A text book of
SHALYA TANTRA

1

As per updated syllabus of CCIM New Delhi

Dr. Tajagna Dalsaniya

SHALYATANTRA

PAPER 1

PART A

ETYMOLOGY & DEFINITION OF SHALYA TANTRA

1. Definition of Shalya, Shalya tantra and its importance. Introduction to Shalya tantra: Historical background and progress made.

Derivation of Shalya:

'शल' 'श्वल' आशुगमने धातूः; तयोराद्यस्य शल्यमिति रूपम् || (Su. Su. 26/3)

The word Shalya is derived from Shala and Shwala. Shala which gives the meaning of fast movement and Shwala means which causes pain/misery. So Shalya is defined as the object which moves quickly and enters the human being, causing pain or misery.

Definition of Shalya:

तत्र, मनःशरीराबाधकराणि शल्यानि; तेषामाहरणोपायो यन्त्राणि|| (Su. Su. 7/4)

The one which produces discomfort/obstruction to the mind & body is said to be Shalya.

Definition of Shalya tantra:

तत्र, शल्यं नाम विविध तृणकाष्ठपाषाणपांशु लोहलोष्टास्थिबालनख पूयास्रावदुष्टव्रणान्तर्गर्भ शल्योद्धरणार्थ, यन्त्रशस्त्रक्षाराग्नि प्रणिधान व्रणविनिश्चयार्थ च| (Su. Su. 1/8)

Shalya tantra is defined as the extraction of substances such as fragments of grass, wood pieces, particles of stone, dust, iron, bone, hairs, nails, condensed pus, discharge from infected wound or to extract the dead foetus from the uterus and to deal with the principle and mode of using and handling blunt and sharp instruments in general and with the application of agni and kshara substances, together with the diagnosis and treatment of ulcers.

The importance of Shalya tantra in Astanga Ayurveda:

1. Shalya tantra is the prime among astanga ayurveda because earlier in the battle between the gods and demon, war inflicted wounds were healed and head transplantation done because beheading done during sacrificial ceremony.
2. This shalyatantra is saswat (everlasting), holy, helps to attain heaven, brings reputation, brings longevity, provides good income source.
3. Diseases which cannot be cured by medicine, sharp instruments and alkali can also be cured by using agnikarma described in Shalyatantra.
4. Because of quicker action, use of yantra, shastra, kshara, agni, and treatments equivalent to other branches, Shalyatantra is prime among Astanga.
5. There are two kinds of diseases: shastrasadhya and snehadikriya sadhya. Snehadikriya can be performed in shastra sadhya diseases but shastrakarma is not used in snehadi kriya sadhya diseases.

Causes of decreased importance of Indian Surgery:

1. **Disparity of Literature:** Sushruta samhita available nowadays is not the exact copy of original one.
2. **Concise explanation:** Detailed description of many important aspects are not found in sushruta samhita.
3. **Lack of Dissection knowledge:** To become one excellent surgeon, the detailed experience of cadaveric dissection is vital. But due to religious and other social issues prevalent at that time cadaveric dissection was not encouraged.
4. **Lack of Anaesthesia:** along with surgical knowledge, anesthesia was not developed. Because of ignorance towards anesthesia, surgery had to slow down.
5. **Influence of Buddhism:** as non-violence was preached by the Buddhists, it also indirectly influenced shalyatantra in negative ways.
6. **Lack of Government support:** there was not much support from the rulers towards Indian surgery.
7. **Maintenance of surgical knowledge secrecy:** the art of surgical knowledge was kept secret. This also led to downfall of surgery.
8. **Foreign invasion:** India was invaded and ruled by foreign invaders many times. Educational institutes libraries and place of worships were destroyed many times.
9. **Westernization in the name of modernism:** Because of westernization in the name of modernization, Indian surgery suffered setbacks.
10. **Lack of collective literature:** Different topics are scattered in different places in the samhitas which made understanding and mastering over any topics very much difficult.

How to Improve Conditions of Shalyatantra

1. Detailed study of Sushrut Samhita.
2. Use of proper anesthesia.
3. Detailed study and practice of marma and marmachikitsa.
4. Detailed study and application of sasti upakrama
5. Practical training
6. Dummy surgery as described in yogyasutriya chapter
7. Obtaining government support for development of Indian surgery
8. Propagation of established treatment protocol or theories.
9. Publicity and propaganda
10. Establishment of research center

Shastra karma done by Ashwini kumar:

Drishtidaan to kanva rishi & Rajarshi Kajrashwa
Normal delivery of Vaghrimati
Eyesight & Artificial limb to Pravraja rishi
Replaced Dadhichi's head with horse head
Reunited excised part of Shyav rishi & rebha rishi
replaced the foot of Vishpala with a metal one

Dhanvantari:

Dhanwantari by implication is a surgeon with extra ordinary skills. Dhanvata means Adharma and Ari means Shatru. So, Dhanwantari is said to be the enemy of diseases. Thus, Dhanwantari refers to an efficient & successful surgeon who relieves suffering from both mind and body.

The name Dhanvantari was mentioned in three contexts:

Dhanvantari first

1. Originated during the churning of ocean one of the 14 jewels
2. Bhaskar was his teacher
3. Work: chikitsatatva vijnantantram
4. He is considered as the incarnation of lord Vishnu. His idol with 4 hands is worshipped.

Dhanvantari second

Birth: Born in the royal family of Sunahotra of Chandra dynasty.
Period: 5000 years before Vikram
Known as 'Ayurveda pravartak' and 'sarvarogapranasan'

Dhanvantari (third) Kasiraj Divodas:

He is the premier in the surgical tradition of Ayurveda. He established the city Varanasi. His disciples are:

1. Aupdhenava
2. Aurabhra
3. Paushkalavata
4. Vaitarana
5. Gopur rakshita
6. Karvirya
7. Sushruta

Period: 1000 to 1500 BC
Teacher: Bharadvaj
Books: Chikitsa darshan, Chikitsa koumudi, Dhanvantari Nighantu, Vaidyabhaskaroday, Chikitsa sarsamgrah etc.

Acharya Susruta:

1. Disciple of Divodas Dhanvantari
2. Son of Mahrshi Viswamitra
3. Probably he lived in Kashi.
4. It is difficult to ascertain the period of Sushruta. But Sushruta was mentioned as the son of Viswamitra and both the names are found in Mahabharat which indicates their time to be second century.

Dalhana:

Period : 12th century
Commentary : Nibandha Samgrah (on entire Samhita)
He was the royal physician of king Sahapaldev of Vadanak kingdom.
Residence : Ankola near Mathura
Father : Bharat pal

Nibandha Samgraha is complete commentary with inputs from Jejjet, Gayadas, Bhaskaracharya, Madhav, Brahmadev, etc. commentaries. Study of Nibandha samgrah reveals that Dalhan was an excellent surgeon.

