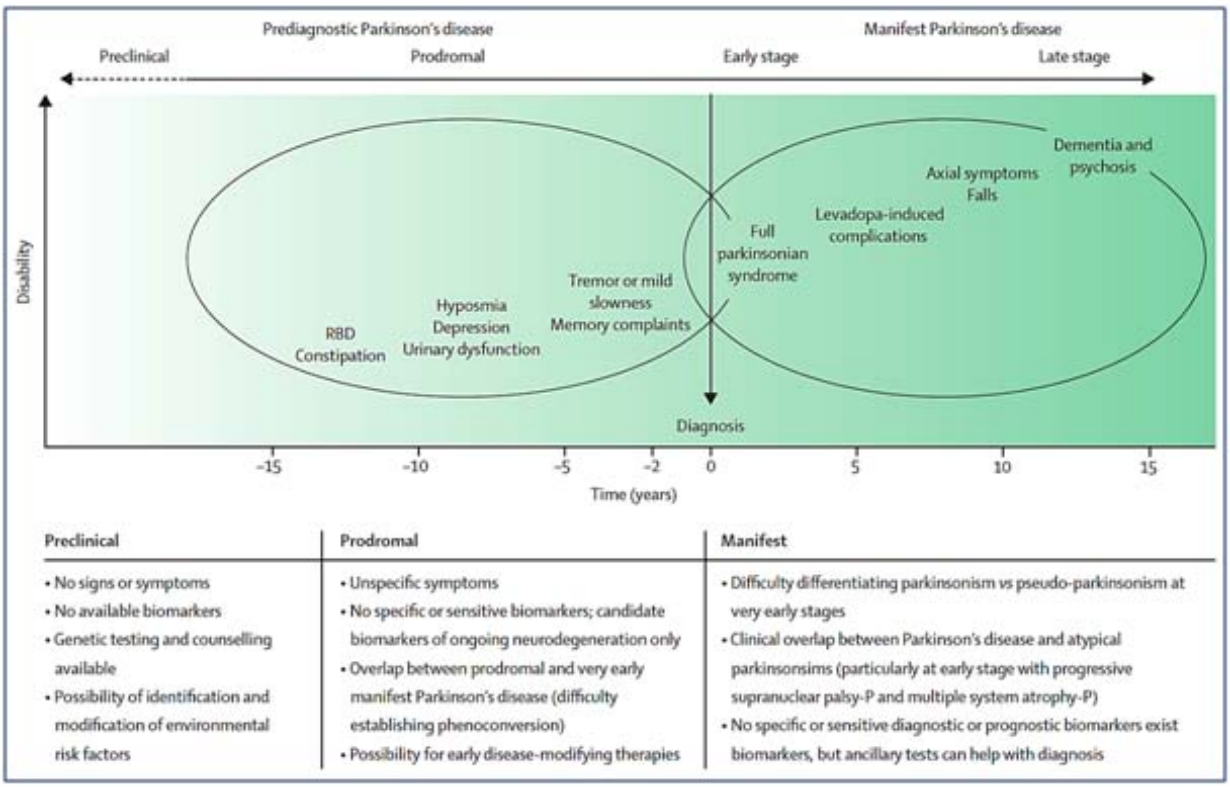

Figure 8 : The natural history of Parkinson's disease[16]

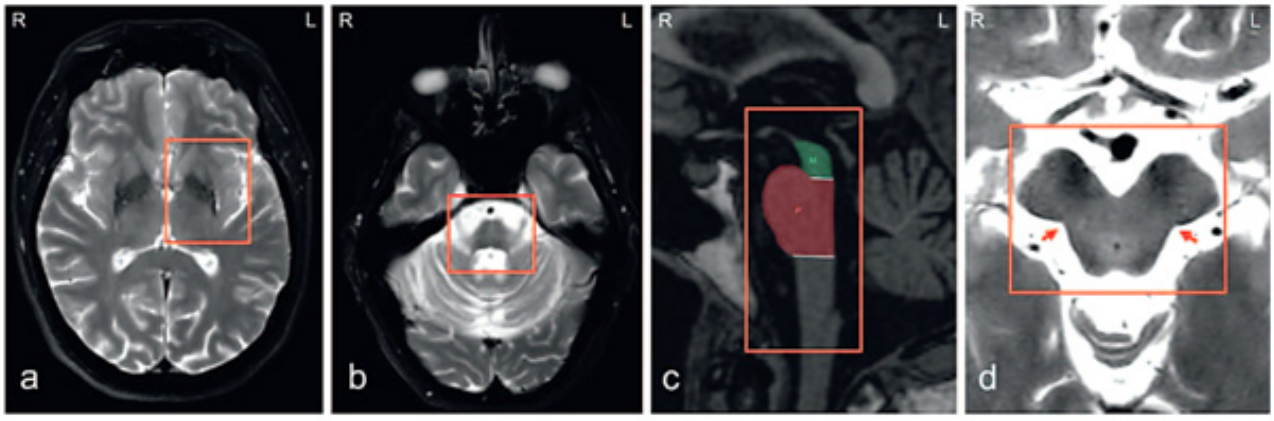

Figure 9 : MRI in MSA and PSP. (a) Axial T2-weighted image showing putamen with hyperintense border of the dorsolateral part on the left as putaminal rim sign. (b) Axial T2-weighted image showing pons with hyperintense hot-cross bun sign. (c) Sagittal T1-weighted image of the brainstem showing atrophy of the mesencephalon and the hummingbird sign. (d) Axial T2-weighted image of the mesencephalon with pronounced lateral atrophy of the tegmentum and Mickey Mouse sign[19]

Urologic Problems in the Elderly Population

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Urological problems are observed commonly in elderly people, and taking care of geriatric patients represents a large portion of the daily routine in the practice of an urologist. Urinary incontinence and voiding dysfunction, nocturia, benign prostatic hyperplasia, prostate cancer, urinary tract infections and late on-set hypogonadism are the most common urologic problems seen in the geriatric age group. Most of these conditions are managed by medications that can affect cognitive functions, blood pressure, heart rate and rhytm, as well as balance, and these medications may interact with the other medications used daily for other conditions. Urinary pathologic conditions, such as incontinence and nocturia, can lead to significant morbidity in the frail elderly, often leading to falls and hip fractures. Surgical intervention is common for urolog- ic diseases, especially for prostatic conditions, but must be carefully evaluated before initiation in geriatric patients.

Introduction

The population of our world is dynamically changing, as the proportion of elderly adults is significantly increasing. Since 1950, the ratio of elderly people has been increasing steadily from 8 per cent in 1950 to 11 per cent in 2009, and is expected to reach 22 per cent in 2050 (1). As long as old- age mortality continues to decline and fertility remains low, the proportion of elderly people will continue to increase. Urologic issues are the third most common type of complaints in patients 65 years of age or older; in addition, they account for

46.2% of outpatients' visits by specialty (2). In this age group, there will be an increase of chronic urologic conditions managed by medications that can affect cog- nitive functions, blood pressure and balance. These medications may interact with the medications used daily for other conditions. Therefore, integration and planning of medications need a thorough evaluation before iniation. Many of the urologic diseases are treated surgically. In this article, common urologic conditions of the elderly; mainly geriatric incontinence and voiding dysfunction, nocturia, benign prostatic hyperplasia, prostate cancer, urinary tract infections and late on-set hypogonadism are reviewed.

Geriatric Incontinence and Voiding Dysfunction

Incontinence

Urinary incontinence (UI) is defined as the complaint of any involuntary leakage of urine and it is one of the most bother- some and common conditions in the geriatric population. It is estimated that 25% to 35% of all adults will experience in- continence during their lifetime (3). While it is not considered as a normal part of aging, UI is more prevalent in the el- derly. It affects 15% to 30% of those living in their homes and 60% of those in nursing home residents (3, 4). It is abnormal at any age.

Urinary incontinence may cause many adverse effects. The condition may lead to social isolation and inability to participate in social activities, often causing depression and functional disability (6). Several studies have shown that elderly patients with UI have a higher risk for falls and fractures (7). The aim of assessing elderly patients with urinary incontinence is to identify temporary or reversible causes, and carefully select those who need to be refferred to a specialist.

Transient incontinence is a sudden onset incontinence usually related to an acute illness, specific medical situation or medication, and most of the time is temporary or reversible. One –third of the cases of incontinent elderly living in the community and half of those in the hospitals have this type of incontinence. The transient causes of incontinence are recalled using the mnemonic DIAPPERS (Delirium or confussion; infection, Atrophic vaginitis/urethritis; Psychological disease, Pharmaceuticals, Excess fluid and endocrine diseases, Restricted mobility, Stool impaction) (8).

Most UI experienced by elderly adults is chronicand the symptoms are persistent. A fast and complete evaluation of UI can be done in an office setting allowing the identification of the type and the cause of UI. Important information that can be elucidated includes onset and severity, medications and the type of the symptoms. sChronic UI can be divided into five categories: stress, urge, mixed, overflow, and functional.

Stress incontinence is associated with the pelvic floor sup- port weakness and a hypermobile urethra. Leakage of urine occurs with the increase of intra-abdominal pressure such as when coughing, lifting, laughing or sneezing. In men, stress incontinence is usually due to sphincteric damage following radical prostatectomy.

Urge incontinence is the most common type of UI in the elderly. It is characterized by an abrupt onset of a sensation of needing to void, with the loss of urine occuring before the pa- tient is able to reach the toilet. Urge incontinence can be associated with frequency and nocturia, which is called overactive bladder syndrome (OAB). Frequent causative factors inc- lude neurologic diseases such as stroke, multiple sclerosis, Parkinson's disease and spinal cord injury. Other urologic conditions that may cause urgency include benign prostatic hyperplasia (BPH), infections, stones and tumor. OAB can al- so be caused by age related bladder changes (9).

Overflow incontinence is usually due to impaired detrusor contractility, severe bladder outlet obstruction, or both (3). In men, the reason is mostly benign prostatic hyperplasia and urethral stricture. Diabetic neuropathy causing bladder contractility dysfunction may also lead to overflow incontinence. UI in presence of large postvoid residual and low voided volume is suggestive of overflow UI. Patients may experience frequent loss of small volumes of urine, dribbling, weak urinary stream and nocturia. The use of anticholinergics, narco- tics and alpha-adrenergic agonists may also contribute to this type of UI.

Mixed incontinence is a combination of urge and stress in- continence, commonly seen in elderly women. Treatment may be planned according to the predominant symptoms.

Functional incontinence is associated with the inability or lack of motivation to reach the toilet on time. Inaccessible toilets, mobility disorders such as severe rheumatoid arthritis, cognitive impairment, and psychological disorders may con- tribute to functional UI. The condition may be transient or chronic. A patient who has experienced a hip fracture, and therefore unable to transfer him or herself to the toilet, is an example of a transient cause. Dementia is an example of a chronic condition that may result in functional UI.

Most of the older patients having UI do not volunteer to share information about their symptoms. This may be due to the feeling of embarrassment or acceptance of UI as a fact of normal aging. Obtaining a thorough history and physical examination are the most important steps in the clinical evaluation of elderly with UI.

Physical examination includes a pelvic or genital, and rectal examination in both men and women. Physical examination must focus on prostatic diseases, pelvic floor support, urethral mobility, bladder fullness and pelvic organ prolapse. Urinalysis and urine culture, voided volume and postvoid residual volume measurements all may be performed in office set- tings.

Treatment

Most patients prefer to initiate with less invasive therapies be- fore considering medications or surgery to treat their UI. Dietary modifications,

weight loss and behavioral interventions are the first steps in treatment. These treatments can yield significant improvements in UI symptoms. Pelvic-floor exercises, bladder retraining and biofeedback are useful as first-li- ne management of incontinence. These are all well studied in the geriatric population and are recommended by most guide- lines as an initial approach to therapy. However, they require good cognitive function and motivation as the success of the treatment depends on the active participation of the patient (10). Antimuscarinic drugs are the most commonly used drugs for the treatment of urgency incontinence (11). These drugs target bladder smooth muscle and show their effect by blocking cholinergic receptors in the bladder, which leads to a decrease in bladder contractility. Patients should be started at lower doses of antimuscarinics due to their side effects. Most common side effects are dry mouth, constipation, reduction in cognition, tachycardia, dry eye and blurred vision. Glaucoma, bronchitis, chronic airway disease, diabetes mellitus, dementia, constipation and congestive heart failure can be exacerbated by anticholinergic therapy (12). Overall success in the control of urge incontinence in clinical studies is in the range of 60% to 80% (13). Surgery should be considered in selected patients. Older age should not be considered as a contraindication if the patient is fit enough (14). Preoperative optimization of comorbid conditions such as hypertension, diabetes, cardiovascular and pulmoner diseases can help to enhance surgical outcomes and improve safety. Recent advances in minimally invasive surgical procedures mostly in urethral slings make surgery for stress UI a good option for a larger number of geriatric patients than in the past. Carr and colleagues (15) reported a 100% succcess with pubovaginal sling procedure in the geriatric age group. Sacral nevre stimulation and botulinum toxin injection are minimally invasive surgical interventions for refractory urge UI (14).

Nocturia

Nocturia is defined as the complaint that an individual has to wake at night one or more times to void (16). Each void must be preceded and followed by sleep. It is an underreported, understudied, infrequently recognized problem in adults (17). The incidence of nocturia is similar for men and women, and increases significantly with age (14). The incidence in men is 29-59%, whereas it is 28-62% for women in the geriatric age group (18). Nocturia may cause a range of detrimental effects because of the associated sleep disturbances experienced by patients on a regular basis. These effects include: reduced qua- lity of life, cognitive disturbances, exacerbation of medical ill- ness and increased falls and fractures (18). Nocturia in its nature is multifactorial and is caused by factors that increase urine production and others that decrease the bladder storage. Potential causes of nocturia can be categorized as arising from: nocturnal polyuria (NP), diurnal polyuria, bladder storage problems, and sleep disturbance or combination of these factors (18). The most common causes of nocturia in men found in the population-based FINNO study were: urinary urgency, BPH, and sleep disruption. Other causes were obesity and the use of anti-depressants (19).

Nocturnal urine volume is defined as the total volume of urine passed between the time the person goes to bed with the intention of sleeping and the time of waking with the intention of rising (20). It excludes the last void before going to bed, but includes the first void in the morning. Nocturnal polyuria signifies that an increased proportion of the 24-h output occurs at night. Thus, if the ratio of nocturnal urine volume to 24-h output is >20% in younger adults, or > 33% in the older population, NP is present (20). Although the pat- hophysiology of NP is not clear, some of the investigators believe that low levels of antidiuretic hormone (ADH) at night and mobilization of fluids in patients with edema are mostly involved (21,22).

Nocturia can be an early feature of potentially serious underlying pathology that may not be previously diagnosed. The first priority in treating nocturia is to identify and treat these underlying conditions, such as diabetes mellitus, congestive

heart failure, diabetes insipidus, urinary tract infections, hypercalcemia, and hypokalemia. After such contributing conditions have been searched for and treated, behavioral therapy can then be instituted. Avoiding nighttime fluid intake, wearing compression stockings and elevating the legs in the after- noon, ceasing consumption of coffee, tea and alcohol late at night are among the behavioral modifications that may provide help. Pharmacotherapy of nocturia includes desmopressin to manage nocturnal polyuria and antimuscarinic agents to manage the patient's decreased ability to store urine.

Prostate Diseases

Benign Prostatic Hyperplasia

Prostate diseases are common in men of all ages. The most frequent diseases are benign prostatic hyperplasia (BPH), prostatitis and prostate cancer. Benign prostatic hyperplasia is a histological condition characterized by benign hyperplasia of stromal and /or epithelial prostate tissue. The incidence and prevalence of BPH and prostate cancer increase with age. It is found in a cross-sectional analysis of 1557 men (aging from 40 to 96) that increasing age is an independent risk factor for lower urinary tract symptoms (LUTS) (23). BPH can create an outflow obstruction statically (prostatic enlargement) or dynamically (increased internal sphincteric tone). LUTS are assessed with both subjective and objective studies. The inter-national prostate symptom score (I-PSS) was designed to quantify the severityof BPH-associated LUTS. Patients are as- ked seven questions regarding their urinary symptoms. A fo- cused physical examination should be performed to assess lower abdomen to rule out globe vesicale. Digital rectal examination (DRE) should be performed to evaluate anal sphincter tonus and the prostate with regard to size and consistency, which may be suggestive of cancer. Urinanalysis and serum prostate spesific antigen (PSA) measurement should be per- formed as a part of the basic evaluation.

Basically low I-PSS scoring patients are advised to follow behavioral changes, median range patients are given the opti- on of medication, and patients with the highest scores suffe- ring with most of the complaints are offered either medication or surgery.

Surgery may be indicated for patients with recurrent infection, hematuria, bladder stones, hydronephrosis, obstructi- ve nephropathy or urinary retention. Transurethral resection of the prostate (TURP) is well tolerated in the elderly population (24). For the patients who are at significant surgical risk, less invasive transurethral treatment modalities include laser ablation, microwave therapy or neddle ablation.

Medications used for treatment of BPH include phytotherapeutic agents, α1-adrenergic receptor blocking agents, 5α- reductase inhibitors (5ARIs). Medical therapy by using alpha blockers and 5α-reductase inhibitors is now considered first- line treatment for BPH (25). The two major approaches of medical therapy for bladder outlet obstruction related to BPH are decreasing the glandular volume and decreasing the bladder outlet resistance by relaxing prostate smooth muscle tis- sue. α1-adrenergic blockers cause relaxation of these muscles, thus treating the dynamic component of bladder outlet obstruction. Non-selective ? blockade can have significant side effects and in order to overcome this problem α1 selective medications were developed to target the urinary system more specifically. Non-selective agents commonly used include terazosin and doxazosin; selective medications are tamsulosin, alfuzosin and silodosin. The most common side effects are asthenia, dizziness and postural hypotension. These problems may be more pronounced in older men, and a lower target do- se should be considered in the very old patients. Attention must especially focus on dizziness and postural hypotension, which may increase the risk of falls in this age group.

5α-reductase inhibitors block the conversion of testosterone to dihydrotestosterone, which is a potent stimulator of prostatic glandular tissue. The inhibition of local androgen stimulation results in reduction of overall prostatic glandular volume over a period of 6 months. The combination of

an α1- adrenergic receptor blocker and a α5-reductase inhibitor may have synergistic effects to improve LUTS especially in patients with prostatic volume greater than 30 gr. The combination therapy has been shown to decrease the incidence of acute urinary retension and surgery for BPH (26).

Prostate Cancer

Prostate cancer is one of the most common malignancies in men. Delongchamps et al. (27) identified prostate cancer in 45% of men older than 70 years of age in their autopsy study. It is evident in this study that this selected group of men di- ed of diseases other than prostate cancer. Thus, we may conc- lude that all prostate cancer cases do not need therapy, but al- so not all tumors require detection if that tumor will not af- fect the patient. After the PSA era, most of the prostate cancer diagnoses are based on the PSA screening. There is little evidence to support the benefit of PSA screening in elderly populations. Randomized trials were performed to predict a benefial impact of PSA screening on prostate cancer mortality with contradictory results (28, 29). There is still serious controversy regarding PSA screening. In men aged 75 years or older, the US Preventive Services Task Force declared that the- re is adequate evidence that the incremental benefits of treatment for prostate cancer detected by screening are little to no- ne. For men 75 years or older, there is moderate certainty that the harms of screening for prostate cancer outweigh the bene- fits (14). The American Cancer Society recommends that asymptomatic men who have at least a 10-year life expectancy have an opportunity to make an informed decision with their health care provider about screening for prostate cancer after receiving information about the uncertainties, risks and po- tential benefits associated with prostate cancer screening (30). Age, clinical stage, PSA level, histologic grade, and co- morbid conditions should be taken into account before plan- ning a treatment, especially in older men suffering from prostate cancer. There are several forms of effective treatment options offered at present. Curative or definitive treatment is only considered possible if the tumor is confined to the prostate gland. Radical prostatectomy is a curative way of treatment for confined disease and offers long-term palliation for locally advanced cancers even in older men (31). Radiation therapy is another option for curative treatment. It may be de- livered by external and interstitial methods with newer technology decreasing complications and increasing effectiveness (32). Incontinence is the main complication after radical prostatectomy and radiotherapy, and it may profoundly decrease quality of life. New modalities have been developed to ablate

the cancerous prostate tisue, using freezing (cryotherapy) or heating (high-intensity focused ultrasound) (33-35).

There is still no known curative treatment for advanced prostate cancer that has metastatized. Hormonal ablative therapy is the cornerstone endocrine treatment for advanced prostate cancer. The aim of this therapy is to remove the sources of androgen or testosterone in the body. Bilateral orchidectomy, luteinizing hormone –releasing hormone (LHRH)- and antiandrogens are the options for hormonal ablative therapy (36).

Aging Male/Late On-Set Hypogonadism or Partial Androgen Insufficiency Syndrome

As a natural result of aging, gonadal function diminishes as well as several other changes both in men and women (37). This situation is referred as Symptomatic Late On-set Hypo- gonadism (SLOH) and Partial Androgen Insufficiency Syndrome (38). It is a clinical and biochemical syndrome, and may affect the function of multiple organ systems and result in a significant decline in the quality of life.

The prevalence of SLOH is not exactly known, but it can be predicted that it is on the rise according to the population based studies. In the Massachusetts Male Aging Study (MMAS), a crude incidence rate of 12.3 per 1000 person-ye- ars was reported in American men from 40 to 69 years old (39). It is known that serum testosterone level decreases after the age of 31. Therefore, biochemical hypogonadism was ob- served in 7%

of men aged between 40-60 years old, in 21% of those between 60-80 years old, and in 35% of men older than 80 years of age (37,40,41).

Four groups of clinical findings are evaluated:

Physical findings: Decrease in muscle mass and strength, fatigue, weakness, abdominal obesity, gynecomastia.

Vasomotor findings: Sweating, hot flushing, sleeplessness, oversleeping, palpitation.

Psychologic findings: Mental fatigue, decrease in cognitive function, distortion in well-being, uncomfortable fee- ling, depression, nervousness.

Sexual findings: Decrease in sexual function, loss of libido, erectile dysfunction, and decrease in ejaculation.

Some questionnaires have been developed in the clinical evaluation of SLOH: 1) St. Louis University's ADAM; 2) The Aging Male Survey (AMS), and 3) The MMAS (42-46). Inte- rest of the androgen deficiency in aging males (ADAM) questionnaire for the AMS symptom scale is the most commonly used form of inquiry, and evaluates all of symptom groups with 17 questions. If the total score is greater than 27, a clinical diagnosis of SLOH can be made.

However, these findings should also be supported biochemically. Serum testosterone level should be measured from blood taken between 8.00-11.00 A.M. If testosterone levels are below or at the lower limit of accepted values (<230 ng/dl), the results should be confirmed with a second determination together with measurement of gonadotropins, especially LH, and prolactin. If serum testosterone level is in the normal range (>350 ng/dl) in a patient with clinical findings, other causes of symptoms should be investigated. On the con- trary, when serum testosterone levels are found between 230-350 ng/dl, not only testosterone level should be measured, but also the bioavailable testosterone level should be calculated (38,47,48).

The aims of the treatment of SLOH are; 1) Preservation ofsexual function, libido and well-being; 2) Prevention of oste- oporosis and protection of muscle strength; 3) Maintenance of cognitive function; and 4) Keeping the testosterone and its metabolite levels within normal limits (48).

There are several testosterone preparations in the market. The choice among these preparations depends on availability, safety, tolerability, efficacy, and preference by the patient and the physician. Before the treatment, serum PSA level and bladder outlet obstruction should be evaluated carefully. Androgen replacement treatment is contraindicated in patients having suspected prostate/breast cancer or having severe infra-vesical obstruction due to benign prostate hyperplasia. Men having significant erytrocytosis, untreated severe congestive heart failure, and untreated severe obstructive sleep apnea should not be initiated androgen replacement therapy before detailed investigation of these co-morbid conditions. Age is not a contraindication to initiate androgen replacement treatment (49,50).

Urinary Tract Infection in Elderly

Urinary tract infections are a common problem in the elderly. Moreover, as the life expectancy increases in the whole world, the morbidity/ mortality and the significance of urinary infections seem to be increasing in importance. Fox- man et al. reported that urinary tract infections account for nearly 25% of all infections in elderly people (51). Also, in a study from Turkey, urinary tract infection was found as one of the most common causes of hospitalization in elderly (34%) (52).

At least 20% of women and 10% of men older than 65 years have bacteriuria, but most of them are asymptomatic (53). On the contrary, bacteriuria was observed in women living in nursing homes with a range of 17% to 55%, and in men with a range of 15% to 31% (54).

The risk factors of urinary infection in the elderly are considered as age-related changes that include: decline in cell- mediated immunity, neurogenic bladder dysfunction, fecal and urinary incontinence, increased incidence of urethral catheter placement; and in women, changes in the vaginal environment, atrophic vaginitis due to estrogen depletion after menopause and cystocele

due to pelvic muscle relaxation; and in men, infravesical obstruction due to benign prostate hyperplasia as well as impaired cognitive function and disabi- lity in everyday life (55,56).

Escherichia coli remains the most common uropathogen (75% of all urinary infections). Additionally, there is a significant increase in the incidence of *Proteus, Klebsiella, Enterobac- ter, Serratia,* and *Pseudomonas* species, enterococci as well as polymicrobial bacteriuria, which are more common among the elderly (55,57).

Urinary tract symptoms are often controversial, and co- morbid diseases can mask or mimic infection findings. Diagnosis should depend on carefully obtained urinalysis and culture. The presence of bacteria greater than 105 cfu/mL in uri- ne is an important finding. However, counts of 102 cfu/mL or more bacteria in catheterized patients are clinically significant (55,56,58).

Asymptomatic patients do not need antimicrobial treatment. However, if lower urinary tract symptoms are present for more than 7 days, antimicrobial therapy is recommended. In addition, in elderly people, these agents should be used carefully and the patients should be followed closely because these agents have the potential to cause more toxic and adverse effects in elderly than young patients due to impaired re- nal/hepatic function in the elderly and the possible interaction with other systemic drugs. Treatment should be planned according to the results of the urine culture and tailored to the physiologic and pathophysiologic conditions of the elderly.

In summary, geriatric patients require a careful planning when developing a treatment program for various urologic problems. In treating BPH or prostate cancer, quality of life and expected life span become important factors in making treatment decisions. Especially in frail older men with prostate cancer, treatment should be planned to relieve symptoms and maintain the quality of life rather than radical cure. Medications that are used to treat urologic conditions such as incontinence, erectile dysfunction and BPH might interfere with cardiac function and balance; therefore, they should be titrated appropriately.

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Infections in Geriatric Population: Whole Spectrum in a Nutshell

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The increase in life expectancy, resulting in the growth of the elderly population during the 20th century, occurred because of the reduction of mortality and morbidity that was caused by infectious diseases. Ironically, with aging, infectious diseases have become an important cause of death disability and functional incapacity in the geriatric population.

Infections in older persons often present in an atypical, non-classical fashion, that creates unique diagnostic challenges to clinicians. Furthermore, the differential diagnosis of infectious diseases in the old differs from the young because, it is dependent on both the clinical setting and the patients underlying status. For example- 'free living" independent, healthy older persons are prone to respiratory infections such as influenza, bronchitis and bacterial pneumonia, genitourinary infections and intra-abdominal infections, including cholecystitis, diverticulitis, appendicitis and intraabdominal abscesses can also occur. However institutionalized elderly are more likely to develop aspiration pneumonia.

Table 1:

Infection	Mortality rate of elderly vs young adult
Pneumonia	3
Tuberculosis	10
Urinary Tract Infection	5-10
Infective endocarditis	2-3
Intra-abdominal Infection	
cholecystitis	2-8
appendicitis	15-20
Bacterial meningitis	3
Septic Arthritis	2-3

Although elder persons are at greater risk of acquiring infections, there are little data that indicate aging is associated with greater susceptibility to all infections. Whether aging alone or age related diseases, that adversely impact host resistance to infections, is responsible for vulnerability to infections remains controversial and unproven.

Infections in Long-Term Care Setting

As mentioned earlier, it is anticipated that with the rapid increase in the aging population, there will be a disproportionate growth in the very old segment of this group. With extreme old age, comes frailty, cognitive impairment and physical dependence. It has been stated that persons aged 65 years and older have approximately 45% risk during their lifetime of becoming institutionalized in a long-term care facility (nursing home). Furthermore , frail elderly residents in nursing facilities are substantially vulnerable to infections because of age related immune changes, diseases, and physical disabilities. A close institutional environment also favors constant exposure to microorganisms because of frequent contacts with personnel and other residents, limited ventilation, filtration and removal of re-circulated air, which could contain micro organisms and the unrestricted movement of infected residents.

The most frequently encountered infections in residents of long term care facilities are lower respiratory infections (pneumonia most often), urinary tract infections and skin and soft tissue infections (including infected pressure ulcers). These 3 infections constitute nearly 70-80% of nursing facility-associated infections. Moreover fever is one of the most common reasons

residents of a nursing facility are transferred to an acute care facility. Furthermore infections are often the cause of acute confusion or delirium in older persons. Thus , the presence of fever and/or an acute change in clinical/ functional status of a resident in a long-term care facility should prompt a careful search for an infectious etiology. Finally the increasing use of antimicrobial agents in residents of long-term care facilities has been associated with an alarming rise in mutant strains of bacteria that are resistant to a variety of antibiotic agents. Stringent adherence to infection control policies and to measures of appropriately prescribing antimicrobial agents will be necessary to prevent major outbreaks of life threatening and untreatable infections.

Clinical features of infection

Clinical symptoms and signs of infection in older persons may be less apparent or even absent .

Types of infections are dependent both on the clinical setting and the functional status of older persons. Pathogens involved in common infections are often different for the old compared with the young. Fever , the "cardinal sign" of infection, has a protective effect in limiting infection in experimental models. However this important indicator of infection may be blunted or absent in older persons.

On average, older persons as compared with younger persons have lower baseline temperature. A significant change in temperature (1.1 R"C or 2R" F or more) from baseline may indicate the presence of an infection in older persons.

Similar to younger persons , fever of unknown origin in older persons is usually due to infection, however non infectious inflammatory conditions and neoplasms account for a higher percentage of cases in the old compared with the young.

Common infections in elderly

1] Sepsis in elderly

Older persons are more prone to sepsis due to the effects of aging, comorbidities, use of invasive devices, and factors associated with institutionalization. It has been shown that around 40–50% of all cases of bacteraemia occur in older patients. In addition, the incidence and mortality of severe sepsis in older patients has increased progressively to achieve a rate of 26.2 cases per 1,000 persons, with a 38.4% mortality rate in patients older than 85 years .

This increment in the incidence of severe sepsis in aging people has been reflected in the demographic changes of bed allocation in intensive care units (ICUs), where, at present, older patients represent around two-thirds of occupations . This situation will further increase over the forthcoming years as well as the amount of health-care resources required by these patients.

According to the World Health Organization definition, the segment of elderly people can be divided into young patients (less than 65 years), young elderly (aged 65–85 years), and old elderly (over 85 years). It is well known that old elderly patients (over or 85 years) is a high-risk population due to their frailty and associated morbidity .

Moreover, there is a concern about the fate of very old patients admitted to the ICU, taking into account that the outcome of young elderly and old elderly ICU patients is usually worse than that of younger patients independently of the underlying diagnosis. Thus, important questions regarding suitability of ICU admission, treatment, and quality of life in this group of patients still remain unanswered. The diagnosis of sepsis is challenging and likely to be missed if not anticipated. Early signs and symptom may go unnoticed, while later clinical presentation can be very severe with very rapid progression to septic shock. In fact, the classical manifestations of systemic inflammatory response syndrome may be minimally present.

In elderly septic patients, febrile response

could be blunted in up to 47% of cases, but other unusual or non-specific signs, such as weakness, malaise, delirium, confusion, loss of appetite, falls, or urinary incontinence may be present.

Diagnosis

In many cases, establishing a prompt and correct diagnosis is further complicated by a lack of cooperation in the frail, dehydrated, debilitated, and cognitively impaired patient, which is a common situation in aging population. It is well known that speed in establishing an accurate diagnosis and implementation of rapid and effective resuscitation treatment are essential factors for optimizing survival rates. However, diagnosing sepsis is not always straightforward, particularly in the elderly patient who often have complex on-going disease processes.

The optimal diagnosis of infection and sepsis in all patients is based on clinical signs and symptoms. Biologic laboratory markers (biomarkers), such as white blood cell count, C-reactive protein, procalcitonin, cytokine levels, and (to some extent) coagulation markers can potentially be used to assess prognosis and development of organ dysfunction, as well as to guide antimicrobial treatment and evaluation of response.

2] Infective Endocarditis in Geriatric Population

The incidence of infective endocarditis (IE) rises in industrialized countries. Older people are more affected by this severe disease, notably because of the increasing number of invasive procedures and intra-cardiac devices implanted in these patients.

MICROORGANISMS INVOLVED

Although oral ***streptococci*** were previously responsible for most cases of IE in elderly, recent studies demonstrated that ***staphylococci*** are now mainly involved, ***Staphylococcus aureus*** being predominant. Methicillin-resistant ***S. aureus*** is often found in older patients. This epidemiological trend is likely linked to the increasing incidence of HA IE. On the other hand, the frequency of IE caused by streptococci colonizing the digestive tract like ***Streptococcus gallolyticus*** and ***enterococci*** also increases because of the higher incidence of colonic lesions in elderly patients. Conversely, IE due to other microorganisms, such as Enterobacteriaceae and fungi, or negative blood culture IE remain rare.

CLINICAL FEATURES

Clinical presentation of IE in elderly is often nonspecific, consisting in general symptoms such as fatigue, weight loss, or confusion. Fever seems to be as common as in younger patients and time between onset of symptoms and diagnosis was rather shorter in patients over 75 years. Immunological events (Osler nodules, Roth spots, and Janeway lesions) and embolic complications such as strokes, intracranial hemorrhages, or mycotic aneurysms are likely less frequent. This observation should nevertheless be considered with caution since these last complications could be less systematically assessed in elderly.

Echocardiographic data also exhibit some specificity: **mitral valve is more frequently affected, vegetations and valve defects are less frequent, whereas peri-valvular abscesses are more often found.** Trans-esophageal echocardiography could therefore lead to a significant diagnostic gain in older patients. However, cooperation of elderly patients for trans-esophageal echocardiography may be difficult because of cognitive disorder or agitation. Resorting to sedation or general anesthesia is also risky when patients have poly-medication or multiple comorbidities.

Antibiotic Therapy

According to the European Society of

Cardiology and American Heart Association, antibiotic therapy of IE relies on monotherapy or combination (as appropriate) of bactericidal drugs active on the microorganism involved, administered intravenously, at high dosage and for up to 6 weeks. The objective is to eradicate the slow growing bacteria present in vegetation and biofilm that exhibit tolerance to most antibiotics. Conversely, aging is associated with various physiologic changes corresponding to aging of each organ and induces pharmacokinetic modifications. The most important modifications for antibiotic pharmacokinetics in elders are fat mass increase, nephrogenic loss, and albumin level modification. The modification of fat mass level that increases with age modifies the volume of distribution of antibiotic according to their lipophilic or hydrophilic properties. Decreased albumin level may impair transport of highly protein-bound drugs and therefore the drug-free fraction.

Elderly patients have also a lower renal clearance, as renal function progressively decreases with age. This will lead to an increased risk of nephrotoxicity or systemic adverse events when choosing renally cleared antimicrobials without dosing adjustment. Clinicians should be aware that elderly patients suffering from diabetes, or using diuretics and ACE inhibitors, are more prone to develop acute kidney injury caused by nephrotoxic drugs, such as aminoglycosides or vancomycin. Physiologic changes occurring with aging could modify antibiotic pharmacokinetics by themselves and favor overdose, leading for example to neurotoxic effect in patients with cognitive disorders. Conversely, an excess of precaution may induce an under-dosing and a decreased efficacy.

Given their bactericidal activity and safety, penicillins are the antibiotics of choice against susceptible strains of staphylococci and streptococci. Higher dosages are necessary, and dosing interval should be reduced to 4 hours, to target stable serum concentration above minimal inhibitory concentration (MIC) over 24 hours. Continuous infusion may also be advantageous but remains to be validated. In case of methicillin-resistant S. aureus or in patients allergic to â-lactams, vancomycin is universally accepted as the first-line drug. It can be administered by intermittent or continuous infusion, which was proven to be effective and less toxic. Teicoplanin, recommended only by the British Society for Antimicrobial Chemotherapy guidelines, could also be considered, as it has a lower renal toxicodynamic profile than vancomycin and a very long half-life, allowing once-daily injection or even a thrice-weekly administration; it is slightly more active than vancomycin against enterococci as well. Daptomycin, a rapidly bactericidal cyclic lipopeptide, has been validated to treat right-sided staphylococcal endocarditis and seems to be well tolerated in the elderly population. It is much more expensive than vancomycin, but it could be considered the drug of choice in patients with severely impaired renal function, and in case of IE affecting cardiac implantable electronic devices for its proven activity against bacterial biofilm.

Combination antimicrobial treatment may facilitate bacterial clearance. Rifampin in combination with penicillin or vancomycin is strongly recommended in cases of staphylococcal prosthetic valve endocarditis or intravascular device infection. However several drug–drug interactions and frequent digestive side effects complicate its use in patients under polypharmacy. The interest of aminoglycosides is increasingly debated, especially for older patients, despite their rapid and strong bactericidal activity. A recent meta-analysis showed no benefit from combination therapy with aminoglycosides compared to â-lactam monotherapy for treating IE, while renal

function declined more likely with the former regimen. In patients over 75 years, aminoglycosides treatment longer than 3 days is associated with increased nephrotoxicity. Thus, the synergistic interaction of aminoglycosides with â-lactams might be relevant in elderly only in cases of staphylococcal prosthetic valve endocarditis. In case of enterococcal endocarditis, amoxicillin could be combined to ceftriaxone rather than to gentamycin, especially in elderly patients at risk of or with renal impairment. This regimen is recommended in the 2015 guidelines as in two studies that included mainly old patients, it appeared effective and safe, and much less toxic than aminoglycoside-containing regimens. Likewise, one single daily aminoglycoside administration should now be preferred according to the last European guidelines, since it is associated with lower nephrotoxicity than split injections.This is especially true in elderly with or at risk of impaired renal function. Monitoring drug serum concentrations to attain therapeutic levels and avoid overdose or underdose could be useful. It is especially mandatory to manage efficacy of aminoglycosides (peak concentration) and prevent toxicity of aminoglycosides and glycopeptides (trough concentration).

Functional decline is one of the most important risks arising from a prolonged hospitalization in elderly patients, particularly in those with cognitive disorders. Outpatient parenteral antibiotic therapy can limit this risk allowing early discharge of patients, and it appears safe and cost-effective,

Surgical treatment

Surgery is often necessary in addition to antibiotic therapy to treat IE, either in case of severe valvular damage responsible for heart failure, extended vegetation at risk of systemic embolism, or uncontrolled infection. It is considered mandatory for prosthetic valve endocarditis, especially caused by S. aureus. Likewise, removing an infected intravascular device is strongly recommended. Nevertheless, surgery could be rarely performed in case of IE complicating TAVI, a procedure used as an alternative to open heart surgery in disabled elderly. Timing of surgery is still a matter of debate. Besides the cases of life-threatening complications, which make valvular surgery emergent, whether it should be performed early in the course of the disease or delayed should be discussed case-by-case.

Age per se is not a contraindication to surgery. However, surgery should be systematically discussed for each patient.

3] URINARY TRACT INFECTIONS IN GERIATRIC POPULATION

Urinary tract infection (UTI) is common in older adults, mainly due to several age-related risk factors. Symptoms of UTI are atypical in the elderly population, like hypotension, tachycardia, urinary incontinence, poor appetite, drowsiness, frequent falls, and delirium. UTI manifests more commonly and specifically for this age group as **delirium or confusion in the absence of a fever.**

UTIs are responsible for around 25% of all geriatric hospitalizations attributing to almost 6.2% of deaths due to infectious diseases and repeated emergency department and office visits yearly . UTI usually presents with localized symptoms like painful urination, new onset or worsening urinary urgency or frequency, and suprapubic pain but symptoms of UTI are atypical in the elderly population. UTI manifests more atypically for this age group as delirium, confusion, dizziness, drowsiness, falls, urinary incontinence, or poor appetite in the absence of fever making the diagnosis of UTI a difficult task as patients are unable to report their urinary symptoms clearly.

Microbiology

Escherichia coli (E. coli) is the predominant pathogen found in 33% of UTI cases, followed by ***Klebsiella*** pneumonia was found in 22.3% of cases; other pathogens causing UTIs include ***Proteus mirabilis***, ***Enterococcus faecalis***, methicillin-resistant Staphylococcus aureus, Candida species, Enterococcus species, and ***Pseudomonas aeruginosa***, which are commonly seen in patients with catheter-associated UTI.

Diagnosis

Signs and symptoms of pre-existing co-morbidities make the diagnosis of UTI difficult as the clinical assessment becomes challenging; for example, conditions like delirium, deafness, and cognitive difficulties (dementia) make communication a complicated obstacle in diagnosing the clinical disease as patients cannot accurately report their symptoms or problems.

Laboratory diagnosis of UTI mainly involves three tests, urine dipstick analysis, urine microscopy, and urine culture and sensitivity. Imaging is usually unnecessary in diagnosing uncomplicated UTIs, and it is indicated in patients with UTIs who do not respond to antibiotics and in patients with recurrent episodes of UTIs to identify underlying complications . Ultrasound (USG) is the initial imaging technique used in the detection of complicated UTIs ; other modalities are computed tomography (CT) scan and MRI (magnetic resonance imaging), which help diagnose complications of UTIs like pyelonephritis, renal or perinephric abscess .

4] Bronchitis and Pneumonia in Geriatric Population

There are a couple reasons why pneumonia can be more severe in older adults:

Our immune system naturally weakens as we age and older adults are more likely to have chronic health conditions, such as chronic obstructive pulmonary disorder (COPD) or heart disease, that can increase their risk for pneumonia. The symptoms of pneumonia in older individuals can differ from those in other age groups.

Older adults with pneumonia may be more likely to:

feel weak or unsteady, which can increase the risk of falling be without a fever or have a body temperature that's lower than normal experience confusion or delirium have changes in functional status, which is the ability to perform daily activities experience urinary incontinence lack of appetite experience a worsening of existing health conditions.

Since symptoms in older adults are often more subtle and can differ from classic pneumonia symptoms, pneumonia can be more difficult to recognize in this population. This can potentially result in a delay in diagnosis and treatment. Microbiology of the common etiologies for pneumonia in older adults are dependent on the site of acquisition. For CAP (community acquired pneumonia) that often can be treated in the outpatient setting, the common pathogens include *Streptococcus pneumoniae, Mycoplasma pneumoniae, Haemophilus influenzae, Chlamydia pneumoniae* and the respiratory viruses (e. g., Influenza A and B, adenovirus, respiratory syncytial virus (RSV), parainfluenza, and human metapneumovirus). Mycoplasma pneumoniae and Chlamydia pneumoniae are common causes of CAP in younger adults, but it is unknown how prevalent these pathogens are in the elderly. When the severity of CAP is greater and requires inpatient therapy, the above listed pathogens, Legionella species and Staphylococcus aureus secondary infection during influenza pneumonia, should be considered. For patients with HAP (hospital acquired pneumonia), Staphylococcus

aureus (both methicillin-susceptible and methicillin-resistant) was identified in a large proportion of patients. Gram-negative bacteria pneumonia (e.g., Pseudomonas species, Klebsiella species) is more common in HAP, VAP(ventilator associated pneumonia), and in community-dwelling older adults with preexisting lung disease, particularly those with high aspiration risk. In outbreak settings, *Legionella pneumophila, Chlamydia pneumoniae*, RSV, influenza, and parainfluenza should be strongly considered.

Other pathogens to consider in older adults include mycobacterial diseases. Reactivation of Mycobacterium tuberculosis is three to four times higher in nursing home residents than in community dwellers. *Mycobacterium avium intracellulare* complex is the causative agent in many evolving, destructive pulmonary infections often in nonsmoking older women who present with cough, fatigue, fever, weight loss, and nonspecific pulmonary infiltrates. Human immunodeficiency virus (HIV) infection with opportunistic pulmonary infections such as *Pneumocystis jirovecii* pneumonia, tuberculosis, cryptococcosis, have been increasingly reported in older adults. With advances in highly active antiretroviral therapy, HIV-infected individuals are living longer, but now older adults often develop opportunistic pulmonary infections that are associated with HIV treatment failure. Other opportunistic infections such as *Nocardia asteroides* and pulmonary aspergillosis should be considered in older adults with malnutrition, progressive weight loss, and evolving pulmonary infiltrates.