Sushruta Samhita:

Timeline of Sushruta Samhita:

Adviser	Bhagwan Dhanwantari	1500-1000 BC
Composer	Old Sushruta	1500-1000 BC
Redactor	Sushruta	Second century
Second redactor	Nagarjuna	5th century

Sr. no.	**Sthana**	**Number of Chapters**
1.	Sutra sthana	46
2.	Nidana sthana	16
3.	Sharira sthana	10
4.	Chikitsa sthana	40
5.	Kalpa Sthana	8
6.	Uttara tantra (added by Nagarjuna)	66
	Total 6 sthana	Total 186 Chapters

Commentary and Commentators of Sushruta Samhita:

A. Sanskrit Supplements: There are total 19 supplements available-

Commentary	**Period**	**Name**
Gayadas	10th century	Nyaya panjika/ Nyaya Chandrika/ vrihat panjika (on nidana sthana
Chakrapani	11th century	Bhanumati/ tatparyatika (on sutra sthana)
Dalhan	12th century	Nibandha samgrah (on entire Samhita)
Haranchandra	20th century	Susrutartha Sandipan (on entire Samhita)
Bhaskar	12th century	Laghu panjika/ Sushruta panjika
Madhav and Brahmadev	9th & 10th century respectively	Tippan

Other commentators: Sukir, Subir, Sudhir, Jejjat, nandi, Kartikkunda, Vangadutta, Gadadhar (son of Vangasen), Ramdev, Bakulkar, Baraha

B. Hindi suppliments:

Commentary	**Period**	**Name**
Ambika Dutta Shastri	20th century	Ayurveda tatve sandipika (on entire Samhita)
Bhaskar Gobinda Ghanekar	20th century	Ayurveda rahasya dipika (on sutra, nidana and sharira sthana)
Anantaram Sharma	21st century	Sushruta vimarsini (on entire Samhita)
Kabiratna Sharma	21st century	Nibandha samgraha explanation
Ramanath Dvibedi	20th century	Sousruti (Hindi translation)

C. English Commentaries:

Commentator	Period
U. C. Dutta	19th century
G. D. Singhal	20th century
Priyavrat Sharma	21st century
Krishnamurti	21st century

Note: The Arabic translation of Sushruta Samhita is 'Kitab-sarsun-al-hindi' or 'Kitab-e-sururun.'

Sushruta's concept and practice of surgery in present era:

1. Detailed description of Yantra and Shastra.
2. Described 8 types of surgical procedures.
3. Description of Ksharakarma.
4. Description of Agnikarma.
5. Described cadaveric dissection for the first time.
6. The word vishakanya was used by Sushruta for the first time.
7. Shirovasti is the contribution of Sushruta.
8. First description of Shada vidha Kashaya Kalpana.
9. Five subtypes of pitta described for the first time.
10. Rakta is given importance as the fourth dosha.

Specification of rakta as the fourth dosha:

1. Clinical features and treatments of raktaja dosa: like the three other dosas, the causes and clinical features of vitiation of rakta, characteristics of normal rakta, and the diseases caused by vitiated rakta are described with treatment principle.
2. Along with increase of dosa during six phases of disease, increase of rakta also described.
3. Sushruta Samhita is mainly surgical book and wound is one of the important topics. Rakta is the main factor influencing fate of wound like suppuration etc. hence rakta is termed fourth dosa.

History of Modern Surgery:

The knowledge of evolution of modern surgery through different stages and constant changes to adapt with changes in socio-economic conditions is very important. The modern surgery started to evolve from 18th century. There are historic evidences of surgical procedures even before 18th century:

1. Babylonia: 1000BC, Drainage of an abscess with bronze knife.
2. Egypt: 3000 BC, surgical, treatment of Head injury and Spinal cord injury.
3. China: 3000 BC, acupuncture, and scrapping therapy
4. Japan: 1600 BC, bloodletting with venipuncture.
5. Greece: 1000 BC, surgical treatment of wound
6. India: in vedic period by Aswini Kumars and later during Sushrut's period, surgery was well established.

YANTRA, SHASTRA AND ANUSHASTRA

2. Description of yantra, Shastra, Anushastra: Definition, number, types, uses, Dosha, Guna, Karma. Relevant modern instruments.

Definition:

तत्र, मनःशरीराबाधकराणि शल्यानि; तेषामाहरणोपायो यन्त्राणि|| (Su. Su. 7/4)

The factors which disturb the normal functioning of body & mind is called Shalya. The mean adopted to extract them are called as Yantra.

Number:
101 Yantras
Dalhana → Innumerable
Harit Samhita → 12

Yantra: types, number, size, use, shape

Yantra	Number		Pramana (angula)	Swarup	Use
	Su.	Vag.			
Swastika (Cruciform instruments)	24	24	18	Joined by masurakriti	Removal of foreign body trapped in shaped nail bones
Sandamsa (Pincer like instruments)	2	4	16	-	Tvak, mamsa, sira, snayu gata shalya removal
Taal (Spoon shaped instruments)	2	2	12	Matsyataluvat	Karna, nasa nadi shalya removal
Nadi (Tubular instruments)	20	23	As per need	With one or two holes, many types, use in different procedures.	1. Srotogat shalya removal 2. For examination of disease 3. Drainage 4. Application of kshara etc. in arsha etc.
Salaka	28	34	-	Gandupad, Sarpa phan etc.	Eshan, Vyhan, Chalan, Aharana
Upayantra	25	19	-	-	-

1. Swastika Yantra:

The tip of such instruments is shaped like different animals and birds. Such shaped swastik instruments are combined by lentil shaped nail.
Number: 24
Length: 18 Angulas
Resembles: Face (jaw/beak) of Lion, Tiger, Wolf, Hyena etc. or Crow, Heron, Eagle, Owl, Hawk, Vulture etc.
Handle: Is bent like ankush (goad of elephant) at its root.
Root: should have circular turn like hook.

Types: Dalhana → 2 types

1. Pashu mukha (animal jaw): 9
2. Pakshi mukha (Bird beak): 15

Uses: Extraction of Shalya fixed to bones or in deeper tissues.

2. Samdamsha Yantra:

Number: 2
Length: 16 angula
Types:

1. Sannigraha: Keela yukta (toothed)
2. Anigraha: Keela rahita (non-toothed)

Uses: Extraction of shalya from twacha, mamsa, sira & snayu.

1. Tala Yantra:

Number: 2
Length: 12 angulas
Types:

1. Eka tala (Single scoop/blade)
2. Dwi tala (Double scoop/blade)

Uses: Extraction of shalya from karna, nasa, & nadi.