Clinical Manifestations

Pathophysiology The primary mechanism of pneumonia, for both CAP and HAP, is bronchoaspiration. Approximately half of all healthy adults aspirate small amounts of oropharyngeal secretions during sleep. Since most healthy adults are colonized with few virulent pathogens in their oropharynx and since forceful coughing, intact ciliary transport, and normal humoral and cellular immune mechanisms are present, healthy adults are often protected from repeated episodes of pneumonia. However, in older adults, there is a higher frequency of silent aspiration, particularly in those with dementia and stroke. Physiologic changes such as a decrease in elastic recoil of the lung, a decrease in compliance of the chest wall, a decrease in respiratory muscle strength, calcification within the rib cage, osteoporosis and resultant vertebral fractures, decreased mucociliary clearance rates, and swallowing difficulty are all associated with aging. In addition, older adults tend to be colonized in the upper respiratory tract with more virulent pathogens such as Enterobacteriaceae, Pseudomonas aeruginosa, and Staphylococcus aureus . The combination of higher rates of aspiration, impaired airway defense mechanisms, and colonization with more pathogenic organisms make older adults at greater risk for the development of pneumonia.

Inflammation associated with pneumonia as part of innate immunity and host defense, can also directly injure the lungs resulting in acute lung injury . In older adults, the inflammatory response itself elicited by highly pathogenic organisms can add to the severity of disease experienced in this population.

Clinical Features Cough, sputum production, chills, and pleuritic chest pain are more commonly seen among patients with CAP; elderly nursing home residents with HAP often present with altered mental status and with or without fever. The classic triad of cough, fever, and dyspnea is seen in about 50% of older patients with CAP. Tachypnea (respiratory rate > 20 breaths/min) and tachycardia (heart rate > 100 beats/min) were seen in two-thirds of elderly patients

with pneumonia, and these signs may precede other clinical features by 3–4 days. Many elderly patients, particularly those that are chronically debilitated, may present with very subtle clinical manifestations such as an aggravation of preexisting comorbidities (e.g., diabetes, CHF), unexplained falls, failure to thrive, and poor appetite . In older patients, *L. pneumophila* is a frequent cause of an atypical pneumonia syndrome presenting with constitutional symptoms myalgias, diarrhea, altered mental status, bradycardia, and hyponatremia. None of these signs or symptoms is specific for L. pneumophila, but they can provide insight into the causative pathogen .

Diagnostic Tests

The diagnosis of CAP is made by having suggestive clinical features (e.g., cough, fever, sputum production, and pleuritic chest pain) with a demonstrable infiltrate on chest radiograph. Physical examination findings (e.g., bronchial breath sounds, rales) are important but less sensitive and specific than chest radiograph findings. Older adults may lack clinical features and/or physical examination findings. Therefore, a chest radiograph is important to differentiate CAP from acute bronchitis in an older adult. Routine diagnostic tests to identify an etiologic agent are optional for outpatients with CAP since most patients do well with empirical antibiotic therapy. Pretreatment blood cultures and an expectorated sputum specimen for Gram stain and culture are standard samples to obtain. However, pretreatment blood cultures only identified a probable pathogen in 5–14% of patients with CAP. Yield from blood cultures is highest in patients with severe CAP, in which more pathogenic organisms, such as S. aureus, P. aeruginosa, and other gram-negative bacilli are identified. Since these pathogens are more commonly identified in older adults, blood cultures should be part of the standard diagnostic evaluation of an older adult with CAP. Many diagnostic tests to determine the etiology of pneumonia require sputum production, and often older adults have difficulty producing sputum. Nevertheless, diagnostic testing is particularly important when results may alter antibiotic management decisions, when outbreaks must be identified (e.g., severe acute respiratory syndrome [SARS], influenza, Legionnaire's disease, agents of bioterrorism), and when there are epidemiologic implications (e.g., emergence of resistant pathogens). The clinical utility of sputum culture results is largely dependent on the quality of the sputum specimen and whether the specimen was obtained prior to antimicrobial therapy. When sputum is difficult to obtain, urinary antigen tests for *S. pneumoniae and L. pneumophila* serogroup 1 can assist in making a diagnosis. These tests have a higher diagnostic yield in patients with the most severe disease. Other advantages of these tests include rapidity of results, ability to detect antigen even after initiation of antibiotic therapy, and high specificity. For Legionella, all commercially available urinary antigen assays only detect serogroup 1. Although serogroup 1 accounts for 80–95% of community-acquired cases of Legionnaire's -disease, other serogroups would not be detected by the standard urinary antigen assay . For influenza A and B, adenovirus, RSV, parainfluenza, and human metapneumovirus, a direct fluorescent antibody test can be performed rapidly on nasopharyngeal samples and can assist in determining whether antiviral or antimicrobial therapy is warranted. For patients with HAP that require mechanical ventilation, postintubation tracheal aspiration has been shown to be reliable for microbiologic diagnosis when compared with bronchoalveolar lavage (BAL), plugged telescoping catheter, and protected specimen brush procedures .

Targeted therapy

General management of pneumonia with addition of empirical antimicrobial therapy should be continued till the identification of pathogens. Once the etiology has been identified the therapy should be pathogen targeted.

Recommended antimicrobial therapy for specific pathogens for pneumonia

Streptococcus pneumoniae

Penicillin nonresistant (MIC < 2µg/mL) Penicillin G, amoxicillin Macrolide, cephalosporins, clindamycin, doxycycline, respiratory fluoroquinolone

Penicillin resistant (MIC > 2 µg/mL) Base on susceptibility --> cefotaxime, ceftriaxone, fluoroquinolone Vancomycin, linezolid, high-dose amoxicillin (3 g/day with penicillin MIC < 4 ìg/mL)

Haemophilus influenzae

Non-β-lactamase producing- Amoxicillin Fluoroquinolone, doxycycline, azithromycin, clarithromycin

β-lactamase producing- Second- or third-generation cephalosporin, amoxicillin-clavulanate Fluoroquinolone, doxycycline, azithromycin, clarithromycin

Mycoplasma pneumoniae or Chlamydophila pneumniae Macrolide, a tetracycline Fluoroquinolone

Legionella species

Fluoroquinolone, azithromycin Doxycycline

Enterobacteriaceae

Third-generation cephalosporin, carbapenem (drug of choice if extended-spectrum β-lactamase producer) β-lactam/β-lactamase inhibitor, fluoroquinolone

Pseudomonas aeruginosa

Antipseudomonal β-lactam plus ciprofloxacin or levofloxacin or aminoglycoside

Aminoglycoside plus ciprofloxacin or levofloxacin

Acinetobacter species

Carbapenem Cephalosporin-aminoglycoside, ampicillin-sulbactam, colistin

Staphylococcus aureus

Methicillin susceptible - Antistaphylococcal penicillin Cefazolin, clindamycin

Methicillin resistant Vancomycin or linezolid TMP-SMX, clindamycin, doxycycline

Anaerobe (aspiration) β-lactam/β-lactamase inhibitor, clindamycin Carbapenem

Influenza virus Oseltamivir or zanamivir

Mycobacterium tuberculosis Isoniazid plus rifampin plus ethambutol plus pyrazinamide (as per WHO recommendation)

Prevention

The mainstay for the prevention of pneumonia in older adults is pneumococcal and influenza vaccination. As per the Centers for Disease Control and Prevention guidelines, all persons age 65 or older should receive pneumococcal vaccine once. Revaccination is not recommended unless the first dose was administered under the age of 65 in which case revaccination should occur at age 65 if 5 years have passed since vaccination. Since 90% of all influenza-related deaths occur among people aged at least 65 years, yearly influenza vaccination has been recommended.

5] Intra Abdominal Infections in Elderly

Geriatric patients presented more frequently without the typical symptoms and signs of abdominal pain, nausea and vomiting, diarrhea and fever and had symptoms for a longer period before presentation. Diagnosis on admission was more often unknown or considered to be of an extraabdominal nature for the elderly patients, and sources of infection were more commonly biliary or pancreatic. Mortality was not significantly different between the groups, but length of stay

and duration until normalization of temperature were longer for the older patients. In short elderly patients with intra-abdominal infections frequently present atypically and have a more-protracted course of illness than their younger counterparts.

Elderly patients with intra-abdominal sepsis present to physicians with less acute and delayed symptoms, compared with younger patients. Several studies found that elderly patients presented with nausea, vomiting, and fever approximately one-half as often as do younger patients. In addition, the duration of symptoms was more than twice as long. Older patients were also more likely than young patients to present with polymorphonuclear lymphocyte counts of <2000 lymphocytes/mm3. With regard to the resolution of infection, the elderly population had an increase of <"50% in the number of days to euthermia and in the length of hospital stay.

The spectrum of diseases that cause intra-abdominal sepsis in elderly individuals is different from the spectrum in younger populations. Because of the variety of physiologic and anatomic changes that occur with age, the frequency of each disease changes. In a study of elderly patients by Cooper et al. acute appendicitis and diverticulitis each caused intra-abdominal sepsis in 28% of patients, and cholecystitis and cholangitis each caused 12% of cases; intra-abdominal abscesses were present in 9% of subjects . Other causes of intra-abdominal sepsis in elderly persons, such as volvulus, mesenteric vascular ischemia, and perforation of the colon as a result of obstructing adenocarcinoma, are unusual in the young.

Etiologies of intra-abdominal sepsis.

Selected endogenous organisms of the gastrointestinal tract become the predominant pathogens in intra-abdominal sepsis. Escherichia coli and Klebsiella, Enterococcus, Enterobacter, and Pseudomonas species are the predominant Enterobacteriaceae; anaerobes from the Bacteroides fragilis group and streptococci are also common.

Antibiotics should be given for }*24 h. In patients with documented infection, clinical evidence of persistent infection should be the determining factor when deciding the duration of the antimicrobial course, rather than use of an arbitrary 10-day or 2-week regimen. When the source of the infectious process has been controlled and there is clinical response (as determined by maintenance of an afebrile state for 48 h, normal WBC count, absence of abdominal tenderness, and return of peristalsis), the antibiotic regimen may be discontinued as soon as 5 days after initiation. In the high-risk patient (including the elderly patient), recommendations include extending the antimicrobial regimen to cover Enterococcus species, and, in carefully selected high-risk patients, to provide empiric antifungal coverage.

Tertiary peritonitis has emerged as a significant problem even among elderly patients who have received seemingly appropriate treatment (both medical and operative) of sepsis. Tertiary peritonitis is defined as the recurrence or persistence of intra-abdominal infection after the receipt of appropriate care.This occurred most often after postoperative peritonitis, pancreatitis, and necrotic bowel. However, it could occur after appendicitis, diverticulitis, and perforated ulcers. In comparison with the organisms associated with secondary peritonitis, the most common offending organisms were Enterococcus species, Candida species, and Staphylococcus epidermidis, followed by E. coli, Enterobacter species, B. fragilis, and Pseudomonas species.

Acute Appendicitis

Acute appendicitis, as another cause of intra-abdominal sepsis, may have an atypical presentation in elderly patients. These variations render the diagnosis of appendicitis difficult in this population, negatively affecting morbidity and mortality. Delays in diagnosis are more common in the elderly population and probably account for the higher incidences of perforation, generalized peritonitis, and death in this population.

It has been postulated that changes occur in the

appendix as we age, including atrophy of intraluminal lymphoid tissue and thinning of the appendiceal wall, which render the appendix more susceptible to inflammation. Atherosclerosis diminishes the blood supply, the lumen becomes narrowed, and the muscularis becomes fibrotic and laden with fat . Thus, small changes in intraluminal pressure can produce rapid ischemia, gangrene, and perforation at rates that are much quicker in older persons than they are in younger persons. A perforated appendix may present in the older patients as a distal small bowel or right colonic obstruction, and, during surgery, it may have to be distinguished from carcinoma of the cecum.

Plain films of the abdomen show an appendicolith in <"20% of cases of acute appendicitis. When the diagnosis is in question, ultrasonography and CT can be useful. CT is particularly useful for elderly patients who are mentally confused, obese, or immunosuppressed or who lack localized symptoms.

Diverticulitis

Diverticula are routinely found in elderly persons. Diagnosis is readily made via CT scan with a water-soluble contrast enema. Older patients are more likely than younger patients to have diverticular perforations that result in generalized, rather than localized, peritonitis. These patients also tend to have a shorter and more rapidly progressive course of disease.

Cholecystitis and Cholangitis

More than one-half of all people aged 70 years have gallstones . Although most cases are asymptomatic, 20% of older patients have serious complications of their disease, a much higher rate than that seen in the 40–50-year-old age group . *E. coli, Klebsiella* species, and *B. fragilis* commonly colonize the gallbladder and biliary tree in elderly patients and are the organisms recovered in secondary complications. Biliary operations have become the most commonly performed abdominal procedure in the elderly population.

Similar to appendicitis and diverticulitis, elderly patients with cholecystitis have delays in presentation to the hospital, diagnosis, and treatment. Elderly patients presented with a seemingly benign course that was not representative of the severity of illness. In fact, despite a perceived decrease in the severity of illness, empyema of the gallbladder, gangrenous cholecystitis, or free perforation, subphrenic abscesses and liver involvement may occur. Severe disease and gangrene can be present with only mild leukocytosis and a lack of peritoneal signs.

There is a 5-fold increase in the incidence of necrotizing, suppurative, or hemorrhagic cholecystitis and a 50% increase in the incidence of complications for elderly patients requiring emergency treatment. Infectious complications include empyema, gangrenous cholecystitis, perforation, abscess formation, and fistula, and the mortality rate is 15%–20%.

Acute cholangitis is most commonly caused by choledocholithiasis, iatrogenic strictures, neoplasms, or sclerosing cholangitis. The classic findings of jaundice, abdominal pain, and fever with chills (Charcot's triad) are only found in 55%–70% of elderly patients. Common in the elderly population are hypotension and mental confusion—which, with Charcot's triad, make up Reynold's pentad. Treatment regimens are based on vigorous fluid rehydration, aggressive monitoring, and nasogastric suction to decrease pancreatic stimulation. Three-quarters of patients who undergo these measures will respond within 24–48 h. If they do not respond, patients with extrahepatic ductal dilatation should undergo endoscopic retrograde cholangiopancreatography, and those with only intrahepatic ductal dilatation should undergo percutaneous transhepatic cholangiography. If these measures fail, common bile-duct exploration is required to decompress the biliary system. Overall, the mortality rate for patients with cholangitis is <"10%.

Colon Cancer Perforation

Perforation may occur in advanced tumors,

causing peritonitis or abscess. This latter group likely represents proximal perforation from obstructing colon cancers.

Peritonitis resulting from perforation has a poorer outcome in elderly patients, with regard to both postoperative recovery and survival from cancer. Possible reasons for the worsened outcomes in this scenario are poorer nutritional status resulting from the cancer, peritoneal spread of the cancer during perforation and more-advanced local disease.

5] Tuberculosis in Geriatric Population

Most cases of TB in the elderly are linked to the reactivation of lesions that have remained dormant. The awakening of these lesions is attributable to changes in the immune system related to senescence. The mortality rate from tuberculosis remains higher in elderly patients.

Pathophysiology

Modified Pulmonary Function in the Elderly and Structural Changes in the Senescent Lung Promote Lung Infection.

Aging is associated with a progressive decrease in lung function. Because of aging, an individual's reserve is diminished, but this decrease is heterogeneous between individual subjects. The presentation of respiratory disorders may differ in the elderly, especially because of a lack of perception of symptoms such as dyspnea.

Many physiological changes are associated with ageing, such as a decrease in the elastic recoil of the lung, a decrease in compliance of the chest wall, and a decrease in the strength of respiratory muscles. Under-nutrition, also common in the elderly, can produce sarcopenia and respiratory muscle dysfunction. In addition, calcification, changes in the shape of the thorax, dorsal kyphosis and increased anteroposterior diameter, has a negative effect on muscles' force-generating capabilities. Decreased forced expiratory flow rates and lung elastic recoil may also compromise the efficacy of clearance of airway secretions by coughing. Moreover, increased incidence of fluid and/or solid aspiration into the lung with old age, and age associated inflammatory disease such as chronic obstructive pulmonary disease (COPD) and pulmonary fibrosis , make the elderly more likely to have a pulmonary environment that favors the establishment of infection, including tuberculosis infection.

Risk Factors of TB in the Elderly Are Linked Simultaneously to Various Parameters

Immunosenescence, individual susceptibility (accumulated co-morbidities, malnutrition, functional dependence), favouring treatments like corticoids or immunosuppressants, communal living for some (life in Care Home for Dependent Elderly People) and closeness that increases contacts between residents and healthcare staff, are specific geriatric settings which favour TB infection.

Immunosenescence is consistent in part with lymphopaenia, due to the reduced output of immunologically naïve T cells from the thymus but also impaired ability of reactive T cells to achieve immunological memory, both favoring intracellular pathogen infections such as TB . In addition, immunosenescence is influenced by infections and comorbidities that model immune repertories, previous infections, or chronic infections by latent viruses (herpes virus, especially the cytomegalovirus) . The increase in concentrations of inflammatory cytokines (called "inflammaging") and, in general, tissue ageing, contribute to high risk of infection. Increased oxidative stress and chronic inflammation, reduced phagocytic capacity of neutrophils and macrophages with a possible link to activity of reactive oxygen species, and impaired activities of natural killer cells resulting from hyperglycaemia, also play important permissive roles for *M. tuberculosis* to survive intracellularly.

Clinical Findings

The clinical presentation of tuberculosis in the elderly has its own specificities, but the usual symptoms are a progressive history, perhaps over several months, of discomfort, weight loss, cough, dyspnea, shivering, fever and night's sweats, and

sometimes pains in the chest . In advanced disease, fibrosis with resultant contraction of the upper lobe produces flattening of the chest, tracheal shift, diminished percussion and altered breath sounds. Pleural involvement with either effusions or thickening is much more common in the elderly, occurring in up to 50% of cases . Dyspnea, lethargy and reduced appetite were more common among older patients than younger patients. The distribution of pulmonary and extrapulmonary disease is similar between the elderly and younger patients.

Comorbidities, which are more common in older patients, may mask the symptoms of TB. For example, those with chronic coughing due to COPD may have a delayed presentation or diagnosis.The commonest differential diagnosis in the elderly is bronchogenic carcinoma. Other differential diagnoses include fibrotic lung disease, lymphomas and pneumonias due to other organisms .

Radiological Findings

In pulmonary TB, differences are found in radiological findings between younger and elderly patients. Cavitation seems to be more common among younger than older patients. In addition, if infiltrates are the most common radiological finding whatever the age, they appear to be more frequent in elderly patients compared to younger.

High resolution computed tomography (CT) is used to characterize active pulmonary disease where the standard chest radiograph is unhelpful and for extra-pulmonary disease . Chest CT is very useful to overcome the limitations of chest radiography, such as poorer inspiration, associated pathologies, deformations of the chest wall. CT can be useful for assessing differential diagnoses in symptomatic patients. In elderly patients, more precise criteria are needed to distinguish active tuberculosis from sequelae. CT can also help for organ lesions, sampling for tuberculosis culture using percutaneous biopsy in doubtful situations. Early diagnosis of miliary TB relies heavily on CT findings .

The elderly patient may present with atypical radiological features, such as middle or lower lobe (rather than upper lobe) infiltrates, mass-like lesions or nodules appearing more like cancers, extensive bronchopneumonia without cavitation or nonresolving infiltrates. Lesions are frequently misdiagnosed as pneumonia or lung cancer in the elderly .

MICROBIOLOGICAL FINDINGS

The elderly are frequently unable to spontaneously produce sputum. Other methods to obtain specimens should be tried, such as bronchoscopy or induced sputum production by nebulized hypertonic saline.

In frail elderly patients, however, the risk of such a procedure should be carefully weighed against the benefit of potentially making a diagnosis of tuberculosis. With the potential risk of MDR TB, the importance of culturing all specimens for tuberculosis to identify the bacterium and to provide sensitivity testing is important.

The sensitivity of microscopic examination of acid-fast bacilli (AFB) in sputum specimens is 50% or less, and almost always negative in infected pleural fluid. AFB staining is still the most widely used rapid diagnostic method for tuberculosis. However, its value for patients who cannot produce sputum spontaneously is very little. Only 30% to 65% of cases of miliary TB are positively diagnosed on the basis of sputum culture. The samples are cultured in Lowenstein-Jensen (LJ) solid medium and in liquid medium after microscopic examination for acid-fast bacilli. The liquid culture medium has a 10 to 15% higher sensitivity than the LJ medium. The growing colonies are then studied for identification of the mycobacterium species. Susceptibility to four first-line drugs (rifampicin, isoniazid, streptomycin and ethambutol) is tested on positive culture and automated liquid antibiograms are very efficient . The WHO recommends mycobacterial culture, which exhibits high sensitivity for detecting M. tuberculosis as the diagnostic gold standard. Unfortunately, due to the slow growth of M. tuberculosis, mycobacterial culture cannot meet

the clinical needs of the diagnosis and treatment of TB.

Rapid molecular biology techniques complement traditional cultures, allowing rapid diagnosis and study of genotypic bacterial resistance particularly to rifampicin with the GeneXpert MTB/RIF assay . Early diagnosis and analysis of drug resistance are crucial for effective patient management and prevention of the spread of MDR TB. Other techniques of molecular biology are being developed, such as the detection of circulating cell-free M. tuberculosis DNA (cfMTB-DNA), which has recently emerged as a tool for diagnosing pauci-bacillary forms of TB such as tuberculous meningitis and pleural TB.

More recently, metagenomic next-generation sequencing has been used in cases where the diagnosis of tuberculosis is difficult to make by the usual techniques, improving the detection of M. tuberculosis .

Culture of mycobacterium on biopsy tissues from various sites, such as the liver, lymph nodes, bone marrow, pleura and synovium, is necessary to diagnose extrapulmonary forms and can be helped by histological analysis that reveals the characteristic tissue reaction (caseous necrosis with granuloma formation).

There are also indirect diagnostic tests such as the tuberculin skin test (TST) or Interferon gamma release assays (IGRAs), which are used to detect latent M. tuberculosis infection (LTBI) in adults that have been evaluated in older people. Diagnostic difficulties in the elderly are common in many diseases, not solely TB. Problems, such as poor memory, deafness, blindness or partial sight, and impaired speech all contribute, often making an accurate history difficult. The patient, family and doctor may often attribute symptoms to "old age". Comorbidities often further complicate matters, especially malignancy that may often coexist .

Treatment

There are no WHO recommendations for a specific TB treatment in the elderly.

The treatment of TB in the elderly is complex, combining the initial constraints of respiratory isolation and contact screening, often in long-term care facilities, and a prolonged use of combinations of anti-tuberculosis drugs that are potentially toxic and induce drug-drug interactions, in the context of often precarious general condition (undernutrition, co-morbidities, cognitive disorders) due both to active systemic infection and to old age. Multidisciplinary management, associating geriatricians and infectious disease specialists, based on close collaboration is justified throughout care to optimize a favorable outcome in these vulnerable patients.

6] Bacterial Meningitis in Geriatric Population

Bacterial meningitis remains a highly lethal disease in older adults, with mortality rates averaging >20% despite modern antibiotic therapy.

Several epidemiological studies indicate that a greater variety of organisms may be responsible for meningitis in the older adult and that viral etiologies are distinctly less common.

The responsible bacterial organisms include ***S. pneumoniae; Listeria monocytogenes;*** gram-negative bacilli such as ***Escherichia coli*** and ***Klebsiella pneumoniae; Streptococcus agalactiae***; and, less commonly, ***N. meningitidis or H. influenzae*** . Suspecting bacterial meningitis in the older adult is a major challenge, as there is considerable variability in the clinical findings. Since febrile responses are often blunted or absent in older adults in general, it is not surprising that fever is not a universal symptom. Similarly, headache and nuchal rigidity have been noted in only about 50% of older adults with meningitis, and depressed levels of consciousness such as stupor or coma are often but not universally present. **Recommended antibiotic therapy for bacterial meningitis in older adults**

There are few studies of the optimal duration of therapy for bacterial meningitis, particularly for older adults. In general, treatment against S. pneumoniae should extend for 10–14 days, whereas treatment against L. monocytogenes, S.

Unknown or suspected diagnosis	Cefotaxime(8-12g) or ceftriaxone (4g) plus ampicillin(12g)
Streptococcus pneumoniae	
<.1 micro g/ml MIC	Penicillin G (20 -40) million unit
.1-1.0 micro g/ml MIC	Cefotaxime or ceftriaxone
>1 micro g/ ml	Vancomycin plus ceftriaxone
L monocytogenes	Ampicillin plus aminoglycoside
Neisseria meningitidis	Penicillin or Ampicillin
H. influenzae	Cefotaxime or Ceftriaxone
Enterobacteriacae	Cefotaxime or Ceftriaxone
Methicillin sensitive ***Staphylococcu aureus***	Nafcillin or Oxacillin
Methicillin resistant ***Staphylococcus aureus***	vancomycin

agalactiae, and gram-negative bacilli should be for 14–28 days; N. meningitidis meningitis generally can be treated for <7 days with effective antibiotics .

There are no convincing data to support the routine use of corticosteroids such as dexamethasone to decrease the complication rate in the treatment of meningitis in older adults, as there are for the management of H. influenzae meningitis in the pediatric age group. However, there are experimental data that would support the use of dexamethasone in the setting of increased intracranial pressure to combat the development or worsening of vasogenic and cytotoxic cerebral edema. If dexamethasone is used in adjunctive therapy for bacterial meningitis, evidence of the penetration and efficacy of the antibiotic therapy—particularly if cell-wall-active agents are used—should be sought, since these drugs depend upon meningeal inflammation to achieve significant levels in the CSF. This may entail the measurement of antibiotic levels in the CSF or, more practically, a repeated assay of the CSF at 24–48 h and perhaps at further intervals to determine improvements in glucose levels and WBC counts as markers of antibacterial efficacy.

Prevention

Since a significant number of cases of bacterial meningitis in older adults are caused by S. pneumoniae, prevention of this form should be a high priority for clinicians. Surveys from 1993 showed that fewer than one-third of patients for whom S. pneumoniae vaccine was indicated had received it. Whether this vaccine can adequately prevent invasive forms of S. pneumoniae disease has been controversial, but the vaccine does appear to be at least partially effective (56%–81% for invasive disease, including meningitis) and to be both safe and well-tolerated. Thus, increased utilization of pneumococcal vaccine is a major health care goal of the Centers for Disease Control and Prevention (Atlanta) and a number of other agencies, with an aim to achieve 60% vaccination rates among eligible persons and 80% among institutionalized older adults.

H. influenzae is an uncommon cause of meningitis in the older adult, and since the vaccine protects against only type B, the use of this vaccine in the geriatric population would not be expected to have a significant impact. Similarly, N. meningitidis vaccine is available and utilized for outbreaks of invasive disease or to protect some travelers and

longer-term visitors and residents in areas where the disease is highly endemic. However, there are no recommendations for its routine use in the older-adult population. Vaccination is recommended, however, for those individuals who have had prior serious infections with this organism and those with complement deficiencies.

Current preventive efforts against L. monocytogenes focus on decreasing exposure to this pathogen by improving food safety and awareness. Research efforts toward the development of an S. agalactiae vaccine are under way.

7] Infectious Diarrhoea in Elderly PoEscherichia coli 0157:H7

In 1982, E. coli 0157:H7 was identified as the causative agent of an outbreak of hemorrhagic colitis." Since then, this organism has emerged as an increasingly identified cause of sporadic and clustered outbreaks of infectious diarrhea and postdiarrheal hemolytic-uremic syndrome (HUS). Most reports of clusters, including those in elderly patients, have implicated undercooked beef as the initial source of infection. In addition to undercooked beef, other meats, cheeses, person-to-person contact and water supplies," and unpasteurized apple cider have been implicated.

Diagnosis requires clinical suspicion of E. coli 0157:H7 or recognition of one of the associated complicating syndromes of infection with E. coli 0157:H7, followed by appropriate stool cultures. Because E. coli 0157:H7 ferments D-sorbitol relatively slowly, it appears colorless on sorbitol-MacConkey agar culture plates, in contrast to other species of E. coli. These sorbitol-negative strains can be screened for reactivity with 0157 and H7 antisera for definitive identification. There is no specific therapy for infectious diarrhea resulting from E. coli 0157:H7. Supportive care with early hydration is the mainstay of therapy. Currently, therapy with antimicrobial agents not recommended. Antimotility agents are contraindicated because this is a toxin-mediated disease.

NONTYPHOIDAL SALMONELLOSIS

Salmonella is one of the most deadly causes of gastroenteritis in the elderly. Several authors reported that Salmonella is the cause of most deaths attributed to outbreaks of infectious intestinal disease in nursing homes. Elderly individuals can present with classic symptoms of Salmonella gastroenteritis-nausea and vomiting followed by abdominal cramps and diarrhoea.In contrast to younger subjects, however, the elderly are less likely to develop gastrointestinal symptoms and are more likely to develop invasive salmonellosis with bacteremia.

The increased rate of complications among elderly individuals infected with Salmonella is probably due to a number of factors, including age-related immunosenescence and underlying chronic disease.

In contrast to other age groups, the routine application of antibiotic therapy is recommended for individuals at the extreme ages of life, because of the high rate of complications seen in these individuals.

C. DIFFICILE INFECTION

Elderly patients are probably at more risk for acquiring nosocomial ***C.difficile*** infection than are other groups simply because they are more likely to spend more time in long-term and short-term care facilities.

The use of antibiotics, particularly cephalosporins and trimethoprim-sulfamethoxazole, and the use of Hs-blockers are identified as risk factors for a C. difficile-positive stool culture. Other factors reported to increase the spread and acquisition of C. difficile in elderly patients include bowel incontinence, laxative use, and use of other medications that alter bowel flora.

Therapy for C. difficile colitis in elderly patients is based on the same principles as in other groups. Adequate hydration must be administered, and the offending antibiotics should be removed, if possible. Metronidazole

or, if necessary, oral vancomycin should be given. For chronic relapses, therapy with probiotic agents may be beneficial.

VIRAL GASTROENTERITIS

The true incidence of viral gastroenteritis among the elderly is not known because routine stool tests do not detect viral pathogens. Rotavirus and Norwalk like virus are the pathogens most commonly identified as the causative agents in outbreaks of viral gastroenteritis among the elderly. Features of viral gastroenteritis outbreaks among the elderly that are in contrast to bacterial outbreaks include (1) sudden and rapid onset of nausea and vomiting, (2) higher attack rates in general and (3) higher attack rates among women compared with men.

As in other age groups, therapy for elderly persons with viral gastroenteritis primarily consists of supportive care with attention to adequate volume resuscitation.

8] Ocular Infections in Geriatric Population

Ocular infections are a frequent motive for ophthalmological consultations in geriatric settings because of the mechanical factors related to age (modifications in palpebral dynamics and lacrymal function) and in local and general immune factors leading to the rapid and/or more severe development of infections. The mechanism of microbial contamination of the eye also determines the clinical damage: predominantly local (dirty hands, traumas) with involvement of the surface tissues (conjunctive and cornea) or general, hematogenic or neurogenic, frequently at the origin of more internal infections (iris, choroid, retina, optical nerve).

CONJUNCTIVITIS AND KERATITIS: These provoke reddening of the eyes, tears and above all pain when the corneal epithelium is involved. Microbiological samples are useful in cases of severe, presumably infectious keratitis or conjunctivitis. Two emergency situations must be distinguished: any suspicion of herpes for which local corticosteroids are contraindicated and keratitis or conjunctivitis with the use of lenses, often due to Gram negative bacilli, amoeba or fungus, the treatment of which is intensive and the prognosis often severe.

OPHTHALMOLOGICAL HERPES ZOSTER: The rapid diagnosis and introduction of efficient doses of antivirals reduces the initial pain, the ocular complications of herpes zoster and post-zoster pain. The latter, when it exists, requires specialized management.

ACUTE UVEITIS: A context of intra-ocular inflammation in an elderly patient must always evoke a pseudo-uveitis syndrome, the principle cause of which is lymphoma. Conversely, an uveitis occurring in the days or weeks following ocular surgery, including cataract, must be considered as suggestive of a post-surgical infection and rapidly referred to a specialist.

ACUTE DACRYOCYSTITIS: Is manifested by a hard and painful tumefaction below the internal angle of the eye. Following collection, it requires draining through an in incision in the skin, washing and packing of the sac, and systemic antibiotic therapy. The preventive treatment of recurrences requires open dacryocystorhinostomy or via endonasal endoscopy.

9] otitis media and sinusitis among elderly

Though often considered a disease of children, otitis media can affect the elderly. The incidence of otitis media among elderly population is variable among countries, but generally low, with a value ranging from 0.25-9%. However, dangerous complications may occur. Otitis media is a complex spectrum of diseases that include acute otitis media, otitis media with effusion, suppurative otitis media, and mastoiditis. Otitis media in elderly doesn't feature the classical presentation in children. Elderly patients experience otalgia with or without hearing loss or signs of inflammation. Infection may spread to either to adjacent structures leading to mastoiditis, petrositis, labyrinthitis, or facial nerve palsy, or intracranially leading to meningitis, subarachnoid abscess, subdural abscess, encephalitis, brain abscess, lateral or sigmoid venous sinus thrombosis, and otitis hydrocephalus. The

mainstay strategies for prevention of otitis media are the adequate proper treatment of each infection, and tight control of modifiable risk factors such as tobacco smoking, immunosuppression, upper respiratory tract infection, allergy, and craniofacial abnormalities**.** Antimicrobial treatment should be continued for at least 10-14 years.

10] septic arthritis and osteomyelitis in elderly

In elderly persons, osteomyelitis is second only to soft-tissue infection as the most important musculoskeletal infection. Acute osteomyelitis is usually acquired hematogenously, and the most common pathogen is Staphylococcus aureus. Acute osteomyelitis can usually be cured with antimicrobial therapy alone. In contrast, chronic osteomyelitis may be caused by S. aureus but is often due to gram-negative organisms. The causative organism of chronic osteomyelitis is identified by culture of aseptically obtained bone biopsy specimens. Because of the presence of infected bone fragments without a blood supply (sequestra), cure of chronic osteomyelitis with antibiotic therapy alone is rarely, if ever, possible. Adequate surgical debridement is the cornerstone of therapy for chronic osteomyelitis, and cure is not possible without the removal of all infected bone**.**

Septic arthritis is defined as joint infection caused by the presence of pathogens within the joint, inoculated either directly or by hematogenous spread. Delayed or inadequate treatment of joint sepsis can lead to rapid, irreversible joint damage and the mortality associated with the diagnosis, due to overwhelming septicemia, is up to 11%.Early diagnosis and prompt treatment, however, are vital to maximizing the probability of a positive outcome. Timely management is all the more crucial in the older patient in whom outcomes are poorer owing to comorbidities and decreased physiological reserve.

Conclusion

The elders' characteristics (performance status, disability) and their impact on the treatment and the prognosis of infectious diseases deserve great attention. Geriatricians should be more involved in this perspective. Available guidelines could be applied to fit elderly patients, but specific recommendations may certainly be necessary for the frailest ones. Improving our knowledge on specificity of infectious diseases in elderly is essential, and further studies focusing on these is becoming more common in elderly population with peculiarities in patient characteristics and are necessary to explore those specific points.

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Understanding and Supporting Elderly Mental Health

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Mental health in old age is a complex and often overlooked aspect of overall well-being. As individuals age, they face unique challenges that can impact their mental health, requiring attention and understanding from both healthcare providers and society at large.

Two Ds are important when we speak about the mental health in old age .

Depression and Dementia

Depression

One prevalent mental health concern among the elderly is depression. 10-20% of the elderly experience an episode of major depression once in their lifetime . The loss of friends and family members, physical health decline, and the potential for social isolation can contribute to feelings of sadness and despair. It's crucial to distinguish between normal feelings of grief and the persistent, pervasive nature of clinical depression in older adults. Depression is an important public health challenge in developing countries like India where awareness is comparatively less.

Moreover, anxiety disorders can manifest in late adulthood, often linked to health concerns, financial worries, or the fear of losing independence. Anxiety can exacerbate physical health problems, creating a detrimental cycle that affects both mental and overall well-being. While some people cope well with the difficult circumtances, the experiance of repeated loss can sometimes lead to depression. Depression is common (and often ignored) in Parkinson's, Chronic Arthritis, Heart Disease, Severe Infections, Cancers etc.

We must remember the biopsychosocial model when we speak about the depression in any age. The genetic factors and other neurobiological changes have a complex interplay with external factors leading to the clinical depression. Medicines and therapies like cognitive behavioural therapy are the primary modality of treatment and immensely useful in management of depression in the elderly while all other supportive measures are helpful too.

Dementia: Dementia is another significant mental health issue in old age, with Alzheimer's disease being the most common form. People over the age of 60 are more likely to develop Alzheimer's. 3% of people aged 65 - 74, 17% of people in the age group 75 - 84 and 32% of people aged 85 and above are suffering from this disease."This neurodegenerative condition results in cognitive decline, memory loss, and changes in behavior. Loss of recent memory with preservation of remote memory is often seen which confuses caregivers whether it is really a memory loss. Behavioural disturbances can be primary presentation. They can be in the form of aggression, delusions, repetitive talk, disorganised speech, poor self care , apathy . Depression is also seen commonly. Delusion of infidelity about the spouse can be embarrassing for family members. Difficulty in managing routine day to day activities can be debilitating for the patients . Psychoeducation about presentation and aetiology of dementia is very important.""Coping with dementia is challenging for individuals and their families, necessitating comprehensive support systems and specialized care. Caregivers experience a significant burden physically, mentally, financially in the long run. It also needs to be

addressed carefully. Medicinal management, management of Comorbid conditions, nursing care are important part in the team work involved in the management.

arkinson's disease is another chronic disease where depression and dementia should be kept in mind during management .

Some real life issues faced by senior citizens which can effect their psychological well-being should be observed.

Retirement is one of those things.

A loss of structure to their daily routines can lead to adjustment problems, changes in mood and can cause anxiety or depression in many individuals as retirees often find it difficult to effectively utilize their time.

After retirement feeling of emptiness, loneliness, no satisfaction from self routine are some of the things sometimes experienced. Sometimes family members also miss out on these points. Groups discussions and counseling are important especially involving all family members . Medicines and therapy remain the mainstay in case of clinical depression and anxiety.

Empty nest syndrome where the children have either left the home for higher education/ jobs or they have become occupied in their own lives can lead to the feeling of emptiness or being unwanted. Many parents have difficulty adjusting to this fact in their old age .

Loneliness and social isolation are frequent companions of aging, especially as one faces the loss of spouses, friends, and contemporaries.

Maintaining social connections is essential for mental health, and addressing the isolation that can come with aging is crucial in preventing associated mental health issues. Time with Friends, relatives , social clubs can be helpful and should be encouraged .

Providing cognitive activities and games that challenge seniors' minds can help maintain cognitive function and mental agility. Engaging in activities like puzzles, brain-teasers and memory exercises offer enjoyable ways to keep the mind sharp.

Physical / Medical comorbidity can also contribute to mental health challenges. Chronic pain, limited mobility, and other health issues like hypertension , diabetes can impact an individual's emotional state. Managing these physical conditions effectively becomes integral to maintaining mental well-being in old age.

Restricted life - limitations in physical activity , driving , travelling , managing things on own are perceived as restrictions for living an independent life and it can lead to feeling of dissatisfaction, low self esteem , irritability and low mood. ""Sexual life - Although recognized as a fundamental driving force, human sexuality is frequently misunderstood and particularly in the elders, neglected. In a society like ours where sexuality is often suppressed it is more difficult for the elderly to express about sexual needs . Erectile dysfunction, lack of desire in either of the partners can lead to unsatisfactory sexual life . Having a sexual desire may be associated with a feeling of guilt in themselves or with a feeling of disapproval in their younger generation. The elderly should be encouraged to speak about their sexual life , needs and difficulties. Romance and Sex do have a certain place in the lives of the elderly.

On a positive note, many older adults maintain good mental health and life satisfaction.

Not all elderly are the same. Each older adult has a unique personality. Each has unique life experiences."

- Many elderly don't feel lonely. They are in contact with their friends and relatives.
- Even dementia patients respond well and interact well with family and friends.
- Many seniors live an independent life.
- The elderly living in society tend to have lower incidence of depression than young adults.

Engaging in meaningful activities, maintaining social connections, and staying physically active can contribute to a positive mental outlook. It's essential to recognize and celebrate the resilience and strengths of older individuals while acknowledging and addressing the challenges they may face.

Effective mental health care for the elderly requires a holistic approach. Healthcare professionals must be attuned to the unique needs of older adults, considering the intersection of physical and mental health. Family members, friends, and caregivers play pivotal roles in the mental well-being of the elderly. Encouraging open communication, providing companionship, and being attentive to signs of mental distress are vital components of a supportive environment.

Combating ageism is essential in addressing mental health issues in old age. Ageist stereotypes can contribute to the neglect of mental health concerns, assuming that mental health challenges are an inherent part of aging rather than treatable conditions. For example loss of memory or repetitive talk is often considered as a normal part of the old age. Challenging these stereotypes and promoting a more nuanced understanding of mental health in old age is our combined responsibility.

In conclusion, By understanding the challenges faced by older adults, providing comprehensive support systems, and challenging ageist stereotypes, we can foster an environment that promotes positive mental health and well-being for our aging population.

Some simple Tips for mental health in old age:

1) Being mentally, physically, socially active.

2) Doing one's own work. - it's an exercise as well as a means to self-dependence.

3) treatment of all physical conditions.

4) Planning one's own finances.

5) Knowing one's own caregivers and keeping in regular contact with them.

6) Following the trinity of regular sleep, diet and exercise.

7) Mixing in society, relatives, friends.

8) Reading, solving puzzles, brain stimulation.

9) Yoga, meditation,spiritual practices can be studied and followed as an active part of daily lifestyle.

10) Making appropriate changes in lifestyle according to changing age - the way Sachin Tendulkar changed the way he batted as he progressed through his career.

ENT Issues in Geriatric Population

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INTRODUCTION

The World Health Organization (WHO) has considered 65 yrs and above as geriatric age. In India, the parameter for geriatric age group has been accepted as 60 yrs and above, in the 'National Policy On Older Persons' adopted by the Government of India in January, 1999.1 In India the size of the elderly population, i.e. persons above the age of 60 years is fast growing, although it constitutes 7.4% of total population. This may rise up to 10.4% by 2024 making 142 million people, 60 years and above.1 The problems of elderly are many. As the life expectancy increases the problems increase proportionately. For a developing country like India, there will be mounting pressures on various medical care providers. As the numbers of elderly patients with Oto-rhino-laryngological problems seeking medical care will increase significantly, over the next several decades, knowledge of the prevalence of the diseases and basic principles of geriatric medicine will become essential for otolaryngologists. A proposed framework for primary care for older individuals that defines short-term, mid- range, and long-term goals may help providers more appropriately and effectively prioritize issues in this population.

Short-term issues: Focus on immediate needs to maintain or restore current health status; may be the sole focus for patients at the end of life.

- Symptom management
- Care coordination
- Personal safety
- Evaluate the living situation

Mid-range issues: Address needs over the subsequent one to five years.

- Preventive care
- Disease management
- Psychological issues
- Coping strategies

Long-term issues: For older adults who are currently healthy and high function. Plans to be implemented at the time of eventual decline. ENT ISSUES IN GERIATRIC POPULATIONS The major ENT problems in Geriatric populations are hearing loss, Vertigo, Epistaxis, Mucositis, Head and Neck malignancies. Age related hearing loss / Presbyacusis It is one of the most common conditions affecting old age. Nearly half of those older than 75 have difficulty in hearing and more than 80% of those older than 85 years. Long term exposure of noise, medical conditions like Diabetes, Hypertension, ototoxic medications, certain chemo therapeutic agents etc can cause early hearing loss in adults. Treatment will depend on the severity of your hearing loss, so some treatments or devices will work better for you than others. A number of devices and aids can help when you have hearing loss. Here are the most common ones: Hearing aids are electronic instruments you wear in or behind your ear. They make sounds louder and more audible to the patient. Depending on patients need and hearing loss different types of hearing aids are there. This may be behind the ear, in the ear or completely in the canal hearing aids. Sometimes patients need visual communication too to understand the speech.