4. Nadi Yantra:

Definition:

नाडीवंत सुषीराणि यंत्राणि नाडीयंत्राणि

Hallow tubular instruments are called as Nadi yantra

Description:

Numerous in numbers, due to variance in size & application

Varieties:

1. Instruments with opening on only one side (e.g., Alabu, Arshoyantra etc.)
2. Instruments with opening on both side (e.g., Basti yantra, Dhumayantra)

Dimensions:

1. Length according to necessary
2. Their diameter should be according to circumference of orifice of passage

Uses:

1. Removal of foreign body from hollow organs
2. To visualize pathological conditions like Oesophageal varrices, Gastric ulcers, Malignancies, anal polyps, Haemorrhoids etc.
3. Aspiration of pus (dosha)
4. To facilitate other surgical procedures like Kshara karma in Arsha

Nāḍī Yantra	Modern Correlation	Number
Bhagandhara Yantra	Rectal speculum	2
Arsho Yantra	Rectal speculum	2
Vraṇa Yantra	Syringe & irrigator	1
Basti Yantra	Enema catheter	4
Uttarabasti Yantra	Urethral / Uterine catheter	2
Mūtravṛddhi Yantra	Cannula	1
Dakodara Yantra	Cannula	1
Dhūmanetra Yantra	Inhalers	3
Niruddhaprakāsha Yantra	Prepuce dilator	1
Sanniruddha Guda Yantra	Rectal dilator	1
Alabu	*Lagenaria vularis*	1
Shṛnga	Horn	1

Arshoyantra (Proctoscope):

- Made up of metals, ivory, horn (of cow etc.), wood
- Shaped like cow's teat
- 4 angula long, 5 angula in circumference for male and 6 angula for females, with width of hasta tala like.
- Two types: Ekachidra (for visualization)
  Dwichidra (for Kshara & Agnikarma)
- Chidra (Slit): 3 angula length and width equal to size of middle portion of thumb in width.
- Karnika (Edge/Rim): ½ angula above slit

Drains:

A drain is a created channel which allows any fluid collected, to come out after closure of the main wound.

Types:

1. Corrugated rubber drains
2. Tube drains
3. Closed suction tube drain system
4. Glove drains
5. Wick drains
6. Sump drains

Classification of Drain systems:

1. Open (static) drain
2. Closed siphon drain
3. Closed suction drain
4. Sump suction drain
5. Under water seal drain

Ryle's tube:

It is one meter long and made of red rubber or plastic.
It has got three lead shots in the tip which makes it radiopaque.
It also facilitates easy passage of the tube through the esophagus.
It has got markings at different levels:
40cm → level of gastro-esophageal junction
50cm → level of body of the stomach
60cm → level of the pylorus
65cm → level of the duodenum

Indication:

Diagnostic:

For gastric function tests- to assess free acid and total acid
To diagnose tracheo-esophageal fistula

Therapeutic:

In acute abdominal conditions like peritonitis/ obstruction
In abdominal trauma
After abdominal surgeries
In upper Gastrointestinal bleeding

Infant feeding tube:

There are no lead shots and markings on the tube.
It is used for feeding purpose in infants who is under coma, with faciomaxillary injuries and anorexia.

Flatus tube:

It is made up of rubber tube, 45cm in length.
There is one opening in the tip and another on the side proximal to the tip.
It is used in sigmoid volvulus to decompress and derogate, in paralytic ileus, in subacute intestinal obstruction.
It is passed per anal into the recto-sigmoid area.

5. **Shalaka Yantra:**

Number: 28
They are of various kinds & have numerous uses.
They are of varied dimension based on their utility.

Shalākā Yantra	Number	Use
Gaṇḍūpada	2	Probing
Sarpaphaṇa	2	Retraction
Sharapuṅkha	2	Separation / Mobilization
Baḍisha	2	Extraction
Masūra dalamātra	2	Extraction of Shalya from Srotas
Kārpāsakṛtoṣṇī	6	Wound cleaning
Khalla	3	Application of Kṣāra
Jāmbava phala	3	Agnikarma
Aṅkusha	3	Agnikarma
Nāsārbuda haraṇa	1	Removal of abnormal growth from the nose
Añjana	1	Application of collyrium
Mūtramārga vishodhana	1	Clearing of urethral passage

6. Upayantra:

These are accessory instrument which are used in any procedure, on any part of the body, depend upon requirement. They are 25 in number.

1. Rajju (Rope): Used to tie in snake bite
2. Venika (Thread wound in three strings for tight bandage)
3. Patta (Piece of cloth/leather): material for bandage
4. Charma (Leather): Bandage
5. Antavalkala (Inner bark of tree): Used in bandaging, suturing and fracture
6. Lata (Creeper): Bandage
7. Vastra (Cloth): Used in pichu and vikeshika
8. Ashtilashma (Stone): Used to remove Asthigata Shalya
9. Mudgara (Morter)
10. Pani & padatala (Palm & sole)
11. Anguli (Fingers): Used in squeezing
12. Jihwa (Tongue): To remove Shalya from eye
13. Danta (Teeth)
14. Nakha (Nails): To remove visible and minute Shalya
15. Mukha (Mouth): For sucking
16. Bala (Hairs): Suturing
17. Ashvakataka (Horse's bridle): To remove Asthigata Shalya
18. Shakha (Branch of tree): To remove Asthigata Shalya
19. Sthivana (Spitting): To remove Shalya from throat obstructed by mucus
20. Pravahana (Straining): In flatus, urination, defecation, delivery etc.
21. Harsha (Happiness): To remove stress
22. Ayaskanta (Magnets): To remove metals as Shalya
23. Kshara (Alkali)
24. Agni (Fire)
25. Bheshaja (Medicine)

Metal used to prepare yantra:

तानि प्रायशो लौहानि भवन्ति; तत्प्रतिरूपकाणि वा तदलाभे|| (Su. Su. 7/7)

They are usually made up of steel (lauha), in the absence of which its substitutes like wood, bone, ivory etc. can be used.