Many patients have had negative experiences with hearing aids or have heard other patients negative reactions to hearing aids. At times, hearing amplification is not tolerated either because patients produce too much cerumen, which plugs the device; the meatus is too small; or the device has increased static or noise. The aid may also cause discomfort, and it is a cosmetic concern to many patients. Finally, it may not allow the patient to understand speech any better, but rather only allows the patient to hear noise at a louder level. Unfavorable experiences can be avoided through careful testing, counseling, device selection, and fitting by an experienced audiologist. Most dispensing audiologists will offer trial periods to minimize the financial risk to the patient. Technological advancements in hearing aids, such as direction- specific microphones, improved speech-processing strategies, and additional customization options, may have improved performance significantly from when patients last tried amplification. There are no strict criteria when hearing amplification should be recommended. When the high-frequency thresholds are greater than 40 dB on the audiogram, a trial of hearing amplification is generally indicated.

Lesser degrees of hearing loss may warrant amplification when employment, educational needs, or social needs require finer hearing. Well-fit hearing aids will also help with the tinnitus experienced by many patients with presbycusis. There is a balance between sounds heard externally and those generated internally.

The restoration of missing frequencies will often noticeably reduce the perception of bothersome tinnitus. Cochlear implants. Cochlear implants are small electronic devices that are surgically implanted in the inner ear and help provide a sense of sound to people who are profoundly deaf or have severe hearing loss. Unfortunately, adult cochlear implantation especially cochlear implantation in old age is rare in India. Assistive listening devices include telephone and cellphone amplifying devices, apps for use with a smartphone or tablet, and closed-circuit systems (hearing loop systems) in some theaters, auditoriums, and places of worship. Auditory rehabilitation Auditory (or aural) rehabilitation is defined as sensory management, instruction, perceptual training, and counseling for hearing impairment. Auditory rehabilitation includes interventions such as active listening training, speech reading, and communication enhancement.

Specific examples include education on reading facial expressions or lip contours of speakers, interpreting contextual cues such as posture to overcome fast speech, and addressing environmental factors by ensuring adequate lighting or phasing out competing sound sources. These treatments are usually administered through one-on-one training, as well as in the group setting. Auditory rehabilitation, when available, is usually practiced in combination with hearing devices. Patients can use specific strategies to improve their communication abilities. Selecting restaurants and venues with favorable acoustics can significantly improve the experience, as can positioning companions on the side of a more favorable ear. One of the most important strategies is for those with hearing loss to actively inform companions about hearing loss.

In this way, their companions can make a habit of using beneficial communication techniques (eg, speaking slowly and clearly while facing the individual with hearing loss). A systematic review of auditory rehabilitation found that there is little evidence that rehabilitation improves communication due to hearing loss. In addition, it is not known which methods of rehabilitation are most likely to be helpful in which populations, alone or in combination with hearing devices. Despite lack of efficacy, auditory rehabilitation is still routinely performed, and newer rehabilitation methods are being developed such as speech tracking and analytic auditory training in computerized forms that may offer benefit.

A few tips which will help in old age to assist better hearing...

1) Tell your family and friends about hearing loss and explain which listening situations

are hard for you.

2) Always talk facing old age people so that they can see your face and lip movements.

3) Speak louder but not yell at them. Speak slowly so that they can follow you.

4) Turn off background noise during conversation.

5) Avoid noisy circumstances.

IDIOPATHIC SUDDEN SENSORINEURAL HEARING LOSS

Idiopathic sudden sensorineural hearing loss develops in less than 72 hours and is usually unilateral. The sound is described as harsh and distorted with accompanying aural fullness. It affects five to 20 per 100,000 adults 40 to 60 years of age annually. Approximately 32 to 70 percent recover spontaneously, but idiopathic sudden sensorineural hearing loss is an emergency requiring prompt referral. Up to 16 percent of patients presenting with idiopathic sudden sensorineural hearing loss are subsequently diagnosed with significant pathology, including autoimmune disease and neurologic conditions. Magnetic resonance imaging with gadolinium is recommended for all patients with potential idiopathic sudden sensorineural hearing loss to identify those with serious underlying pathologic conditions. Steroids are currently the standard treatment for idiopathic sudden sensorineural hearing loss.

VERTIGO IN ELDERLY

The most common cause of vertigo in elderly is Benign Paroxysmal positional verrigo. Other causes include postural hypotension, Hypoglycemia, Migraine, spine conditions, Menieres disease, TIA, Vertebro basilar insufficiency, CP angle leisions and cerebellar infarct / hemorrhage. Most importantly, the physician should be able to differentiate between central vertigo and peripheral vertigo. In central vertigo, signs are more and symptoms are less because if central adaptation, but in peripheral vertigo, symptoms are more and signs are less. Many a times a timely referal can save patients life.

In Peripheral vertigo, treatment include the following:-

Explanation and reassurance are important, as anxiety exacerbates vertigo. Persistent dysequilibrium should be overcome by central adaptation, but anxiety may prevent the required level of activity. Drugs that sedate the vestibular-brainstem axis, such as prochlorperazine, relieve symptoms. Sublingual preparations help when vomiting is severe. Avoid prolonged use, as they prevent central compensation. Betahistine may improve perfusion of the labyrinth and is used prophylactically in Meniere's disease. There is little evidence of its efficacy. The Epley manoeuvre or semonts manoeuvre usually resolves BPPV. Untreated BPPV usually settles within months.

The Cawthorne-Cooksey and other vestibular rehabilitation exercises promote central compensation and help resolve persistent dysequilibrium.

Red flags in treating vertigo The following findings are of particular concern:

Head or neck pain Ataxia Loss of consciousness Focal neurologic deficit Severe, continuous symptoms for > 1 hour Downward beating or upward beating nystagmus Use of the HINTS exam (Head Impulse, Nystagmus, Test of Skew exam) to differentiate central from peripheral causes of acute vestibular syndrome is one of the most important bed side tests to be done in a patient presenting with vertigo.

RHINOLOGICAL DISORDERS IN THE ELDERLY

Aging in the nasal tissues produces anatomical and physiological changes in the elderly. The elderly have a generalized decrease in body water content of 7%, and with the degeneration of mucus-secreting cells, the effectiveness of the mucociliary system is reduced with frequent symptoms of nasal stuffiness. The fragmentation and weakening of the cartilage of the septum also causes airflow changes contributing to nasal

stuffiness. The elderly also experience hormonal and metabolic changes which affect the physiologic nasal function. Epistaxis is relatively common in the elderly, and aging changes in the vascular system such as atherosclerosis contribute to the severity of epistaxis. The majority of bleeding occurs anteriorly and is due to dryness and local trauma.

Other causes include Hypertension, anticoagulants, rhinosinusitis, Tumours, vascular malformations including aneurysms, chronic alcohol ingestion, renal dysfunction causing uremia, bleeding disorders, abnormal LFT, platelet dysfunction, Maggots in nasal cavity, etc.

Medical approaches to the treatment of epistaxis may include the following:

Adequate pain control in patients with nasal packing, especially in those with posterior packing (However, the need of adequate pain control has to be balanced with the concern over hypoventilation in the patient with posterior pack.) Endoscopic cauterisation Embolization Oral and topical antibiotics to prevent rhinosinusitis and possibly toxic shock syndrome. Avoidance of aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) Medications to control underlying medical problems (eg, hypertension, vitamin K deficiency) in consultation with other specialists.

HEAD AND NECK MALIGNANCIES IN ELDERLY
ORAL CAVITY MALIGNANCIES

Oral cavity tumors present as ulcerative or ulceroproliferative lesions in base of tongue/ floor of mouth / buccal mucosa along with cervical lymphadenopathy. Flexible endoscopic assessment along with dental examination required . Incisional biopsy of mucosal lesion is needed. FNAC of suspicious lymphadenopathy, OPG, CT scan, MRI, USS and PET are required for diagnosis. Excision of tumour with adequate clearance with or without neck dissection followed by radiotherapy & / chemotherapy is the treatment modality. Advanced Buccal mucosa carcinoma requires reconstruction with free flaps after excision. Nasopharyngeal carcinoma can present with blood stained nasal discharge, post nasal drip,nasal block, ipsilateral hearing loss ,tinnitus and middle ear effusion. Diagnosis made by nasal endoscopy or nasopharyngoscopy followed by biopsy. Ebstein barr virus antibody serology, cytology, nasopharyngeal brushing for EBV DNA are being done for conformity of EBV. CT,MRI, USG ,PET scans can be done in imaging. Primary treatment is radiotherapy and chemotherapy.

Long term follow ups are required.In case of recurrence surgery is being considered. Malignancies of Nose and PNS can present as unilateral stuffiness and blockage, epistaxis, facial pain. Diagnosis can be done by nasal endoscopy and imaging-CT/MRI followed by biopsy. Endoscopic surgeries can be done for the treatment of the same followed by RT / CT if required depending on histopathology. Oropharyngeal Squamous cell carcinoma can be classified as HPV + and HPV -. So important to do molecular testing for HPV status. Major site is being tonsils -60%. HPV+ Oropharyngeal squamous cell carcinoma may be small and asymptomatic. It's also the most common site for primary tumour in context of carcinoma of unknown origin. Base of tongue have 30% involvement. These cases present with odynophagia, persisting pain including referred otalgia ,dysphagia, altered speech and impaired tongue movement. Soft palate and posterior pharyngeal wall tumors constitute 10% cases. Presentation is with ulcerative lesions. Cervical lymphadenopathy can be seen along with these symptoms. Flexible fibre optic laryngoscopy is being done to have a diagnosis.

Other investigations include ultrasound and FNAC of neck nodes ,CT scan, MRI, PET scan for imaging. Evaluation under anesthesia of upper aerodigestive tract with biopsy is also done. Management includes RT / Concurrent CT. Transoral resection done via transoral laser microsurgery and transoral robotic surgery with or without neck dissection is also preferred. In laryngeal malignancies, glottic carcinoma shows altered voice in the earliest presentation itself due to altering wave pattern over vocal cord. Hoarseness more than or equal

to 3 weeks requires urgent ENT examination. Advanced cases present with breathing difficulties progressing to airway obstruction and stridor. Supraglottic small lesions cause foreign body sensation. Bulky tumor produces hot potato voice,referred otalgia, odynophagia and true dysphagia. Subglottic tumors present with foreign body sensation in early cases whereas hoarseness, diplophonia, progressive dyspnoeic stridor seen in advanced cases. Flexible nasal laryngoscopy / 70 degree rigid endoscopy is done to have a diagnosis. CT scan and MRI and evaluation under anesthesia with biopsy done for the confirmation. Small lesions can be managed with endoscopic excision (laser assisted) or radiotherapy. In early carcinoma voice preserving surgeries can be done. For glottic Ca - surgical resection via Transoral laryngeal microsurgery. For supraglottic Ca - radiotherapy / transoral laser microsurgery / trans oral robotic surgery with or without neck dissection can be done. In advanced cases CRT/ total laryngectomy can be done. Hypopharyngeal carcinoma presents with odynophagia dysphagia, hoarseness, otalgia and neck swelling.

Significant weight loss and early dysphagia seen in post cricoid carcinoma and oesophageal tumor. Investigations include barium oesophagogram, flexible transnasal oesophagoscopy, direct laryngoscopy + biopsy under GA. USG neck and FNAC of neck nodes, CE-CT neck MRI and PET scan. Management includes partial laryngopharyngectomy, trans oral laryngeal microsurgery, Transoral robotic surgery with or without neck dissection. Radiotherapy can be considered in early cases. Advanced cases with intact laryngeal framework treated with chemoradiotherapy / RT and in these with compromised laryngeal framework total laryngectomy with radiotherapy can be done.

MUCOSITIS AND ORAL ULCERATION IN ELDERLY

Mucositis is the inflammatory process involving mucus membrane of oral cavity and GIT. Elderly with poor oral hygiene, reduced salivary flow, low BMI are highly susceptible. Other risk factors include smoking, alcoholism, previous cancer treatment. Females are more prone than males. Chemotherapy agents like 5 fluro uracil and etoposide are main causative of Mucositis. High dose chemotherapy, radiation administered directly to head neck and chemotherapy combined with radiotherapy increases the risk. Mucositis present as asymptomatic erythema, redness of oral cavity, erythema replaced by erosion, ulcers covered with white fibrous pseudomembrane, xerostomia and pain. Management includes oral care - brush all tooth surface, rinse mound with bland mouthwash, use water based moisturiser, maintain adequate hydration, avoid tobacco, alcohol and irritating foods. Cryotherapy by placing ice chips and cold water in mouth- causes vasoconstriction of oral cavity. Patient describe oral mucositis as most painful and debilitating symptoms after cancer treatment. Decreasing oral Mucositis can help patient in receiving the needed dose of radiation / chemotherapy to cure and control cancer.

ORAL ULCERS

Injury to oral mucosa causes localised defect of surface in which covering epithelium is destroyed leaving inflammed area of exposed connective tissue. Ulceration is the most common lesion of oral mucosa and is the manifestation for many local and gentic disorders. Oral ulcers are classied as clinical and pathological ulcers. Clinical are spreading, healing and callous type of ulcers. Pathological are further classified as based on the cause - Traumatic, infective and immunological. Mechanical - biting, sharp cusp, ill fitting intra oral appliances can cause ulcers. Chemicals like hydrogen peroxide, phenol, aspirin, Thermal- very hot food / drinks, immunologic can be due to idiopathic, bechets disease, reiters disease, contact allergy etc. Idiopathic ulcers can be further classied as major and minor aphthous ulcers, herpetiform ulcers. Major aphthous ulcer can occur anywhere in oral cavity but lip soft palate, tonsillar areas and oropharynx are the common sites. Infectious aetiology can be bacterial - syphilis, leprosy, TB, gonorrhoea, viral- herpes simplex, varicella zoster, HIV. Fungal - aspergillosis, deep fungal infection. Treatment is cause related. Symptomatic if underlying cause is unknown or not

correctable.Most cases will heal completely without any intervention. Long lasting ulcers to be considered for biopsy and further radiological evaluation to be done.

CONCLUSION

The profile of aging in our country has changed dramatically over the last century. The current life expectancy for India in 2023 is 70.42 years. By 2030, the percentage of the population over 65 years of age will exceed 20 percent, or over 70 million people. Worldwide, the number of adults over 60 years of age will top 2 billion by 2050 and will constitute over 20 percent of the world's population.

Definitions of health and wellbeing in late life have changed with the increase in life expectancy. Heart disease, cancer, and stroke have become the leading causes of death among older adults, while deaths due to infection have decreased. Adults surviving into late life suffer from high rates of chronic illness; 80 percent have at least one and 50 percent have at least two chronic conditions. There is a strong association between the presence of geriatric syndromes (cognitive impairment, falls, incontinence, vision or hearing impairment, low body mass index, dizziness) and dependency in activities of daily living. Decline in function and loss of independence are not an inevitable consequence of aging. Given the high prevalence and impact of chronic health problems among older patients, evidence- based interventions to address these problems become increasingly important to maximize both the quantity and quality of life for older adults.

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Geriatric Dermatology - Skin diseases and dermatoses of the elderly with treatment protocols

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INTRODUCTION

In our current youth-oriented society, the skin changes associated with advancing age can be difficult to accept psychologically as well as physically.

Some of these changes begin to appear in middle-age. However, an acceleration in their development is often perceived by women after menopause, and by men when they are in their 60s. In recent years, a number of products and procedures have become available to treat these conditions. Cosmetic surgical techniques have been refined to correct wrinkles and hair loss. A wide range of medical approaches has also been introduced, including collagen and silicone injections for facial lines, topical minoxidil for alopecia, more effective moisturizers, dressings that aid in wound healing, and medications to improve the circulation. In this article we discuss many of the well-known problems of older patients, along with their newer, and perhaps less well-known treatments.

COMMON BENIGN SKIN TUMORS SEBORRHEIC KERATOSES

Seborrheic keratoses are benign epidermal lesions that are extremely common in older people. They tend to develop in patients in their 30s and are usually multiple. Although they may be found anywhere on the body, there is a predilection for the trunk. Seborrheic keratoses appear as sharply defined, flat, light or dark brown verrucous papules ranging in size from a few millimeters to more than 3 cm in diameter. Keratotic plugs are frequently present. As they enlarge, they become darker and thicker and develop a greasy scale. With sun exposure or chronic irritation the lesions become larger and more heavily pigmented.

Dermatosis papulosa nigra is a variant of seborrheic keratosis that is seen in black individuals with an earlier age of onset. These small, darkly pigmented papules are seen commonly on the face in the malar region and are usually numerous."

Although there is an increased familial incidence, the etiology of seborrheic keratoses is unknown. There is no sex predilection, and no definite att tern of inheritance has been determined. The clinical characteristics of seborrheic keratoses are distinctive and usuallv do not ~resent a diagnostic problem. A more deeply pigmented lesion must be differentiated from a nevus, lentigo maligna, malignant melanoma, or pigmented basalcell carcinoma. The clinician should also be sus~icious of the sudden appearance of a large number of seborrheic keratoses, as well as a sudden increase in their size. This can signal the development of an underlying malignancy of the gastrointestinal tract. This is termed the sign of LeserTrblat.

Microscopically, seborrheic keratoses show marked hyperkeratosis, acanthosis with basaloid-

appearing keratinocytes, and elongation and bridging of the rete ridges. The amount of pigment varies with the individual lesion. The histologic picture is markedly different if the lesion has been irritated. Irritated seborrheic keratoses have numerous oseudohorn and horn cysts as well as a dense inflammatory infiltrate throughout the papillary dermis. The epidermis contains scattered dyskeratotic cells as well as mitoses, which can be suggestive of a squamous-cell carcinoma.

Treatment

Patients frequently ask to have seborrheic keratoses removed because they are cosmetically unacceptable or are becoming irritated by friction from clothing or body movement. There are many effective treatments that leave little or no scarring. The lesions can be easily removed by curettage, light electrodesiccation, or liquid nitrogen.

In 1974, Van Scott reported that topical alpha hydroxy acids were effective in removing early flat seborrheic keratoses. This mode of therapy offers a distinct advantage for patients with numerous seborrheic keratoses.

The patient may apply this type of preparation at home. A preparation containing 20 per cent glycolic acid may be used on the more advanced, thicker keratoses.~~ Application of the acid twice daily for a period of 2 to 6 weeks successfully removes the lesions, without scarring (Fig. 1). The amount of time required depends on the thickness of the lesions. ,Also, the solution must be applied carefully, as surrounding normal skin can become erythematous and superficially eroded with repeated exposure.

SKIN TAGS, ALSO CALLED ACROCHORDONS

Skin tags, also called acrochordons, are very common lesions in the elderly. They are soft, flesh-colored to brown papules and occur on the neck, upper eyelids, and intertriginous areas are common locations. Their size can vary from one to several millimeters. The larger lesions can become symptomatic because of torsion and infarction.

Histologic examination reveals papillomatosis, hyperkeratosis, and some acanthosis of the epidermis. The dermis is composed of loose and edematous collagen with many dilated capillaries.

TREATMENT

Although benign and usually asymptomatic, these lesions are cosmetically unacceptable to some patients. They can be easily removed by scissor excision or electrodessication.

CHERRY HEMANGIOMAS

Cherry hemangiomas, also known as senile hemangiomas, are commonly seen in older patients but may begin in early childhood. These cherry-red, dome-shaped lesions vary in size from one to several millimeters and increase in number and size with age. The lesions most commonly occur on the trunk, but are sometimes seen on the proximal extremities.

On microscopic examination, these lesions are composed of many capillaries with a surrounding edematous collagen matrix.lg They are best described as capillary hemangiomas. Although no treatment is required, it may be requested for cosmetic reasons. Light electrodesiccation, shave

excision, and cryotherapy are effective forms of treatment.

SEBACEOUS HYPERPLASIA

These lesions usually occur as multiple, umbilicated, soft, yellow papules on the face of elderly patients. The size ranges from 1 to 3 mm in diameter. Microscopically, these lesions consist of an enlarged multilobulated, sebaceous gland in association with an oversized duct.lg These lesions may be removed by electrodesiccation. Oral isotretinoin has been reported to diminish these lesions. However, the potential side effects may outweigh the benefit.

CHONDRODERMATITIS NODULARIS HELICIS

This condition presents as an extremely painful nodule on the helix of the ear. The majority of patients afflicted are men older than the age of 40.

The lesion is usually unilateral and more often involves the right ear. The nodule is flesh-colored and firm, with an erythematous border and an overlying scale or crust. The average size is approximately 5 to 10 mm. The patient often complains of pain that is precipitated by pressure on the ear or exposure to cold.

Chondrodermatitis nodularis helicis probably develops because of the constant exposure of the ear to physical and environmental trauma.30 Anatomic features that predispose the ear to this condition are a limited blood supply and a lack of subcutaneous fat to protect the cartilage from minor trauma. Whether the initial damage occurs in the dermis or the cartilage is not known. Inflammation and the subsequent degeneration of tissue produce the pain and epidermal changes. It is also thought that the changes may be due to a solar-induced granuloma that then elicits the inflammatory response."

The histopathology shows an epidermis that is acanthotic and hyperkeratotic. In the dermis there is edema with areas of collagen degeneration.

Surrounding the necrobiotic collagen is a focus of granulation tissue with a lymphohistiocytic inflammatory infiltrate. The perichondrium is thickened and also shows a lymphocytic inflammatory infiltrate. The cartilage may be normal or show areas of focal degeneration.

The differential diagnosis of chondrodermatitis nodularis helicis includes basal-cell epithelioma, squamous-cell carcinoma, verruca vulgaris, and actinic keratosis. Keratoacanthomas, tophi, and rheumatoid nodules are also seen in this location. The clinical presentation of an extremely painful nodule of the helix as well as the characteristic histologic picture establishes the diagnosis.

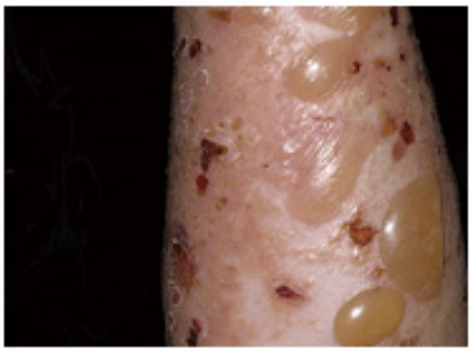
TREATMENT

The treatment of choice is excision. However, intralesional steroids may be beneficial. Prophylactic measures include having the patient use down pillows or sleep supine to minimize pressure on the ear. A telephone receiver may be another source of trauma for some patients.

Figure 2. Bullous pemphigoid. Tense bullae arising on an erythematous urticarial base.

COMMON SKIN DISEASES

BULLOUS PEMPHIGOID



Bullous pemphigoid is a blistering disease seen in elderly patients usually over 60 years of age. Both sexes are affected equally. This chronic eruption is characterized by multiple tense bullae that occur on normal skin or on an urticarial basea(~ig. 2$ In approximately one third of patients there are urticarial lesions as well as erythematous plaques with central clearing. As blisters rupture, large denuded plaques result.

Bullous pemphigoid is considered an autoimmune disease because of the presence of circulating and tissue-fixed anti-basement membrane antibodies. On direct immunofluorescence of ~erilesional skin. there is a linear band along the basement membrane zoneLconsisting of I~G and sometimes C3.34 The histopathology of bullous pemphigoid consists of subepidermal bullae and a sparse perivascular infiltrate consisting of mononuclear cells and eosinophils. l7

The prognosis for a patient with bullous pemphigoid is very good as this disease is usually self-limited. Despite earlier reports, there does not appear to be an increased incidence of internal malignancy in these patients. 34

TREATMENT

The customary treatment is prednisone, beginning at approximately 60 mg per day. More difficult patients may require much higher doses. Once the disease has stabilized, the goal is to taper the prednisone slowly to an alternate-day dosage schedule. Azathioprine or cyclophosphamide may be added for their steroid-sparing effect in the range of 1.5 to 2 mg per kg per day.= Patients require close monitoring and frequent laboratory tests to reduce the possibility of side effects from these medications.

Dapsone and sulfapyridine have recently been reported to be effective in the treatment of bullous pemphigoid. The reduced toxicity of these agents makes them attractive alternatives for certain patients. The clinician must bear in mind the self-limited, relatively benign course of this disease when formulating a therapeutic program.

EXFOLIATIVE DERMATITIS

This is a severe, generalized dermatitis characterized by erythema and scaling, which typically affects patients over the age of 40, men twice as often as women. This eruption is also accompanied by lymphade,nopathy,

hepatomegaly,' and sometimes splenomegaly.' Loss of hair and nails may occur.

Exfoliative dermatitis develops as a result of an underlying dermatologic condition or systemic disease. Drug allergies were estimated to be the cause of 40 per cent of the cases of exfoliative dermatitis in one study.31

Pre-existing dermatologic diseases that may cause this condition include psoriasis, atopic dermatitis, stasis dermatitis, contact dermatitis, seborrheic dermatitis, pityriasis rubra pilaris, and lichen planus. Internal malignancy can also produce a generalized erythroderma. In 1979, Rosen et a1 reported that 1 per cent of the 494 patients with exfoliative dermatitis they reviewed had an

underlying malignancy of the colon, liver, thyroid, lungs, or prostate.~' Leukemia and lymphoma were also found. It should be noted that in many cases of exfoliative dermatitis the underlying cause may never be discovered.

Exfoliative dermatitis is a reactive process of the skin in which cell division is accelerated, with a subsequent decrease in the transit time of the keratinocytes. The widespread exfoliation results in considerable water, electrolyte, and protein loss, which can be life-threatening. Increased basal metabolic rate and problems with thermal regulation ensue. Some cases of hypothermia have been reported. Other complications include anemia, which is seen in up to 50 per cent of these patients, and secondary infection or septicemia.

TREATMENT

Therapy for this condition should be based on the underIying cause.

If a drug is implicated, withdrawal of the offending substance usually results in prompt resolution of the eruption. Topical corticosteroids are effective in decreasing the vasodilation and erythema. Antihistamines are an essential part of the therapy, as pruritus is extreme in these patients. If they are not contraindicated by the underlying cause, systemic corticosteroids may be used. Fluid and electrolyte balance must be monitored carefully. Skin precautions to minimize the risk of secondary infection should be instituted.

Bacterial infections need to be treated promptly should they occur.

CONTACT DERMATITIS

Exposure to allergens or irritating substances can produce contact dermatitis. This type of dermatitis starts at the area of exposure but may become generalized. Erythematous, edematous plaques or vesicles appear in the affected sites. The distribution and pattern of the eczematous changes provide useful clues as to the etiology of the eruption. Careful questioning of the patient regarding recent contactants will also help to pinpoint the cause. When the etiology remains obscure, patch testing can be performed to determine if the patient has an allergy. Standardized commercially available patch test kits contain a variety of diluted allergens in a solution or ointment base. These substances are applied to the back, covered with an adhesive dressing, and left in place for 48 hours. The underlying skin is then examined for any sign of reaction at 72 hours.

Common allergens include nickel, rubber, balsams, plants, dyes, paraben esters, and lanolin. Soaps and detergents are common household irritants that can also produce a cutaneous reaction. Patients frequently develop contact dermatitis in their attempt to treat an existing rash or sore. The use of topical antihistamines, benzocaine, procaine, and neomycin may lead to an allergic reaction, especially in an area of dermatitis.

Older patients are at risk of developing contact dermatitis for a number of reasons. As the skin ages, its barrier function dim in is he^.^ At the same time, the ability of the skin to clear chemicals from the dermis decreases, leading to an accumulation of these irritants and allergens. Dry skin is more easily irritated. Stasis dermatitis, a common condition in the older population, is another predisposing factor to the development of contact dermatitis.

Although older people are at risk for developing contact dermatitis, they are actually less able to mount a delayed hypersensitivity reaction.

Waldorf et a1 demonstrated the inability of older subjects to develop sensitivity to dinitrochl~robenzene.~~ The lower rate of positive results to standardized skin tests in the elderly has also been demon~trated.~' This altered

responsiveness may be attributable to the decreased number of circulating T lymphocytes and reduced vascular reactivity that occurs with advancing age.

TREATMENT

The primary treatment for contact dermatitis is removal of the offending agent. Topical corticosteroid creams and oral antihistamines provide symptomatic relief. Severe cases may require a 2- to 3-week course of systemic corticosteroid therapy. Vesicular eruptions can also be treated with shake lotions and aluminum acetate compresses.

PRURITIS

Itching is a common complaint of elderly patients. The reason for this ailment is frequently obscure and usually considered to be idiopathic. In 10 to 50 per cent of patients in some series, the symptom is related to a significant medical disorder.%. 36 The most common conditions include chronic renal failure, hyperthyroidism, diabetes, lymphomas, leukemia, drug ingestion, polycythemia Vera, and hepatic disease. When patients over 65 present with the complaint of generalized pruritus without an apparent skin eruption, these causes should be excluded.

Older patients may have pruritus due to xerosis. If no etiology for itching can be identified, the condition is called "senile pruritus."

TREATMENT

If the pruritus is secondary to one of the medical conditions listed above, treatment of the underlying disease will frequently relieve the itching. Patients with renal disease often respond to UVB light therapy. administered on a biweekly basis over several weeks. Subtotal Para thyroidectomy," '' intravenous lidocaine,~~ oral cholestyramine resin,42 and oral charcoal3' have also been reported to be beneficial in cases of uremic pruritus. Oral cholestyramine resin5, 222 40 and plasma perfusion with charcoal-coated beads16 have aided patients with hepatobiliary disease. Discontinuation of an offending medication may be the solution for other patients.

There are some general guidelines for the treatment of pruritus regardless of its course. Tepid baths followed by the application of smoothing emollients containing phenol, 0.25 to 0.5 per cent, or menthol, 0.25 to 0.5 per cent, will hydrate the skin and provide relief. Topical steroids are also helpful because of their anti-inflammatory, vasoconstrictive and anti-pruritic effects. Lower-potency steroids are sufficient and reduce the risk of atrophy and adrenal suppression. Soft, absorbent clothing, such as cotton, will also add to the patient's comfort. Antihistamines are useful but must be prescribed with some caution. Paradoxical restlessness and psychomotor dysfunction are frequent side effects in the elderly.

ASTEATOSIS

Dry skin is a relatively common ~roblem in all age groups, but by the age of 70 nearly everyone is affected. The reason why the skin becomes or appears "dry" is still poorly understood. Many explanations for this process have been described in the literature. It has not been definitively established whether there is an actual change in the water content in the skin or whether there is an increased amount of water loss. Potts et a1 reported that aged skin has a lower water content than younger skin.35 Lorincz concluded that there was excessive loss of water through a defective horny layer barrier that lead to dehydration of the epidermis.%' On the other hand, Kligman found that there was actually less transepidermal water loss in the aged.14 Several authors have also stated that the water content of the skin was greater in the aged.14. 45

In most elderly patients the skin appears dry, rough, and scaly. In more severe cases there is visible fissuring of the stratum corneum, which is given the name eczema craquel6 (French "marred with cracks") (Fig. 3).

These conditions become aggravated during the winter months. The onset of symptoms is frequently linked to home heating, which significantly lowers the humidity.

TREATMENT

A home humidifier, although helpful, increases the ambient humidity to only 50 per cent. At this level the skin may still be dry. Bathing less frequently with warm rather than hot water, using mild, superfatted soaps, and erythema of the epidermis.

Superficial fissuring and applying moisturizers while the skin is still damp are helpful measures.

For patients with eczema craquelk, a topical corticosteroid cream should be added to reduce inflammation.

LICHEN SIMPLEX CHRONICUS AND PRURIGO NODULARIS

Repetitive rubbing and scratching of localized areas can lead to the development of these two conditions. In lichen simplex chronicus, lichenified scaly plaques develop at the nape of the neck, lower legs, extensor surfaces of the forearms, and anogenital regions (Fig. 4). Predisposing factors include dry skin, stress, and atopic dermatitis. Firm, excoriated papules and nodules of the extremities are characteristic of prurigo nodularis

TREATMENT

Topical corticosteroids with or without occlusion provide symptomatic relief for these disorders. In more resistant cases, intralesional steroids may Figure 4. Lichen simplex chronicus of the nape of the neck.

Figure 5. Prurigo nodularis. Discrete indurated hyperkeratotic nodules are located mainly on the extremities. The lesions are very pruritic. be indicated. Oral antihistamines are also needed for their antipruritic effect.

INTERTRIGO

This inflammatory condition occurs in the genitocrural and submammary regions as well as in folds of abdominal skin. Obesity, diabetes, poor hygiene, friction of clothing, and incontinence are predisposing factors.

Bright, erythematous, moist, sharply defined plaques develop in the intertriginous areas (Fig. 6). Erosions or frank ulcerations may develop in untreated patients. Burning and itching are common complaints. Tinea, moniliasis, psoriasis, seborrheic dermatitis, and contact dermatitis may mimic this disorder or be aggravating factors. Intertrigo. Moist erythematous plaques develop in body folds as a result of perspiration and friction. Candidiasis is a common secondary infection.

Angular stomatitis due to loss of vertical dimension.

TREATMENT

Reduction of the moisture, maceration, and friction is the primary therapeutic goal. Aeration of the affected areas several times daily is helpful, but often difficult to accomplish. Soft, absorbent clothing, such as cotton, should be next to the skin. Men can be advised to wear loose-fitting boxerstyle shorts and an open-mesh scrota1

support. The frequent application of dusting powders will reduce friction. Zinc oxide paste or ointment can be soothing and provides a protective barrier if incontinence is a problem. For macerated or eroded plaques, cool compresses 3 to 4 times a day with Burow's solution or tap water is indicated. A low-potency steroid cream will reduce inflammation. For individuals with an underlying candida or tinea infection, anti-fungal creams such as miconazole or clotrimazole should also be utilized.

ANGULAR CHEILITIS

Angular cheilitis is an inflammatory reaction of the angles of the mouth seen in older individuals. Erythema and maceration of the oral commissures develop. Adjacent mucosal surfaces may also become involved (Fig. 7).

There are various causes of this condition. In the older patient, the skin folds around the mouth and nasolabial area become more prominent because of atrophy of the alveolar bone and loss of teeth, with resultant overclosure of the jaws. Decreased facial muscle tone is another factor in its development. The intertriginous area thus formed predisposes the individual to maceration as well as candidal infection. Candidiasis may also develop on the mucosal aspect of the angles of the mouth, especially in patients taking broad-spectrum antibiotics. A deficiency of iron or Bcomplex vitamins may also cause angular cheilitis. Excess salivation seen in the older individual results in moisture at the comers of the mouth, which forms a favorable environment for secondary infections. Factors such as seborrheic or contact dermatitis can also contribute to this condition.

TREATMENT

The treatment of angular cheilitis is based on eliminating the etiologic factors. In the edentulous patient or in the patient with poor-fitting dentures, improvement of the bite and alteration of the vertical dimensions must be attempted. Collagen injections of the oral commissures have been advocated recently to minimize prominent folds and thus reduce accumulation of moisture. The newer cross-linkecl collagen implant may prove to be a superior treatment for this condition because of its deeper placement and increased durability. Correction of underlying nutritional deficiencies or stopping broad-spectrum antibiotics may be necessary. Topical therapy can provide relief. A combination of hydrocortisone and nystatin in a cream base is frequently effective. Application of a barrier ointment may prove useful when excessive salivation is a problem.

ROSACEA

Rosacea is a common acneiform condition that occurs most commonly in women in the fourth, fifth, and sixth decades. Intermittent erythema or an exaggeration of the normal flush response is the presenting sign. The erythema, which usually involves the forehead, chin, nose, and cheeks, becomes more persistent with the subsequent appearance of telangiectasias.

Papules, pustules, and sometimes nodules are common in the more advanced signs. Rhinophyma, a type most commonly found in men, is characterized by enlarged sebaceous glands, dilated pores, and thickened skin involving the lower portion of the nose. The nose may become markedly enlarged. Ocular complications are associated with rosacea, the most common being blepharitis and conjunctivitis. Keratitis with secondary ulceration and corneal opacities is a less common but more serious complication.

The histopathologic findings are varied and depend on the severity of the condition. Telangiectasias and a perivascular lymphohistiocytic inflammatory infiltrate with some dermal edema are seen in the erythematous telangiectatic phase. Findings associated with papular rosacea consist of epithelioid cells, histiocytes, and dense inflammatory infiltrate.'Wyperplasia of the sebaceous glands is seen in rhinophyma.

The cause of rosacea is not known. A number of hypotheses have been advanced. Increased vascular lability resulting in the early "blush phenomenon" has been proposed. The Demodex folliculorum mite has been found in large numbers in sebaceous follicles; however, it has not proved to be the causative factor. Other theories include vitamin deficiencies, endocrine changes, and abnormalities of the gastrointestinal system. Factors that have been shown to exacerbate rosacea are hot beverages, spicy foods, ingestion of ethanol, exposure to sunlight, and an increase in environmental temperature.

TREATMENT

Treatment can be difficult because rosacea follows a chronic course that usually increases in severity. Control of environmental factors such as avoidance of extreme heat and sunlight is recommended. Discontinuing hot drinks, spicy foods, and alcoholic beverages may prevent worsening of existing lesions.27 The acneiform papules and pustules respond to traditional acne therapy. Oral tetracycline is probably the single most effective form of therapy for acne rosacea. Topical erythromycin, tetracycline, or clindamycin and benzoyl peroxide gels may be used for mild cases. Hydrocortisone cream compounded with 10 per cent sulfacetamide or 3 per cent precipitated sulfur and 2 per cent salicylic acid is also useful. Electrocautery and argon laser therapy are used in the treatment of facial telangiectasias. Rhinophyma can be improved by traditional scalpel surgery, electrosurgery, or reduction with the carbon dioxide laser.

HERPES ZOSTER

Herpes zoster is a viral infection commonly seen in patients in their 60s, 70s, and 80s. Zoster develops because of a reactivation of the varicella virus from a latent state in a sensory ganglion. Although most patients afflicted with shingles are in good health, decreased immunocompetence predisposes the individual to the eruption.~' Patients undergoing radiation and chemotherapy or suffering from malignancies or severe bacterial infections have an increased incidence of this disease.

Prodromal symptoms occur a few days before the skin signs and consist of tingling or itching in the regions to be affected. The skin eruption begins with erythematous macules and papules in a single dermatomal distribution.

These lesions may then progress to grouped vesicles, which may become confluent (Fig. 8). Vesicles may continue to erupt for up to 2 weeks. Dry haemorrhagic crusts develop as the lesions resolve. Secondary bacterial infections are

common. In the elderly, healing often results in scarring.

Severe pain is associated with herpes zoster but typically subsides in 2 to 4 weeks as the lesions resolve. Post herpetic neuralgia (persistent pain for weeks to months after the lesions have revealed) is a frequent problem in the older patient. It has been established that this pain affects half of the patients over 60 years of age.

Dissemination is a life-threatening complication of herpes zoster seldom seen except in the immunosuppressed patient. A few vesicles scattered outside of the dermatomal pattern can be seen in healthy adults and pose no risk to the individual. If the virus affects the ophthalmic division of the trigeminal nerve, the eruption is termed herpes zoster ophthalmicus. Serious complications may result when the nasociliary branch of the ophthalmic nerve is affected.

Vesiculation on the tip of the nose often presages involvement of the eye, such as corneal ~lceration.~~

TREATMENT

Treatment of herpes zoster in the healthy patient consists of symptomatic relief and avoidance of bacterial and ophthalmic complications. Local skin care with aluminum salt compresses is important in preventing secondary infection. Hydrocortisone lotions and oral analgesics can make the patient more comfortable. Patients with ocular involvement should be followed closely by both the dermatologist and the ophthalmologist. The use of systemic steroids to prevent or attenuate postherpetic neuralgia is controversial. Studies by Eaglstein7 and Keczkes13 indicate that systemic steroids are effective in preventing postherpetic neuralgia in the older patient.

Herpes zoster in the immunosuppressed patient can be life-threatening because of the constant risk of dissemination, especially to the central nervous system. These patients require hospitalization and treatment with intravenous acyclovir.

VASCULAR DISORDERS

Venous lakes

These blue-black, compressible, raised lesions are usually found on exposed areas such as the lips, face, ears, and neck. They may be single or multiple. Histologically, dilated veins are observed." If a patient finds them cosmetically unacceptable, they may be treated by electrodesiccation.

Senile purpura

Senile purpura tends to occur over the dorsal surface of the hands and forearms. Little or no trauma is needed to induce these lesions. White pseudoscars may result from dermal injury. This condition is due to increased fragility of blood vessels as a consequence of their lack of supporting tissue.

SPIDER VEINS

Multiple fine networks of superficial varicosities frequently develop on the legs of older women. They may or may not be associated with deeper and larger varicose veins, but these superficial lesions are only significant from a cosmetic standpoint.

Attempts at treating these vessels with electrocautery may result in obvious scarring. Sclerotherapy with hypertonic saline solution has become a more popular alternative in recent years. A 30- to 32-gauge needle is threaded into the lumen and the vessel is then perfused with saline. It is a relatively simple, well-tolerated procedure,

which has little potential for scarring. The argon laser has not been as successful in treating leg varicosities as it has been for facial telangiectasias. The incidence of scarring is greater in this location. Another practical approach to this problem is the use of a leg make-up to cover these lesions.

STASIS DERMATITIS AND STASIS ULCERS

Women develop varicose veins four times as often as men do.44

Hormonal factors and circulatory changes associated with pregnancy may be responsible for this increased incidence. A genetic predisposition may be another factor leading to their development. The incompetence of the venous valves gradually results in the pronounced dilatation and tortuosity of the veins. Edema of the lower extremities, hemosiderin deposition, inflammation, and in some cases ulceration mark the progression of this disorder

TREATMENT

Guidelines for patients with venous insufficiency should include fitted support stockings and avoidance of standing or sitting with the legs dependent for extended periods of time. For patients with stasis dermatitis, topical cortisone creams are effective. Patients should be advised not to use preparations with "-caine" derivatives for relief because of the risk of allergic sensitivities. Patients with stasis dermatitis are at an increased risk of developing an allergic contact hypersensitivity compared with people with other common skin disorderse3

Stasis ulcers tend to be a chronic and disabling problem for many elderly patients. Management consists of debridement, cleansing, treatment of secondary infections, and various dressings. Debridement may be accomplished through the use of wet to dry dressings, ointments containing proteolytic enzymes (Elase and Travase), or hydrophilic beads (Debrisan), or may be accomplished by surgical means. Aluminum salt solutions, hydrogen peroxide, silver nitrate, and acetic acid soaks are effective cleansers. Acetic acid soaks are particularly effective when gram-negative organisms are abundant. Bandaging the ulcers provides relief from pain and also promotes wound healing. In recent years a variety of semipermeable membranes have been proved to be effective in the management of leg ulcerations, including Vigilon, Duoderm, and Opsite. Unna boot dressings applied on a weekly basis in a doctor's office simplify the treatment regimen for the patient. Medical management of stasis ulcers may also include diuretics to reduce pedal edema. Oral zinc, topical nitroglycerin, benzoyl peroxide, and sodium cromalyn have been reported to be effective.

However, no consensus has been reached in the benefits of these medications.

Some ulcerations reauire surgical " intervention. S~lit-thickness skin grafts are frequently utilized for this purpose. Pinch grafting, a process by which small full-thickness grafts are harvested from the thighs under local " "anesthesia, is a simple technique advocated by many dermatologists.

HAIR CHANGES

Some of the most obvious signs of aging, as well as the most bothersome, are changes that occur in the hair. These changes consist of graying, androgenetic alopecia, and in women, an increase in facial hair.

Approximately half the population has gray hair by age 50.' This color change is due to the progressive loss of melanocytes from the hair bulb.

Changes in pigmentation are thought to occur more rapidly in hair than in skin because melanocytes multiply and manufacture melanin at maximal rates during the anagen or growth phase of the hair cycle, whereas epidermal melanocytes are relatively inactive throughout their life span.

Scalp hair is believed to gray more rapidly than other body hair because its anagen (growth phase)-to-telogen (resting phase) ratio is considerably greater than that of other body hair.

Androgenetic alopecia showing the typical

frontotemporal recession.

TREATMENT

Gray hair may or may not be considered a cosmetic problem. In many adults the color change may be flattering; others may "hate that gray" and want to wash it away. Many options are available for those who choose the latter route. Temporary color rinses and permanent hair coloring kits are available in drug stores or may be applied professionally in salons. Gray hair may be thinner and sparser, but it is not weaker than pigmented hair.

It tends to be more resistant to permanent waves and coloring. For individuals with thin hair, a permanent can make the hair look fuller, thicker, and more flattering.

ANDROGENETIC ALOPECIA

Androgenetic alopecia can be a signifcant problem for both men and women. In men, the earliest manifestation may be "frontotemporal recession" (Fig. 10). In 5 per cent of white men, this process begins in their 20s. By the seventh decade, 80 per cent show frontotemporal recession.

More extensive hair loss occurs in 15 to 18 per cent, and 1 to 2 per cent develop severe alopecia by their early 30s.44 Hair is retained in the occipital region of the scalp and along the sides.