Ideal yantra:

समाहितानि यन्त्राणि खरश्लक्ष्णमुखानि च |

सुदृढानि सुरूपाणि सुग्रहाणि च कारयेत् || (Su. Su. 7/9)

- Standard size (Sama-hita)
- Gripping part should be furrowed and smooth (Khara shalakshana mukha)
- Strong (Sad-dhruda)
- Pleasant to look (Surupani)
- Easy to handle (Sugrahani)

Yantra dosha:

तत्र, अतिस्थूलम्, असारम्, अतिदीर्घम्, अतिह्रस्वम्, अग्राहि, विषमग्राहि, वक्रं, शिथिलम्, अत्युन्नम, मृदुकीलं, मृदुमुखं, मृदुपाशम्, इति द्वादश यन्त्रदोषाः || (Su. Su. 7/19)

1. Atisthula (too thick)
2. Asara (weak/made up of impure metal)
3. Ati deergha (too long)
4. Ati hrasva (too short)
5. Agrahi (bad grip/does not holds the object well)
6. Vishama grahi (irregular grip/holds improperly)
7. Vakra (Asymmetrical)
8. Shithila (loose)
9. Atiunnata (too prominent/elevated)
10. Mrudu kila (loose rivets/joints)
11. Mrudu mukha (loose at ends/soft holding parts)
12. Mrudu pashu (loose threading/snaring power)

Yantra Karma:

यन्त्रकर्माणि तु- निर्घातन पूरण बन्धन व्यूहन वर्तन चालन विवर्तन विवरण पीडन मार्गविशोधन विकर्षण आहरण आञ्छन उन्नमन विनमन भञ्जन उन्मथन आचूषण एषण दारण रुजूकरण प्रक्षालन प्रधमन प्रमार्जनानि चतुर्विंशतिः|| (Su. Su. 7/17)

1. Nirghatana (mobilizing & then extraction)
2. Purana (filling)
3. Bandhana (Bandaging)
4. Vyuhana (Collecting together/Retraction)
5. Vartana (Rolling/Approximation)
6. Chalana (Moving/Sliding/ Displacement)

7. Vivartana (Rotating)
8. Vivarana (Dilating)
9. Pidana (Squeezing)
10. Marga vishodhana (Clearing the passage)
11. Vikarshana (Hold and remove)
12. Aaharana (Extraction)
13. Aanchana (Traction/Extension)
14. Unnamana (Lifting upwards/Elevation)
15. Vinnamana (Pushing downwards/Depression)
16. Bhanjana (Breaking)
17. Unmathana (Churning)
18. Aachushana (Aspiration/Suction)
19. Eshana (Probing)
20. Darana (Tearing open/Splitting)
21. Rajukarana (Straightening)
22. Prakshalana (Washing/Irrigation)
23. Pradhmana (Insuffulating)
24. Pramarjana (Mopping/swipping)

Prashasta yantra:

एतैर्दोषैर्विनिर्मुक्तं यन्त्रमष्टादशाङ्गुलम् |

प्रशस्तं भिषजा ज्ञेयं तद्वि कर्मसु योजयेत् || (Su. Su. 7/20)

- Should have all ideal qualities
- Devoid of 12 mentioned defects
- 18 angula long
- Kanka mukha yantra. Because it holds well, easily penetrate, or comes out of the body tissues & hence can be successfully used at any site.

Drashta (visible) shalya → Extraction by simha mukhadi (jaws of animal) yantra
Gudha (Invisible) shalya → Extraction by kanka mukhadi (beaks of birds) yantra

SHASTRA

Shastra vyapad → 4
Shastra guna → 6
Shastra dosha → 8
Shastra karma → 8
Shastra number → 20 (Vagbhat → 20+6)

Definition:

शस्त्रं हि शरीर हिंसकं इति| (Chakradatta)

Any device or instrument which causes injury (intentional) to tissue is considered as shastra.

Numbers of Shastra:

Shastra	Modern Correlation	Prayoga
1) Maṇḍalāgra	Circular knife	Chedana & Lekhana
2) Karapatra	Bone saw / Surgical saw	Chedana & Lekhana
3) Vṛddhipatra	Scalpel	Chedana & Bhedana
4) Nakha shastra	Nail parer	Chedana & Bhedana
5) Mudrika	Ring knife	Chedana & Bhedana
6) Utpalapatra	Lancet	Chedana & Bhedana
7) Ardhadhārā	Single edged knife	Chedana & Bhedana
8) Sūchī	Suturing needle	Visrāvaṇa & Sīvana
9) Kushapatra	Bistoury	Visrāvaṇa
10) Āṭimukha	Hawk bill scissors	Visrāvaṇa
11) Sharārimukha	Scissors	Visrāvaṇa
12) Antarmukha	Curved bistoury	Visrāvaṇa
13) Trikūrchaka	Brush	Visrāvaṇa
14) Kuṭhārika	Chisel	Vyadhana (Asthi pradesha)
15) Vṛhimukha	Trocar & Cannula	Vyadhana (Māṁsa pradesha)
16) Ārā	Awl	Vyadhana (Kaṭhīna kaṛapāli)
17) Vetasapatra	One type pf scalpel	Vyadhana
18) Baḍisha	Sharp hook	Āharaṇa
19) Dantashaṅku	Tooth-scaler	Āharaṇa
20) Eṣaṇī	Sharp probe	Eṣaṇa

Name	Yantra	Shastra
Badisha	Length & diameter as required	6 angula length, Teekshana kantaka mukha
Eshani	Gandupada mukha shape, Length & diameter as required	8 angula length, shape as teekshana kantaka yavapatra

Parts of Shastra:

1. Moola (rear end)
2. Vrintha (handle)
3. Greeva/Phala (Neck)
4. Prushtha (Non cutting edge)
5. Dhara (Cutting edge)
6. Agra (Tip)

Grips:

Pencil Grip	To make short and fine incision
Fingertip Grip	For long incision and it allows maximum cutting edges
Palm Grip	Strongest and used when great pressure is required

Methods of handling (holding) shastra: (Grips)

Vruddhipatra	Hold in between handle and blade, other shastra used for the purpose of bhedana should be held in similar way.
Vruddhipatra & mandalagra (Scraping)	In elevated position for lekhana
Visravana	Shastra should be held towards tip of handle. In case of old, children, soft person, timid, female, king, prince only trikurchak should be used for vishravana.
Vreehimukha (Vyadhana)	Should be held in between thumb and index finger hiding the handle.
Kutharika	Should be held in the left hand and supported by middle finger of right hand and do stroke
Aara, Karaptra, Eshani	Should be held at the base
	Rest should be held based on convenience

Shastra guna:

तानि सुग्रहाणि, सुलोहानि, सुधाराणि, सुरूपाणि, सुसमाहितमुखाग्राणि, अकरालानि, चेति शस्त्रसम्पत्|| (Su. Su. 8/8)

1. Sugrahani → Convenient to handle with good grip
2. Sulohani → Made up of ideal metals
3. Sudharani → Edge should be sharp & uniform
4. Surupani → Good to look with bright finishing
5. Susamahita mukhagra → Business end should be fine & of appropriate size
6. Akarala → Should not be serrated (Kharapatra is exception)