Androgenetic alopecia begins at a much later age in women and is less pronounced than it is in men. Thinning usually occurs at the vertex and frontal regions. The hair may also become finer and less dense in the temporal area.

Androgenetic alopecia is attributable to the effect of androgen on genetically predisposed hair follicles. The anagen phase of hair growth becomes progressively shorter, leading to increased shedding of telogen or resting hairs. The hair becomes thinner and miniaturized during this Figure 11. A, Male pattern alopecia prior to transplantation. B, Same patient after transplantation surgery. process. The final result is the replacement of coarse, pigmented terminal hairs by fine, non-pigmented vellus hairs.

TREATMENT

Medical research still has not discovered the "cure" for androgenetic alopecia. Various antiandrogenic agents, including cyproterone acetate, spironolactone, and cimetidine, are currently under investigation. In recent years, minoxidil, an antihypertensive medication with the well-known side effect of increasing hair growth, has received much attention. Multicenter clinical trials have been conducted utilizing topical minoxidil solution for the treatment of pattern alopecia. Initial results seem to indicate that approximately 25 to 30 per cent of individuals receiving the drug develop some new hair growth. In many cases, however, these new hairs are still very fine and not cosmetically significant. Hopefully the partial success of this medication will lead to the development of more effective treatments.

Surgical hair transplantation provides an alternative form of therapy for the man with significant male-pattern alopecia. In this procedure small cylindrical grafts are harvested from the hair-bearing occipital region of the scalp and transplanted to the frontal and parietal areas (Fig. 11). If the area of alopecia is extensive, scalp reduction may precede the hair transplantation procedure. Numerous advances in hair transplantation have been developed in the last 20 years, including the use of smaller punch grafts to create a more natural hairline, strip grafts, tissue expanders used in conjunction with scalp reduction, and postoperative application of minoxidil to reduce temporary shedding of hair.

The best candidates for this procedure are men with "salt-and-pepper" hair coloring and rather curly hair. It is also important that they have enough hair on the sides to make the hairline appear natural, as well as sufficient hair on the occipital region to provide an adequate supply for the transplantation.

EXCESSIVE FACIAL HAIR

As women lose hair on their scalp, they may be paradoxically developing hair in unwanted areas. Coarse, pigmented terminal hairs may develop on the chin and upper lip. Long terminal hairs may also appear on the ears of men.

TREATMENT

In recent times and with modern day upgrades the diode laser particularly the triple wave length diode laser provides an effective and desirable solution to excessive facial and ody hair , the long pulse nd yag laser and many other wave-lengths have also been used for the same indications in various FP skin phototypes.

As per old techniques ,Excessive facial hair may be removed by a variety of temporary or permanent methods or bleached. For women with a fair complexion, bleaching may be a reasonable alternative. Facial bleaching products are available commercially. Tweezing and facial depilatories, which women may employ at home, are temporary methods of removing unwanted hair.

Waxing is a technique that is best done in a beauty salon. Melted wax is applied to the affected areas, allowed to set, and then stripped off. Hairs embedded in the wax are plucked out. The treatment cannot be repeated until the hair is long enough to become embedded in the wax again, usually 4 weeks. As with repeated tweezing, waxing may result in damage to the follicles so that many unwanted hairs no longer grow back. Electrolysis is the only permanent method of hair removal. It requires a skilled operator, and even then there is a risk of scarring. This can be a rather uncomfortable and tedious procedure. The incidence of regrowth after an individual treatment is 40 to 60 per cent. For this reason, to remove just the hair of the upper lip can require months of treatment.

NAIL CHANGES

Nails become thicker, duller, and more brittle as people age. Longitudinal ridges frequently develop The linear growth rate of nails also decreases by 30 to 50 per cent between early and late adulthood.

TREATMENT

The brittleness of nails is directly related to their water content.

Soaking nails in water for 15 minutes or longer will hydrate them and make them more flexible. The nails should then be coated with a cream to retard water loss. Some recent reports indicate that moisturizers containing "Senile nails," showing longitudinal striations. phospholipids may be more effective for this purpose. The excessive use of nail polish removers will dehydrate nails. Women who wear nail enamel should be instructed to remove it no more than once per week with a gentle acetone-free remover. Any chips in the polish can be covered with the application of an additional coat.

To increase the mechanical strength of nails, nail wraps and liquid nail strengtheners containing nylon fibers may be helpful. Acrylic nails should be avoided, however, because of their association with allergic reactions and local infections. Shorter nails are easier to maintain and less likely to tear.

Other tips for fingernails include (1) wearing gloves to minimize exposure to laundry detergents and

soap; (2) keeping nails short; and (3) filing nails in an oval rather than a more pointed shape to reduce splitting.

Longitudinal ridges may be reduced by the use of specially designed nail "buffers. "

WRINKLES

Wrinkles are most prominent on the face and neck primarily because they receive the greatest amount of exposure to the sun. A number of factors are responsible for wrinkles including the degeneration of elastic fibers into thick amorphous clumps, a decrease in the number and resiliency of collagen fibers, and thinning of the dermis and subcutaneous fat.

TREATMENT

Several types of treatment are currently available to repair damaged or excessively aged skin. Trichloroacetic acid and phenol peels can successhlly treat superficial wrinkling and in some cases irregular pigmentation of the face. Trichloroacetic acid peels do not penetrate quite as deeply as the phenol peels, and therefore the cosmetic effect is not as pronounced with this technique. The advantages of the trichloroacetic peel are that it is done more quickly, is less painful, and requires less time for healing. Trichloroacetic peels are also useful in the periorbital region. Phenol peels will correct deeper wrinkles, but this technique requires close monitoring because of the risk of cardiac toxicity. Dermabrasion is another procedure that can remove wrinkles through the use of high-speed rotating brushes.

Risks associated with this technique include irregular pigmentation, grooving of the skin, milia, and hypertrophic scars.

Collagen injections offer a nonsurgical approach to minimizing facial lines. This material is injected into the superficial layers of the dermis.

Wrinkles of the forehead, glabella, and nasolabial folds respond readily to this treatment. The newer cross-linked form of collagen is injected into the subcutaneous fat to correct deeper furrows or scars. It is longer-lasting than the original collagen products, which tend to last from 6 months to 2 years.

Injectable medical-grade silicone has not yet received the approval of the Food and Drug Administration in this country. If no major problems with this substance are found, it would offer the advantage of being a permanent correction for facial lines.

Cosmetic surgeons perform blepharoplasties and facial rhytidectomies to remove wrinkles and sagging skin. Liposuction offers an added dimension to facial and body contouring. Many of this procedures, which were once performed in a hospital setting under general anesthesia, are now being done with local anesthesia on an outpatient basis. With improved techniques, scars are less noticeable and the recovery time is shortened.

Minimizing exposure to the sun is the best prophylactic treatment for wrinkles. In recent years, the introduction of effective and cosmetically acceptable sunscreens has made this a realistic goal Protective clothing together with avoidance of the sun during peak daylight hours minimizes solar damage.

Lasers in geriatric dermatologic diseases and dermatoses

Lasers in onychomycosis

— Long pulsed Nd: YAG 1064-nm laser

— Q-switched Nd:YAG 1064- and 532-nm Nd:YAG lasers

— Carbon-dioxide (CO2) laser

— Near-infrared Diode laser

RATIONALE

— Temperatures over 45°C (fluence of >16 J/cm2) can result in pain and necrosis in humans, whereas **fungicidal temperatures occur at 50°C**.

— Fungal cells and dermal cells differ in membrane conductivity and water content

— As these dermal structures have a higher thermal conductivity, heat can be easily dissipated.

— Fungal cells, however, do not have this property and can therefore be targeted. The mycelium surrounded by the chitin wall is slow to dissipate heat between successive pulses, resulting in a buildup of temperature within the mycelium, unlike the surrounding tissue where heat is conducted away by tissue and water.

The q switched nd yag laser in pigmentary disorders

— Once synthesized melanin is packed in melanosomes, melanosomes are then transferred to keratinocytes from dendritic processes ,here is where the laser comes in thus preventing the incorporation to the keratinocyte ,by photoacoustic effect ,as melanosome is heated steam is formed =whitening clinically = endpoint in most cases

— The fractional q switched nd yag works on melanosomes and their suppression and via this we perform the laser dendrectomy ,earlier and till today fractional photothermolysis with diode 1550 nm is the usfda approved protocol however nanosecond and picosecond lasers are showing promising results

PRP (PLATELET RICH PLASMA) IN ANDROGENTIC ALOPECIA

— Hair loss has a significant influence on psychological distress and is associated with low self-esteem and depression. Treatment options for androgenic alopecia are very limited and include topical minoxidil and oral finasteride (FDA approved) either alone or in combination

— However, there are several reported side effects such as headache and increase in other body hairs for minoxidil whereas loss of libido has been reported with oral finasteride. Finasteride also interferes with genital development in a male fetus and is contraindicated in pregnant women and those likely to become pregnant.

— PRP has already attracted attention in plastic surgery, orthopaedic surgery and cardiac surgery because of its potential use in skin rejuvenating effects, rapid healing, reduced infection, decreased chance of hypertrophic keloids and scars.

— Growth factors are known to activate the proliferative phase and transdifferentiation of hair and stem cells and produce new follicular units. bFGF is reported to promote the in vitro proliferation of papilla cells, and thereby plays a key role in elongating hair shaft.

SUMMARY

Aging of the skin is still an inevitable and unavoidable process. The cutaneous problems associated with aging can be annoying, cosmetically unacceptable, or, in some cases, life-threatening. Fortunately, with the increased interest in geriatric medicine, a much broader range of therapeutic modalities is now available to treat these disorders.

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Cancer in Geriatric Population

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Burden of aging and cancer:

Globally, cancer ranks as the second most prevalent non-communicable disease. Although cancer can manifest at any age, its occurrence markedly increases in later stages of life. Research indicates that the elderly face an 11-fold higher risk of developing cancer compared to their younger counterparts. According to GLOBOCAN's 2020 estimates, global cancer incidence and mortality reached 19.3 million and 10 million, respectively, with India ranking third globally after China and the United States.

The heightened susceptibility to cancer among the elderly can be attributed to factors such as population growth, lifestyle choices, and the enduring impact of infection-related malignancies. Throughout much of human evolutionary history, external threats like predation and pathogens, coupled with limited food resources, limited the lifespan of individuals, preventing the prevalence of diseases like cancer in old age. However, advances in healthcare have led to a rapid aging of the global population, with life expectancy soaring from 37 years in 1950 to the current 70.4 years in India.

Presently, over 703 million individuals worldwide are aged 65 or older, constituting 9.1% of the global population. This aging trend is anticipated to persist, with global projections indicating that the proportion of people aged 60 and above will nearly double from 12% today to 22% by 2050. In India, this demographic shift is evident in the increase from 8.6% in 2011 to 9.7% in 2022[1].

More than half of individuals diagnosed with cancer are aged 65 or older, as reported by GLOBOCAN 2020[2]. Consequently, this demographic significantly contributes to the overall cancer incidence, imposing substantial physical, emotional, and financial burdens on individuals, families, communities, and healthcare systems.

Measures of economic burden:

The Disability-Adjusted Life Years (DALYs) attributable to a disease or health condition encompass both the years of life lost due to premature mortality (YLLs) and the years lived with a disability (YLDs) arising from prevalent cases of the disease or health condition within a population. Furthermore, informal caregivers typically assume a crucial role by offering essential emotional, financial, and personal care support to individuals affected by cancer. This support often necessitates their absence from work, leading to economic losses.

What defines elderly?

The National Program of Health Care for the Elderly in India categorizes individuals aged 60 and above as elderly, with further subclassifications into Young Old (60-69 years), Middle Old (70-79 years), and Old Old (>80 years).

What to consider: Chronological age vs Physiological age?

The aging process initiates intricate transformations in biological, physiological, environmental, psychological, behavioral, and social domains, heightening the vulnerability to diseases, frailty, and disability. Chronological age, while a common metric, fails to uniformly represent life expectancy or stress tolerance.

Physiological age emerges as a more comprehensive measure, encompassing the cumulative effects of medical and psychosocial stressors on aging, discernible through functional assessments[3]. Physical frailty, characterized by reduced reserve and stress resistance across various physiological systems, accentuates susceptibility to adverse outcomes.

What happens with aging?

Tissue-level modifications involve changes in the functionality of stem and progenitor cells, immune infiltrates, oxygen/nutrient availability, cytokine and growth factor levels, and the extracellular matrix. Such alterations in the microenvironment create a selective pressure for the emergence of new adaptive phenotypes, some of which may contribute to the development of cancer. Additionally, factors such as telomere attrition, epigenetic changes, cellular senescence, and altered metabolism introduce phenotypic variability, serving as critical contributors to somatic evolution[4]. Elevated mutation rates are expected to further enhance somatic evolution. Contrary to previous understanding, the tumor-suppressive potential during youth is more potent than previously acknowledged, actively restraining cancer development over five decades of human life, even in the presence of increased DNA mutations and disrupted tissue environments.

Physiological changes encompass declining memory, attention span, respiratory and cardiac functions, digestive processes, muscle mass, bone density, renal function, and immune responses. The individualized nature of aging is underscored by these multifaceted alterations, which interact with comorbid conditions and lifespan health deficits, thereby amplifying the susceptibility to malignancies.

Patho-Biogenesis of certain cancers in elderly - differences:

Advanced age is linked to distinct molecular patho biogenesis compared to younger individuals, characterized by a prevalence of slightly fewer high-grade tumors, reduced occurrences of triple-negative breast cancer and HER2+ subtypes, and an increased frequency of luminal tumors. The mutational landscape further diverges, with the older breast cancer population exhibiting fewer TP53 mutations and a higher incidence of PIK3CA mutations compared to their younger counterparts. Age-dependent alterations in systemic and peritumoral immunity have been observed, particularly in breast cancer, warranting further exploration across different subtypes.

Similarly, in lung cancer, older individuals exhibit a higher incidence of squamous cell carcinoma and distinctive molecular features such as an elevated tumor mutational burden, varied EGFR mutation subtypes, and a reduced prevalence of ALK, ROS1, and RET rearrangements, which may influence treatment approaches. In prostate cancer, older patients typically present with aggressive cancers, higher-grade tumors, and increased P53 positivity. In colon cancers associated with older age, characteristics include a predominance of right-sided tumors, a heightened incidence of CpG island methylator phenotype-high tumors, microsatellite instability phenotype, and a greater occurrence of BRAF mutations.

Managing / treating cancer in elderly - issues to consider :

Inadequate awareness of the burden of geriatric cancers, along with a lack of knowledge about the signs and symptoms of prevalent cancer types, poses a significant obstacle to enhancing cancer survival rates among older adults. The frequent late diagnosis of cancer in this demographic diminishes the chances of successful treatment. Insufficient awareness of early warning signs can delay the initiation of care-seeking behavior, further compounded by the reluctance of many older adults to seek medical attention.

Elderly cancer patients encounter obstacles to referral, influenced by family decisions or hesitancy from primary physicians[5]. Disparities in healthcare access contribute to suboptimal care, particularly in developing countries. Physiological changes affecting drug distribution, metabolism, and toxicity impact therapeutic decisions for the elderly. Complications such as comorbidities,

polypharmacy, falls, and bleeding necessitate tailored approaches, including less intensive chemotherapy and organ-safe formulations.

The lack of awareness and trained geriatric counselors presents a hindrance to the implementation of Comprehensive Geriatric Assessment (CGA) in India. Multidisciplinary teams may exhibit age-related biases in recommending chemotherapy for elderly patients, relying on preconceived notions rather than comprehensive assessments. Discrepancies between recommendations and actual treatment prevalence underscore challenges in decision-making.

Emergency and intensive care management for elderly cancer patients requires special considerations due to atypical presentations and heightened vulnerability[6]. Attentiveness to fluid balance, drug interactions, and organ function is crucial for optimizing outcomes. Initiatives aimed at enhancing elderly participation in cancer research necessitate targeted efforts, including increased awareness, healthcare professional training, and the integration of geriatric considerations into educational curricula[7].

Cancer in elderly - special issues :

Delays in seeking medical attention often stem from the misattribution of symptoms to aging, caregiver biases, and misconceptions held by physicians. Challenges are further compounded by atypical presentations, a lack of understanding, and inadequate enrollment in clinical trials. Societal influences, cultural stigma, and insufficient treatment guidelines also contribute to avoidable delays.

Upon an elderly family member's cancer diagnosis, families grapple with mixed emotions and frequently delay disclosure due to perceived emotional distress or frailty. Cultural beliefs and family dynamics strongly influence the decision to shield the patient from the diagnosis.

Various factors, including life transitions, dependence on others, financial constraints, and societal perceptions, contribute to social withdrawal and depression in elderly cancer patients. Psychosocial challenges are exacerbated by feelings of underappreciation, under-assessment, and under-treatment.

Unique challenges in decision-making emerge, often involving conflicting preferences among patients, caregivers, and family members. Economic considerations, resource availability, and diverse attitudes toward aggressive treatment underscore the complexity of decision-making[8].

The simultaneous use of undisclosed alternative remedies poses risks, with the potential for contamination adding an additional layer of complexity.

Assessment in elderly :

The aging process is not characterized by a consistent or linear trajectory, resulting in individuals of the same chronological age exhibiting diverse physical and mental capabilities. These variations significantly influence the feasibility and desirability of different treatments. To comprehensively assess these capacities, geriatric assessments (GAs) serve as the gold standard[9].

Geriatric assessments are multidimensional, interdisciplinary evaluations designed to assess an older individual's functional ability, physical health, cognition, mental health, and socio-environmental circumstances. These assessments offer potential benefits such as cost reduction in healthcare, early detection and treatment of geriatric syndromes, and improved survival and quality of life for patients. GAs can identify health problems and impairments that may go unnoticed in routine cancer care. In trials, patients who received geriatric assessments not only experienced fewer side effects but were also less likely to encounter falls during treatment, with only 12% experiencing falls compared to 21% of those without geriatric assessments.

Comprehensive Geriatric Assessment (CGA) emerges as a crucial tool, integrating multiple domains to detect geriatric impairments, estimate survival, predict treatment-related toxicity, facilitate communication, and guide treatment decisions.

Key geriatric domains assessed in CGA include functional status, fatigue, comorbidity, cognition, mental health, social support, nutrition, and geriatric syndromes. Challenges persist, given the time and resource-intensive nature of these assessments, as well as concerns about cultural applicability, the shortage of trained personnel, and the need for post-assessment follow-up[10].

In lieu of this, a brief clinician-conducted assessment of older adults serves as a valuable screening tool to identify those requiring a full GA[11]. Such screenings, like G8[12], VES-18[13], TRST tools, take only a few minutes and can be employed in busy practices to distinguish fit older patients from those at risk for geriatric deficiencies[14]. This targeted approach, adopted in many European countries, utilizes full CGA only when screening tests indicate a geriatric risk profile, optimizing efficiency[15]. Conversely, in the United States, numerous centers utilize patient-completed geriatric questionnaires, leveraging patient involvement to manage the workload efficiently.

Multidisciplinary Team in Geriatric Oncology:

Considering the intricate health challenges faced by elderly cancer patients, the involvement of a multidisciplinary team is imperative. A collaborative framework, spearheaded by geriatricians and oncologists, and reinforced by allied healthcare professionals, guarantees comprehensive care that encompasses the physical, psychological, and social dimensions of the patient's well-being[16]. Ideally, the leadership role should be assumed by a Geriatric Oncologist or an oncologist with specialized training in geriatric medicine[17]. Holistic treatment, in this context, necessitates the incorporation of palliative care, physiotherapy, nutritional support, and the addressing of psychosocial issues.

Maintaining Quality of Life in elderly cancer patients :

The World Health Organization (WHO) defines Quality of Life (QoL) as an individual's subjective assessment of their position in life within the context of their culture, values, goals, expectations, standards, and concerns. Symptoms arising from cancer and its treatments, such as fatigue, nausea, vomiting, loss of appetite, and pain, are linked to diminished physical function and QoL. Preserving and enhancing the quality of life holds paramount importance in the care of elderly cancer patients.

Pain emerges as the predominant factor impacting QoL among cancer patients. Concerns about potential addiction to pain medications and societal perceptions of weakness further compound this challenge. Variances in pain tolerance and acceptability, coupled with misconceptions about analgesic use, contribute to the overall impact on QoL. It is crucial to prioritize education on pain medications, appropriate dosages, and the management of adverse effects.

Cancer-related fatigue adversely affects daily activities, increases dependency on others, and strains interpersonal and social relationships. Strategies such as scheduling daily activities based on perceived energy levels, alongside pharmacological and cognitive-behavioral therapies, offer some relief.

Insomnia, encompassing difficulties initiating sleep, frequent awakenings, and the inability to resume sleep, results in a lack of expected refreshment after sleep. Pharmacological interventions, such as melatonin, may provide some relief. Assessing patients' experiences of negative feelings and employing psychologist-based interventions, including counseling and cognitive-behavioral therapies, alongside pharmacological options such as anxiolytics, mood enhancers, and sedatives, contributes to the alleviation of depression, improves the outlook on life, and thereby helps maintain QoL.

Alterations in physical appearance resulting from cancer and its treatments significantly impact Quality of Life (QoL). Extensive surgeries, the loss of organs or limbs, dependence on devices such as feeding tubes and colostomy bags, contribute to shifts in body image perception, lower self-esteem, depressed mood, and impaired social interactions. Opting for limb salvage surgeries, utilizing artificial limbs for mobility, breast

conservation and reconstructive surgeries, employing sentinel node techniques to minimize postoperative lymphedema, and employing strategies like flaps, tattooing of scars, makeup, clothing, wigs, among others, can address some of these challenges. A robust family and social support system play a pivotal role in improving treatment outcomes and overall QoL. For instance, a study on lung cancer demonstrated that being married and having a spouse positively influenced treatment outcomes, while patients from families with higher income and education levels reported better QoL[18].

Interventions led by nurses, counselors, and educators focused on side effects and coping strategies have been shown to enhance QoL. Collaborative efforts with allied specialties, including dieticians, dentists, physiotherapists, and psychologists, contribute to shaping the overall outlook of patients. Lifestyle interventions, such as maintaining a healthy diet, engaging in small, frequent snacks, being physically active, incorporating moderate strength training exercises, participating in creative activities and hobbies, socializing with friends and relatives, spending quality time with loved ones, and occasionally embracing moments of relaxation, all impact QoL. Environmental modifications, such as optimizing lighting, ensuring safe toilet heights, installing railings in washrooms, providing easy clothing options, and facilitating access to safe drinking water, along with measures like air beds to prevent pressure injuries, collectively influence overall outcomes.