Shastra dosha:

तत्र वक्रं, कुण्ठं, खण्डं, खरधारम्, अतिस्थूलम्, अत्यल्पम्, अतिदीर्घम्, अतिह्रस्वम्, इत्यष्टौ शस्त्रदोषाः| (Su. Su. 8/9)

1. Vakra (Crooked)
2. Kuṇṭha (Blunt)
3. Khaṇḍa (Broken)
4. Kharadhāra (Rough/Serrated blade)
5. Atisthūla (Too thick)
6. Atyalpa (Too thin)
7. Atidīrgha (Too long)
8. Atihrasva (Too short)

Shastra dhara (Thickness of edge of Shastra):

Bhedana → Masuri
Lekhana → Ardhamasuri
Vyadhana & Visravana → Kaishika
Chedana → Ardhakaishika

Shastra Payana (Tempering of instruments):

Purpose of Payana: Instruments other than those made up of stainless steel are susceptible to get rust and contaminated and incourse of time may become blunt. This can lead to irritation and infections in surgical cases and may even a cause for improper surgery.

Payana of shastra is done by heating it to red hot & dipped in various liquid media to get Teekshnatvada (To increase sharpness) and Utkarsa hetava (Protecting sharpness).

There are three types of payana viz.

1. Kshara payana: Edge become hard enough to even cut through arrows, bone, & other foreign bodies.
2. Udaka payana: Edge able to sustain tearing, incising & excision of muscles
3. Taila payana: Used for puncturing veins & cutting ligaments

Nishana (Sharpening):

Once Shastra has made durable by payana, it needs to be repeatedly sharpened (Nishana) to keep it in use. For this Shastra should be rubbed & made sharp over a smooth, black coloured stone.

Shastra kosha (Instrument box):

Aim: To preserve the edges of cutting instruments
Made up of: Kshaumpatra, Oona, Kausheya, Vastra, Duluka, Mrudu charma
Size: 12 angula long and 9 angula wide

The case should be in such a way that all instruments are arranged in order in their respective platforms & impression lined by silk or woolen cloth. They could be folded, closed with a rod and firmly tied by knot.

Anushastra:

अनुशस्त्राणि हीनशस्त्राणि शस्त्रसदृशानि वा| (Dalhana, Su. Su. 8/15)

Anushastra are similar to shastra and used in absence of it.

Anushastra	Modern Correlation	Prayoga
1) Tvak sāra	Bamboo	Chedana & Bhedana
2) Sphaṭika	Crystal	Chedana & Bhedana
3) Kācha	Glass	Chedana & Bhedana
4) Kuruvinda	Ruby	Chedana & Bhedana
5) Jalauka	Leech	Raktamokṣaṇa
6) Agni	Fire	Agnikarma
7) Kṣāra	Alkali	Kṣārakarma
8) Nakha	Nails	Chedana, Bhedana & Āharaṇa
9) Gojihvā	Leaves of *Elephantopus scaber*	Visrāvaṇa
10) Shephālikā	Leaves of *Nyctanthes arbor-tristis*	Visrāvaṇa
11) Shākapatra	Teak leaf	Visrāvaṇa
12) Karīra	Sprouts	Eṣaṇa
13) Bāla	Hairs	Eṣaṇa
14) Aṅguli	Fingers	Eṣaṇa

Indications:

1. Children
2. Patients not inclined to undergo surgery
3. Afraid of surgery
4. When instruments are not available

MODERN SURGICAL INSTRUMENT

1. Proctoscope:

A proctoscope is a hollow tubular instrument that is used to examine the anal cavity and anal walls of the rectum for any evidence of hemorrhoids, polyps, tumors, etc.
It may or may not be equipped with a light source.
Length = 7 cm (most used); some varieties may be 15-32 cm

Types: - 3

1. Slit proctoscope
2. Common proctoscope
3. Pediatric proctoscope

Parts:

1. Obturator (inner)
2. Proctoscope sheath (outer)

Position for Examination:

1. Left lateral position / Sim's position
2. Knee elbow position
3. Lithotomy position

Procedure:

- The proctoscope sheath and obturator are well lubricated and held in one hand.
- It is slowly inserted in the direction of the axis of anal canal, upward and forward towards the patients' umbilicus and in to the curve of the sacrum.
- Hold the proctoscope sheath steady and slowly remove the obturator with the other hand. Observations are made as the proctoscope is slowly withdrawn.

2. Probe:

Rod like instrument with different sizes
Made up of copper, iron, or silver
Malleable and non-malleable
Used to know the depth and direction of sinusand fistula
Used for ksharasutra therapy in ano, pilonidal sinus, hidradenitis supurutiva etc.

3. Artery forceps:

Artery forceps is a haemostatic forceps available in various sizes.

Features: They are pointed at one end, with rings at the end of two shafts, linked with hinge in the middle and a ratchet to lock the blades.

Uses:

- To compress an artery to stem bleeding.
- Grasping tissue at the time of operation.
- Holding stay sutures.

Types:

Based on size	Based on shape
Small or mosquito artery forceps Medium sized artery forceps Large artery forceps	Straight artery forceps Curved artery forceps

4. Dissecting forceps:

Dissecting forceps is used for grasping and holding structures.

Types:

1. Plain / Non-toothed dissecting forceps: Used to hold delicate structures like the peritoneum, vessels, bowel, nerves, tendons, etc.
2. Toothed dissecting forceps: Used to hold the skin and tough structures.

5. Allis tissue holding forceps:

Allis tissue holding forceps may be long (17 cm) or short (12 cm). The blades are curved at the ends and toothed, 4 in 5 or 5 in 6 teeth.

Features:

It has ratchet and triangular expansion at the tip, where the serration is present.

Uses:

- Used to hold or grasp heavy tissue, such as fascia, skin flaps, bladder wall, etc.
- It may be used to hold soft tissue, such as the breast or bowel tissue.

6. Babcock's forceps:

Babcock forceps has curved distal parts, forming a triangular fenestra, which allows soft tissue to bulge out. The tip is non-traumatic with transverse serrations.

Uses:

To hold any part of bowel, thyroid gland, mesoappendix, uterine tubes, ureter, etc.

7. Sponge (Swab) holding forceps:

Sponge holding forceps has ring-shaped ends which may be serrated or smooth on the inner surface. Jaws may be straight or curved.

Uses:

- Painting in surgical procedures, for blunt dissections
- To swab cavities and to mop the oozing area

8. Cheatle's (sister's) forceps:

Features:

The handle has no lock with curved shaft.
Always keep dipped in antiseptic solution.

Uses:

- Used to remove sterilized instruments from boilers and formalin cabinets. They are used to ensure that as each item is removed, others are not infected.
- Used to take out needles and scalpel blades from Lysol.
- Used to take out instruments from the autoclave drum.

9. Sinus forceps:

- Called sinus forceps because initially it is originated to pack the sinus cavities.
- To facilitate free opening of the blades, sinus forceps has no ratchet.
- Serrations are confined to the tip.
- Used to break the loculi in abscess drainage.

10. Scissors:

Scissors have one stationary and one movable blade, which may be straight or curved.

Types:

1) Dissecting scissors (blunt tip)
2) Cutting scissors (sharp tip)

Parts:

1) Finger rings
2) Shanks
3) Box joint
4) Blades

Use:

- Tissue dissection or dividing
- Cutting of sutures or other surgical materials
- Undermining skin or raising skin flaps
- Cutting gauze, mesh or other surgical materials

11. Scalpel:

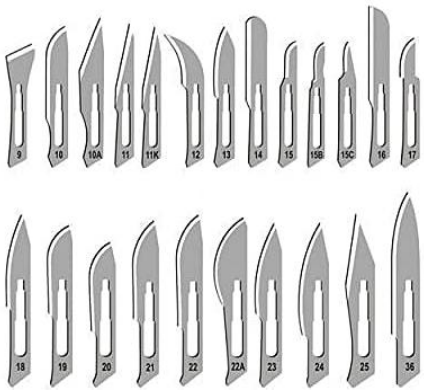
A scalpel is popularly known as “surgeon’s knife.”

Parts:

1) Handle

It is commonly known as BP (Bard Parker) Handle.
It is reusable.
It is mainly available in 2 sizes = 3 & 4
Size 3 handle can accommodate small sized surgical blades (number 10-15).
Size 4 handle can accommodate larger surgical blades (number 18-25).

2) Blade



It is disposable.
It is either made from stainless steel only or from stainless steel with platinum coating.

Blade number	Uses
10	Stab incision, Pediatric surgeries
11	Stab incision (Abscess drainage)
12	Tonsillectomy, Cardiovascular surgery
15	Plastic and pediatric surgery
22	Skin incision
23	Skin and deeper incisions
24	Skin incision

Use: For making a deliberate, controlled, and clean cut into the tissue.

12. Needle holder:

- Smaller, short blunt blades, criss cross serrations and groove in the center of blade for maintaining the orientation of needle
- Should be held between thumb and ring finger
- Maximum grip of needle is achieved by placing the needle at the junction of proximal 2/3rd and distal 1/3rd.
- Used to hold the needles which are used to suture the part

13. Retractors:

- Retractors are instruments which are used to pull tissue aside to expose a surgical field.
- Retraction should be gentle and injury to the underlying tissue should be avoided by placing a sponge or gauze piece beneath the retractor.
- An assistant who is retracting should be allowed to relax between surgical maneuvers in order to avoid fatigue and muscular cramps.

Types:

1. Superficial retractors
2. Deep retractors
3. Self-retaining retractors

Use: Traction, countertraction or both.

14. Towel clip:

- Small and curved instrument with 4–5-inch length
- Curvature of blade is so that whole thickness of towel can be held easily and firmly
- Tips are sharp for better grasping
- Used to fix the drapes in manner, so that only operative field is exposed to the atmosphere and rest of area is covered with sterile drapes

15. Catheter:

A catheter is a hollow, flexible tube with openings at both ends.

Types:

1. Simple or Non-self-retaining catheter: Simple rubber catheter
2. Self-retaining catheter: Foley's catheter, Malecot's catheter, etc.

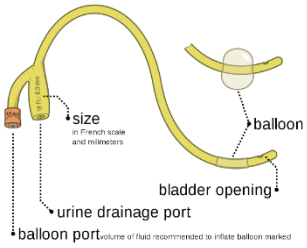
Simple Rubber Catheter

It is a non-self-retaining catheter made from India / red rubber.
This catheter is available in size 3-12, each having 37.5 cm length.
Its tip is blunt with opening at the sides only.

Use:

Used for bladder wash, enema, bowel wash and to temporarily drain the urine in case of acute retention of urine. It is also used for retrograde cystourethrogram.

Foley's Catheter



- It is a self-retaining catheter made from latex.
- It has a balloon near the tip into which distilled Water is infused to make itself retaining.
- It is sterilized by gamma radiation.

Use:

- To relief retention of urine.
- Used during and after any major surgery, and in case of burns to monitor the urine output.
- Irrigation of urinary bladder
- Hemostatic after prostatectomy
- Introduction of cytotoxic drugs while treating papillary carcinoma of the bladder.
- Catheter cholecystostomy and gastrostomy

Malecot's Catheter

It is a self-retaining catheter made from red rubber, containing sulphur. It has a flower or umbrella shaped end.
It is never introduced per urethral route. It can be inserted through the skin into different areas of the body.

Use:

- Used in the drainage of different body fluids, e.g., urine, bile, pus.
- Suprapubic cystostomy, if Foley's catheterization fails after two trials.
- Perinephric and subphrenic abscess
- Amoebic liver abscess

Advantages:

- Can be kept for longer duration (3 months)
- Drains fluid adequately
- Less infection rates
- Easy removal

STERILIZATION

3. Nirjantukarana / Sterilization: Methods, types and its role in surgical practice.

Nirjantukarana:
Nirjantukaraṇa is a term to denoting the meaning of sterilization.
For a successful surgery, sterilization is essential. These methods were mentioned sporadically in classical texts under various surgical procedures.

Āchārya Ḍalhana mentioned the physical method of sterilization of instruments before an operation by flaming them. Further, he explained that if this method is not done, the operation site becomes prone for infection.

Dhūpana karma (fumigation), characterized under Bahirparimarjana, has been mentioned as a treatment in all classics of Ayurveda. This medicated smoke creates an aseptic environment which kills the microbes thus preventing infections.

Examples of commonly used Dhūpana Dravya:
1. Nimba: Insecticidal, its fumes act against streptococcus pyogens after 10 minutes of exposure.
2. Guggulu: Potential action on gram +ve and -ve bacteria.
3. Sarshapa: Glycosinolates, biocidal action on bacteria and fungi.
4. Ela: Its volatile oil having antimicrobial and antifungal action.
5. Haridra: Exhibit fumigation activity against beetles and insects with antibacterial and antifungal activity.
6. Jatamamsi: Antibacterial due to essential oils.
7. Tulsi: There is presence of chavicol, eugenol, linalool, camphor etc. which acts as insecticidal, nematocidal, and fungicidal.

Āchārya Sushruta described the Rakṣoghna Dhūpa containing Sarṣapa, Nimba patra, etc. which has been told to use for wound management.