Pharmacological interventions, such as the use of anabolic steroids for sarcopenia, hormone replacement therapy to maintain bone strength and sexual activity, and bisphosphonates for osteoporosis, contribute to the enhancement of QoL. Consideration and recommendation of alternative and complementary therapies are crucial, and non-pharmacological interventions like cognitive-behavioral therapies, acupuncture, acupressure, meditation, and yoga also play significant roles in influencing QoL. Engaging with the spiritual aspects of life provides comfort, strength, a sense of purpose, and a feeling of belonging, further impacting overall well-being.

Enhancing Oncology Care for Geriatric Patients: What Steps Can Be Taken?

The World Health Organization (WHO) defines a National Cancer Control Programme (NCCP) as a public health initiative aimed at reducing cancer incidence and mortality while enhancing the quality of life for individuals with cancer. This is achieved through the systematic and equitable implementation of evidence-based strategies covering prevention, early detection, diagnosis, treatment, and palliation, optimizing the use of available resources. Comprehensive NCCPs serve as valuable guides for countries in making informed investments to improve cancer outcomes, considering the entire continuum of care, including prevention, early detection, diagnosis, treatment, rehabilitation, palliation, and research. The success of such programs relies on setting realistic priorities, robust costing of cancer plans, and sustained budgeting for cancer programs. However, the limited awareness of cancer and aging among policymakers poses a potential constraint, hindering national policy responses to the increasing burden of cancer in older adults.

Enhancing exposure and training in geriatrics within healthcare curricula is crucial to bolster the skill sets needed for managing elderly individuals with cancer. This involves incorporating geriatric oncology into core undergraduate nursing and medical curricula, as well as developing teaching modules for both geriatric and oncology specialist trainees. Establishing national oncogeriatric training as part of ongoing professional development, recognizing Geriatric Oncology as a specialization within the National Health System, and appointing a National Clinical Lead in Geriatric Oncology to collaborate with cancer centers for improved care and research studies are key steps toward advancing the care pathways for older cancer patients.

Conducting Continuing Medical Education (CME)

programs aims to enhance the knowledge and skills of healthcare providers, enabling them to proficiently utilize geriatric assessment in evaluating the health of elderly individuals with cancer. This initiative seeks to facilitate early detection, support holistic treatment, and instill confidence in healthcare practitioners. National workshops will be established to serve as a platform for knowledge dissemination and collaboration[19]. A Clinical Lead in Geriatric Oncology will be appointed to coordinate education and training efforts in geriatric oncology in partnership with national training bodies.

Developing treatment recommendations tailored to the elderly involves considering their physical abilities, cognition, diet, comorbidities, psychological status, and social support to address individual needs effectively. Assessing the risk level of elderly individuals undergoing clinical cancer treatment is crucial. Strategies encompass broader inclusion in clinical trial designs, fostering interdisciplinary collaboration, and utilizing technology for awareness, education, and healthcare delivery. Region-specific models of care will be developed, leveraging existing resources and conducting research to establish evidence-based guidelines[20]. Efforts will also focus on creating culturally relevant, user-friendly, and feasible assessment tools.

Recognizing that social isolation and reduced mobility can impact the ability of older adults with cancer to access health services and may influence cancer survival, a comprehensive approach is essential. This approach should encompass policy and programmatic responses aimed at reducing social isolation and enhancing care for older adults with cancer.

(Footnotes)

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Peri-operative care of Geriatric Patients

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"There can be minor surgery but no minor anaesthesia". this is best illustrated in anaesthesia and perioperative care for geriatric patients. The reduction in physiological reserve with the addition of physiological and preoperative stress compounded by underlying disease; makes anaesthesia and perioperative care of the elderly challenging. Anaesthetists and physicians should not be influenced by age as a criteria to ration care to the elderly. It is important to reiterate that the American Society of Anaesthetists physical status classification does not use age for classifying anaesthesia risk [1] (Society, n.d.). In the care of the elderly, the effect of comorbidities of the patient rather than the chronological age should be used to provide care.

India poses a unique challenge by having the largest emerging geriatric population worldwide in a multilingual and cultural environment. An increasing number of geriatric patients are and will be subjected to anaesthesia and surgery. The outcomes of these patients are influenced by the age related physiological changes as well as the co-morbidities. The changing physiology as well as frailty should be considered in the care for the elderly. The term 'frail patient' applies to a majority of geriatric patients. Comprehensive Geriatric Assessment (CGA) (Stuck AE, 1993) was developed for primary care physicians in the UK to assess and treat elderly patients. It included 6 burdens: Comorbidity Polypharmacy, Physical Function , Psychological status, Nutrition, Risk of postoperative delirium. The assessment although cumbersome predicted an all cause mortality rate superior to the ASA classification.

Central Nervous System

The central nervous system shows a reduction in volume of the white and grey matter (etal, 2002), but the cerebral metabolic rate, cerebral blood flow and electrical activity remain unchanged. The decrease in the number of receptors to neurotransmitters in the CNS reserve is reflected in sensitivity to anaesthetic agents, and a higher incidence of postoperative cognitive dysfunction and delirium. There is a reduction in CSF production and increased permeability of the dura. The volume of the epidural space and the conduction velocity through the nerves are reduced. The latter is due to the decrease in the number of Schwann cells, thus increasing the sensitivity to peripheral and neuraxial blocks (etal, 2004). Permeability of drugs through the dura increases, causing exaggerated effects in epidural blocks. Socially the elderly might be reticent because of hearing, visual problems or cognitive dysfunction. The incidence of cerebrovascular accidents increase with age and may leave sequela which affect the general wellbeing and the perioperative management.

Cardiovascular system

Changes of ageing manifest in the cardiovascular system too, compounded by hypertension and ischaemic heart disease or degeneration of valves. The increased vascular stiffness (etal, 2011) contributes to rise in mean arterial blood pressure and diastolic blood pressure. The arterial wall hardens and the reflected pulse wave from the non-compliant blood vessels contributes to a higher systolic reading in the limbs. Central blood pressure measurement gives a better reflection

of blood pressure control. The heart relaxes incompletely during diastole. The impaired relaxation of the ventricle causes diastolic dysfunction leading to preserved ejection fraction heart failure (HFpEF) which has shown an increase in overall mortality (etal, 2003). In addition to diastolic dysfunction there is a reduction in contractility too. The beta receptor population, conduction fibre density and sinoatrial cells are also reduced (HJ, 2000). The left ventricular wall thickens contributing to impaired filling pressures on the ventricle (etal, 2007), thus the safety range between hypovolemia and volume overload is narrow in the elderly.

Respiratory system

There is a reduction in the elastic elements of the chest, and an increase in compliance of the chest resulting in obstruction to expiratory gas flow. The airways collapse early leading to air trapping and hyperinflation. The shape of the chest changes and the diaphragm is flattened, thus making contraction less efficient. The resting shunt increases causing low resting blood oxygen levels. The FEV1 is reduced resulting in an inefficient cough. Pulmonary vascular resistance and pulmonary artery pressures increase with age decreasing respiratory reserve. Degeneration of tissues causes increased adhesions in the lungs making them prone to atelectasis. The CNS response to hypoxia and hypercarbia are blunted. The above along with alterations in gas exchange needs a longer pre oxygenation time (etal, 2000).

Renal system

There is a progressive reduction in renal blood flow and Glomerular Filtration Rate (GFR). The serum creatinine however remains constant, thus making it a poor predictor of kidney function (etal, 2011). All geriatric patients should have the GFR estimated and fluid orders and drugs should be based on that value. The ability to conserve sodium is reduced and elderly tend to lose sodium in the urine, hyponatremia sets in easily if there is inadequate intake of sodium coupled with diuretics.

GI system and nutrition

The elderly can be expected to be malnourished due to either lack of appetite, or less intake, and tend to become hypoglycaemic if kept fasting for a long time. Iron, vitamin B12 and folate supplementation may be needed for subclinical nutritional anaemia before elective surgery.

The liver volume decreases as age increases thus reducing the ability to metabolise drugs especially those that are slowly metabolised.

Others:

The eyes are frequently affected in old age and special attention should be paid to glaucoma and retinal detachment if present. Tearing is reduced creating a higher incidence of dry eye (Sharma, 2014)artificial tears should be available postoperatively. Care should be taken in the operating theatre and ICU to prevent exposure of the cornea thus preventing exposure keratitis.

Patients are usually hard of hearing needing or avoiding hearing aids, these handicaps have to be addressed in the preoperative period. Aging worsens eccrine sweat gland function, leading to heat intolerance, which is associated with increased mortality due to heatstroke (Ezure, 2021). Aged people have a reduced response to heat stimulation and also to stimuli from the nervous system. The skin remains dry and thin and breaks down easily with pressure and sticky tape, antidecubitous cushions and mattresses are needed for the patients. The incidence of intraoperative ulceration was found t be 8.5% (REF). Loss of subcutaneous fat, and stiff joints makes positioning uncomfortable. Adequate gel padding is needed under bony prominences during and in the post operative period. Bladder and bowel issues including constipation, urinary retention or incontenence need to be addressed. The use and the need for frequent change of diapers for incontenence makes demands of nursing and carer services. Constipation may lead to urinary retention and should be taken care off. Intra and perioperative hypothermia is of major concern in the elderly because of the lack of muscle mass, subcutaneous fat, lower metabolic rate and

vascular reactivity. Hypothermia leads to increased surgical site infections, bleeding, delayed recovery, adverse cardiac events, and increased oxygen consumption due to shivering.

The perioperative care for the elderly needs a multidisciplinary approach. This might involve anaesthetists, physicians, nephrologists, cardiologists, and oncologists. In addition to physicians specialising in geriatric medicine, a thorough and thoughtful preoperative assessment by the anaesthetist is time well spent. A past history could be exhaustive or could be very short because of loss of memory, records or inability to communicate. One has to corroborate or rely on the history provided by caregivers. Old medical records might be missing or incomplete. It is best to ask for the medicines to be brought to the hospital as some of them could be combination medications. Visual or auditory compromise should be noted during the preanesthetic checkup. Co morbidities affecting various organ systems should be noted and optimised. It is prudent to ask the patient to bring their hearing aids to the hospital resulting in better communication and less disorientation.

Postoperative cognitive dysfunction and delirium are more common amongst the elderly. Dementia if present can complicate the post operative period making nursing care and analgesia titration difficult, long term mortality increases with dementia. Dementia can have associated conditions such as alcoholism, vascular disease, diabetes, and neuro degenerative disease. It is however not clear if general anaesthesia increases the progression of senile dementia.

Delirium is another disturbing complication in the postoperative period. The overall incidence of delirium is estimated to be 10%, it is influenced by the type of surgery, icu stay, insomnia and other co morbidities. Hip fractures and cardiac surgery seems to show a higher incidence of delirium. Delirium increases the hospital stay and makes it difficult for the care givers. The Confusion Assessment Method(CAM) (al, 1990) (Appendix 1) is a tool to diagnose delirium, this can be used by physicians not trained in psychiatry.

There has been no difference shown in the incidence of delirium between the use of general or regional anaesthesia (RC, 2000). Post operative delirium is predictable and correction of the factors that might precipitate it might reduce the incidence or intensity of delirium.

Factors predisposing to decubitus ulcers

Cardiopulmonary bypass.
Hypothermia
Prolonged cases and intraoperative transfusion.
Long periods of hypotension.
Low intraoperative diastolic pressure.
Patient positioning.
Severe illness (higher ASA class)
Vasopressor use.

Pre existing risk factors for developing postoperative delirium.

Advanced age (>65 years).
Male gender.
History of delirium, and depression.
History of falls.
Dehydration.
Reduced oral intake, malnutrition.
Chronic liver and renal disease.
History of stroke, neurological disease.
Visual, auditory, and cognitive impairment.
Sleep deprivation.
Electrolyte imbalance.
Polypharmacy.
Anticholinergic medication.
Sedatives and Opioids.
Alcohol abuse.
Fracture or trauma.
Major blood loss and low haematocrit.
Post operative pain.
Faecal impaction.
Urine retention
Hypoglycemia.
Wound infection.
Post operative restraint.

(Anesthesiologists, n.d.) (Anesthesiologists, n.d.)

Acute onset, needing a reliable informant.

Fluctuating course with lucid intervals.

Inattention and not maintaining a thread of conversation.

Disorganised thinking.

Disorientation.

Altered sleep cycles.

Emotional disturbance.

Delirium can be hypoactive or or hyperactive (etal, 2006). The former is marked by lethargy and may be overlooked. The latter is seen as an agitated patient with increased vigilance. It is important to raise that delirium may be part of the presenting syndrome for respiratory failure, myocardial infarction, stroke, electrolyte imbalance or heart failure. Long standing medications such as sedatives can contribute to delirium. Antiparkinson medications such as Levodopa and Bupropion can also precipitate delirium. Neuroimaging is of limited value in delirium but is needed where encephalitis or cerebrovascular accident is suspected. Analgesia is the cornerstone of delirium management in the perioperative period. Regional blockade as well as multimodal drug therapy using gabapentin has shown consistently good results (etal, 2011) (etal, 2006). Other supportive therapies include, timing procedures in the ward without disturbing sleep , allowing exposure to diurnal variations of the day, limiting noise, and familiar environment. The latter includes reducing frequent staff and room changes, encouraging wakefulness in the daytime, and maintaining communication with regular family members. Delirium is common and is a preventable adverse event in the elderly population. It also reflects the quality of care. The most commonly used pharmacological intervention for delirium is Haloperidol. Intravenous use be better avoided and can be given orally. It causes prolongation of QT interval and should be avoided in patients with drug withdrawal and hepatic insufficiency. Placing physical restraints on patients to the bed can itself increase delirium. If restraints are neededto prevent self harm including pulling out vascular lines and bandages the relatives should be informed, and the restraints should be placed in a humane manner and padded to prevent bruising and skin injury. It is the author's practice to pad the wrists and fingers like boxing gloves.

Post operative cognitive dysfunction (POCD) are short term cognitive changes that manifest a few days to a few weeks after surgery. These changes are well documented and are mostly self limiting, however in a few it may persist longer. The most important risk factor for POCD is advancing age. The role of anaesthesia contributing to POCD is controversial and is a subject for ongoing research.

Respiratory complications are usually preventable. The main concerns are with aspiration pneumonitis, preexisting chest infection such as hypostatic pneumonia. Prevention includes following fasting guidelines while preventing hypoglycaemia, Using regional anaesthesia and analgesia whenever possible, completely reversing muscle relaxants after surgery. Early ambulating, preoperative and postoperative chest physiotherapy and preventing drying of secretions with the use of high flow nasal oxygen, and maintaining the humidity of the room.

Frailty must be assessed preoperatively to ensure that the patient should return to the preoperative presenting status if not better. Frail patients have higher morbidity and mortality following surgery. The assessment of frailty should incorporate a mix of clinical judgement and objective questionnaires. Limitations in functional capacity such as paralysis limit the extent of assessment using objective tools such as hand grip strength or 6 minute walk test (6MWT). Just as the hypochondriac patient may require more time to assess the multiple complaints, complacent patients who present with 'there isn't really anything wrong with me' form a risky cohort among geriatrics.

The Indian scenario calls for more vigilance while eliciting clinical signs and taking history. Nutrition is usually assessed superficially and malnutrition is only picked up when gross physical signs are

visible which is fairly late. The typical elderly Indian diet has a deficit of protein and micronutrients.

Dysphagia in the elderly contributes to malnourishment. It may present as coughing or choking while swallowing, difficulty in initiating swallowing, and drooling. Patients who use dentures should have ready access to the same. Ultrasound examination of the muscles is emerging a useful tool to screen early sarcopenia. Assessment of Metabolic Equivalents (METs) can prove particularly challenging. The Ministry of Health and Family welfare of India has created operational guidelines for elderly care at health and wellness centres. The community health officer would undertake comprehensive assessment of the geriatric patient twice a year. Assessment charts called Activity of Daily Living, depression assessment, and Mini Mental State examination (MMSE). The Duke Activity Status Index (DASI) estimates functional capacity of a patient an can be reliably used for estimating frailty. It consists of a 12 item questionnaire and each item has a weight based on metabolic cost. It should be noted that the daily living assessment chart has several parallels to the DASI questionnaire.

Post operative analgesia:

Analgesia sans sedation is the gold standard for pain relief in the postoperative period. A multimodal analgesia plan incorporating gabapentin is a successful model (Ref Miller). However the provider should note that gabapentin causes sedation and even delays recovery from anaesthesia. The use of NSAIDs should be carefully considered because of the risk of renal failure, gastrointestinal bleeds and heart failure. (Ref BMJ Non-steroidal anti-inflammatory drugs and risk of heart failure in four European countries: nested case-control study BMJ 2016;354:i4857). Opioids have their limitations, the dose difficult to titrate, causes sedation, and importantly causes constipation and nausea and vomiting. Loss of gastrointestinal function further prolongs discharge from the hospital.

Regional blocks as well as epidural analgesia wherever possible are an excellent alternative. An epidural block can cause urinary retention and the patient may need an indwelling catheter. Regional blocks can cause numbness and if the patient position or posture is not changed regularly can cause a pressure sore. However a well placed local anaesthesia nerve block not only provides excellent analgesia but reduces the incidence of delirium and confusion.

Polypharmacy and rationalisation of drug therapy:

The elderly are prone to polypharmacy and some of the drugs continue to be taken even their prescription period is over. Preoperative evaluation provides an opportunity to review prescriptions and eliminate redundancies. Adding new medication after a surgical procedure must be done after taking the current prescription into account. Encouraging the use of pillboxes and alarms on phones helps to decrease the cognitive load of taking medication. Using sustained release preparations decreases the quantity of tablets taken at one time creating less room for error. Medications such as insulin, warfarin, methotrexate, sodium valproate have narrow therapeutic ranges and overdosing can be lethal. Cognitive priming for these medications may not be feasible for the illiterate and feeble geriatric.

Haematological and Immunological system.

Many geriatric patients are anaemic with low clinical significance in normal life. However treatment becomes important when the senior citizen is subjected to surgery. the cause of anaemia may be difficult to determine. If the cause nutritional, and the surgery is elective, it is useful to improve iron stores, this is where multi-disciplinary approach becomes important. "Immunosenescence " (Fulop T, 2005) is the dysfunction of the immune system, known to set in old age making them prone to post operative infections. Due care needs to be taken to prevent hospital acquired infections.

Monitoring:

The physiology of the elderly demands aggressive monitoring of the cardiovascular system as well

as the perfusion of the brain. These include invasive haemodynamic monitoring including cardiac output, arterial pressure monitoring, and central venous pressure monitoring. The perfusion of the brain can be monitored through near infrared spectroscopy.

Informed consent and the living will:

It may sometimes be difficult to obtain an informed consent from an elderly patient, the complexities of complications may not be comprehended, especially if the patient has dementia. In special situations a legally responsible family member may need to be taken to confidence. the Supreme court of India has made the living will legal and has laid down procedures to file such a document. More and more patients will arrive in the future with a living will. The document and the wishes should be respected specially before starting invasive treatments such as mechanical ventilations, ECMO etc.

Conclusion

At the turn of 2022, India became the most populous country in the world. Coupled with advances in healthcare and increased longevity and economic stability, India will have the highest burden of geriatric patients. Taking this into account, the prospect of safely providing anaesthesia to such a heterogenous group seems daunting.

Cardiovascular compromise carries the single greatest risk of morbidity to the patient. Perioperative physicians should be aware about the risks of Diastolic dysfunction and should be sensitised to current biomarkers (NT Pro-BNP). Early interventions of nutritional deficit, mobility and cognitive issues will reduce the burden of frailty, thereby decreasing overall morbidity of these patients in the perioperative period. Geriatrics in itself is an emerging branch of medicine in India and it is likely that the interdisciplinary coordination needed to manage these patients will be overseen by a geriatrician in the future. The intraoperative conduct for these patients must be meticulously logged to create a basis for further procedures.

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APPENDIX 1

Confusion Assessment Method (CAM)
Short form

The diagnosis of delirium by CAM requires the presence of BOTH features *A* and *B*	
A. Acute onset and **Fluctuating course**	Is there evidence of an acute change in mental status from patient baseline? Does the abnormal behavior: ➢ come and go? ➢ fluctuate during the day? ➢ increase/decrease in severity?
B. Inattention	Does the patient: ➢ have difficulty focusing attention? ➢ become easily distracted? ➢ have difficulty keeping track of what is said?
AND the presence of EITHER feature *C or D*	
C. Disorganized thinking	Is the patient's thinking ➢ disorganized ➢ incoherent For example does the patient have ➢ rambling speech/irrelevant conversation? ➢ unpredictable switching of subjects? ➢ unclear or illogical flow of ideas?
D. Altered level of consciousness	Overall, what is the patient's level of consciousness: ➢ alert (normal) ➢ vigilant (hyper-alert) ➢ lethargic (drowsy but easily roused) ➢ stuporous (difficult to rouse) ➢ comatose (unrousable)

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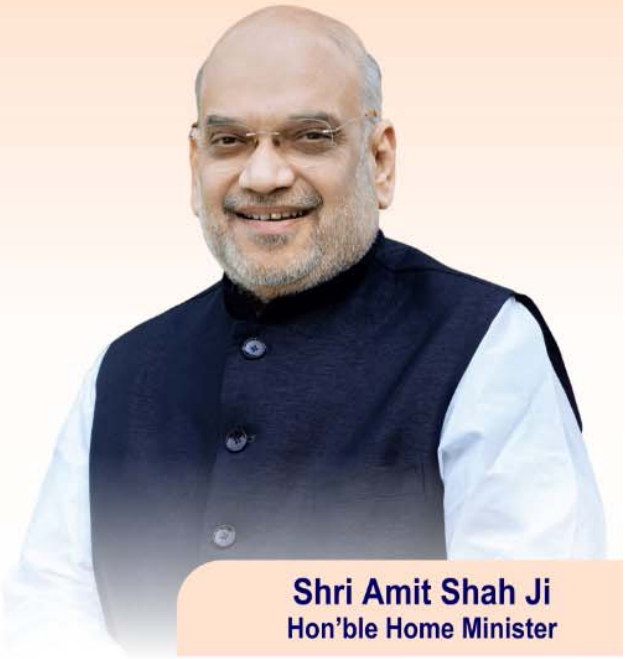

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