Disinfecting powder and ointments:
1. Kushthaghna, Kandughna, Krimighna, Vishaghna etc. Mahakashayas. (Charaka)
2. Arkadi, Eladi, Patoladi, Aaragwadhadi ganas (Sushruta)
3. Dhataki + Lodhra churna
4. Panchavalkal churna + shukti churna
5. Sikta taila

STERILIZATION

Definition:
A process designed to remove or destroy all viable forms of microbial life, including bacterial spores, to achieve an acceptable sterility assurance level.
Sterilization: If physical methods are used
Disinfection: If chemical methods are used

Definitions of terms related to sterilization:
Sepsis: The putrefactive destruction of tissue by disease causing bacteria or their toxins.
Asepsis: The complete absence of bacteria, fungi, virus or other micro-organisms that could cause disease.
Antisepsis: Elimination of bacteria, fungi, virus, or other micro-organisms that cause disease by use of physical or chemical method.
Process:

1. Bacteriocidal (Killing the bacteria)
2. Bacteriostatic (Limiting bacterial growth)

Disinfection: The process of killing pathogenic organisms from inanimate objects like surgical instruments.
Antiseptic agents: It is a chemical which either kills pathogenic organisms or inhibits their growth.

Antiseptic solutions:

1. Lysol
2. Savlon
3. Phenol
4. Hydrogen Peroxide
5. Spirit
6. Formalin solution
7. Povidine Iodine
8. Silver nitrate

Method of Sterilization:

1. Physical
2. Chemical

1. Physical method
   1.1 Heat 1.2 Radiation 1.3 Filtration

1.1 **Heat method:**

Dry heat	Moist heat
Flaming Hot air oven	Heating below 100°c Heating at 100°c (Boiling) Heating at 120°c (Autoclave)

A. Flaming:
Used in sterilization of inoculating lops or wires, forceps points & spatulas etc.
B. Hot air oven:
It is an electrical device used for sterilization utilizing dry heat.
Temperature: 160°c
Time: 1hour
Sterilization: Glassware, Forceps, Scissors, Scalpel, Syringes, Swabs, Dressings etc.

a. Heating below 100°c:
Used for pasteurization of milk (on 72°c for 30 seconds)
b. Heating at 100°c:
Immersion in boiling water (100°c) for 10 minutes kills most of pathogenic organisms. Used for sterilization of syringes, injection needles, surgical instruments except scissors, knives, suture needles etc.

c. Autoclaving:

A sterilizer that utilizes saturated steam under pressure.
Principle: In an autoclave, water boils when its vapors pressure equals the pressure of surrounding atmosphere. When water is boiled at increased pressure inside a closed vessel, the boiling point of water increases & so is the temperature of steam produced. Saturated steam has better penetrating power. When steam comes in contact with cooler surface, it condenses into water & gives up its latent heat to that surface leading to sterilization.
Temperature: 120°c
Pressure: 20 pounds per square inch
Time: 20 minutes
Sterilization: Syringes, needles, linen including gowns, masks etc.

1.2 Radiation:

I. Non ionizing
II. Ionizing

I. Non ionizing:

Infrared: Sterilization of syringes
Ultraviolet: Entryways, hospital wards, OT room etc.

II. **Ionizing:** It involves X-rays, Gamma rays & Cosmic rays.

Gamma rays: Plastic syringes, swabs, catheters, sutures, IV infusion set, blood donor transfusion set, scalp vein set etc.

1.3 Filtration:

Filtration through several different types of filters including the modern membrane filters (Milipores filters) is an efficient way of removing larger particles & bacteria from liquids (ex. Human serum albumin) that cannot be treated by other mean.

2. Chemical methods:

The chemical substance known as disinfectants, are antimicrobial agents that are applied to objects to destroy or inactivate pathogenic organisms.
Principle:
A chemical disinfectant acts by coagulating or changing the composition of protein, so that the latter no longer exists in the same form.
Examples:

1. Gases: Formaldehyde, Ethelene oxide etc.
2. Aldehydes: Formaldehyde
3. Alcohol: Ethyl alcohol
4. Dyes: Flavin, Acriflavin
5. Halogens: Chlorine & Iodine
6. Surface active: Soaps & Detergents etc.

SANGYAHARAN / ANAESTHESIA

4. **Sangyaharan / Anaesthesia: Definition and types**

I. **Local Anaesthesia: Drugs, Techniques, Indications, Contraindications, Complications, and their management.**

II. **Regional and General anesthesia: Drugs, Techniques, Indications, Contraindications, Complications, and their management.**

Anaesthesia:
Anaesthesia is a state of temporary induced loss of sensation or awareness. It enables the painless performance of medical procedures that would cause severe intolerable pain to unanesthetized patient.

Anaesthesia in ayurveda:

1. Madhya paan:

Sushruta mentioned Madhya for some operations. It is even advocated by Charaka to relieve pain of labor & during extraction of foreign body

2. Shantvaitva:

Means consoling, the most of operations were advocated to be conducted just by soothing & counselling the patients with sweet words, happy conversations, fomentation, applying digital pressure on root of sensory nerves etc.

3. Aaptairdrudham grahitasya: Holding & caressing by relatives
4. Samgnya sthapana dravyas:

Samgnya sthapana means group of medicinal plants used to restore the consciousness. They are…

- Hingu
- Kaitarya
- Irimeda
- Vacha
- Choraka
- Vayastha
- Golomi
- Jatila
- Palankasha
- Rohinya

5. Vedana sthapana dravyas:

Vedana sthapana means group of medicinal plants used to subside the pain.
They are…

- Shala
- Katphala
- Kadamba
- Padmaka
- Tumba
- Mocharasa
- Shirisha
- Vanjula
- Elavaluka
- Ashoka

6. Sammoha churna:

A preparation as a moha churna is vigorously used as for the head surgeries in king Bhoja kingdom.

7. Reversal of unconscious:

Reference available in Valmika Ramayana, where sanjeevani was used to revive Lakshman who was badly injured in battle

8. Acc to Vagbhatta:

Matulunga rasa & Madhya can be used as anesthetic agent for eye operations etc.

9. Drugs:

Bhavaprakasha says Ahiphena, Bhaanga possess the quality moha & madkari which is used in the management of pain.

10. Mantra:

Certain mantra & rituals were being performed before conducting the operations whit probably may have super natural or hypnotic effect on patient.

11. Bandhas: Jalandhara bandha in tooth extraction etc

ANAESTHESIA

Derivation: An means without or negative and Aisthēsis means sensation. So, Anaesthesia defined as loss of sensation.

Definition: It is an induced artificial procedure to abolish pain during surgical procedures.

Analgesia: Abolish of pain perception.

Akinesia: Abolition of muscular contraction at the site of injection of anesthetic drug.

Types of anesthesia:

1. Local anesthesia
2. Regional anesthesia
3. General anesthesia and
4. Dissociative anesthesia.

1. **Local anesthesia** inhibits sensory perception within a specific location on the body, such as a tooth or the urinary bladder.
2. **Regional anesthesia** renders a larger area of the body insensate by blocking transmission of nerve impulses between a part of the body and the spinal cord. Two frequently used types of regional anesthesia are Spinal anesthesia and Epidural anesthesia.
3. **General anesthesia** refers to inhibition of sensory, motor and sympathetic nerve transmission at the level of brain, resulting in unconsciousness and lack of sensation.
4. **Dissociative anesthesia** uses agents that inhibit transmission of nerve impulses between higher centers of the brain (such as the cerebral cortex) and the lower centers, such as those found within the limbic system.

Local anesthesia:

Definition: Loss of sensation in circumscribed area of the body caused by depression of exciting in nerve ending or in inhibition of conduction process in peripheral nerves.

Advantages	Disadvantages
Simple administration Easily available, less expensive, and easily sterilized The patient remains conscious & still does not feel the pain. No pre-anesthetic preparation of the patient is required. After the procedure, the patient can be sent home; he does not require hospitalization. Psychological trauma to the relatives is avoided. Reduces bleeding during surgery.	Not good for non-co-operative patients. Allergic reactions Ideal surgical condition (relaxed field) is not produced The patient may develop hypersensitivity or signs & symptoms of hyper sympathetic activity, because of partial block. May cause nerve injury. No satisfactory anaesthetization in infected area & faster absorption in acidic medium cause systemic toxicity.

Types of local anesthesia:

1. Surface anesthesia
2. Infiltration anesthesia
3. Nerve block
4. Field block

1. **Surface anesthesia:**

It is defined as superficial loss of sensation in conjunction mucus membranes or skin produce by direct application of local anesthetic solutions, ointments, gels, or sprays.
Drugs used are xylocaine 4% solution, ethyl chloride spray etc.
It is commonly used in…
Laryngoscopy and bronchoscopy
Incision of quinsy (tonsilitis)
Cystoscopy
Urethral dilatation etc.

2. **Infiltration anesthesia:**

Subcutaneously
Drug is injected fanwise through as few needles pricks as possible.
Drugs used are xylocaine 2%
Used in lipoma, polyp, tooth extraction etc.

3. **Nerve block:**

The local anesthesia solution is deposited in close proximity to the main nerve trunk supplying the operative field.
Drugs used: Lidocaine, Bupivacaine etc.
Common nerve blocks are

a. Brachial block → block shoulder, upper arm, elbow and forearm
b. Digital block → block complete finger

4. **Field block:**

Local anesthetic is infiltered in circumferential pattern around the border of the surgical field, leaving the operative area undisturbed.
Used in upper paramedian, midline incision, in operation for hernia, in excision of benign tumour of skin & subcutaneous tissue.

Regional anesthesia / Spinal anesthesia:

The spinal tracts are blocked by injecting local anesthetic drug in sub arachnoid space.
Position:
Lateral decubitus position with head, hips and knee being fully flexed to open the interlaminar spaces. Highest point of Iliac crest corresponds top 4^{th} lumbar vertebra.

Useful drugs in spinal anesthesia:
Lignocaine
Bupivacaine
Tetracaine
Cinchocaine / Nupercaine

Types of Spinal Anaesthesia:

1. Caudal (Up to L_2)
2. Low spinal (Up to L_1)
3. Mid spinal (Up to T_{10})
4. High spinal (Up to T)
5. Unilateral spinal

Indications: Surgeries below the umbilicus (lower abdominal) and perineal

Materials required:

- Lumbar puncture needle
- 2cc & 5cc disposable syringes
- 23/24 number injectable needle
- Towel
- Sponge holding & artery forceps
- Glows and anesthetic drugs

Advantages:

1. Economical
2. Hypotension reduces the bleeding
3. Adequate relaxation is achieved.
4. Respiratory complications are less.

Disadvantages:

1. High incidence of post operative headache
2. Hypotension
3. Dural puncture
4. Meningitis

Complications:

Immediate	**Late**
Bleeding Severe headache Backache Soothing pain	Vomiting Restlessness Paralysis Nerve damage Shock

Spinal needle passes following structures:

1. Skin
2. Subcutaneous tissue
3. Supra spinal ligament
4. Inter spinal ligament
5. Ligamentum flavum
6. Epidural space
7. Duramater
8. Sub arachnoid space

Contraindication:

1. Cardiac patient
2. Increased Intra cranial pressure, may precipitate coning.
3. Spinal tumours
4. Kyphosis, Scoliosis
5. Neurological conditions like syringo myelia
6. Back pain and spinal disease

Mechanism:
Regardless of the anesthetic agent (drug) used, the desired effect is to block the transmission of afferent nerve signals from peripheral nerve receptors. Sensory signals from the site are blocked, thereby eliminating pain. The degree of neuronal blockade depends on the amount and concentration of local anesthetic used and the properties of the axon. Thin unmyelinated C-fibers associated with pain are blocked first, while thick, heavily myelinated A-alpha motor neurons are blocked last. The desired result is total numbness of the area. A pressure sensation is permissible and often occurs due to incomplete blockade of the thicker A-beta mechanoreceptors. This allows surgical procedures to be performed with no painful sensation to the person undergoing the procedure.

Some sedation is sometimes provided to help the patient relax and pass the time during the procedure, but with a successful spinal anesthesia the surgery can be performed with the patient wide awake.

General anesthesia:
General anesthesia is a medically induced coma and loss of protective reflexes resulting from the administration of one or more general anesthetic agents.

Purpose: General anesthesia has many purposes including:
1. Analgesia - loss of response to pain,
2. Amnesia - loss of memory,
3. Immobility - loss of motor reflexes,
4. Unconsciousness loss of consciousness,
5. Skeletal muscle relaxation.

Types:
1. Intravenous
2. Inhalation

Premedication:
It is the term given to the administration of certain medications prior to anesthesia. Their objectives are as follows;
1. To allay anxiety: Tab Diazepam. 0.1-0.2 mg/kg or Tab Lorazepam 2-4 mg orally or Triclofos syrup 100 mg/kg, one hour prior to surgery (children)
2. To relieve pain: Morphine 0.1 mg/kg or Pethidine 0.5 mg/kg or Tramadol 0.5-1 mg/kg IM
3. To dry secretions: Anti-cholinergic drugs like Glycopyrrolate 0.2 mg IV
4. To help anesthesia induction
5. To blunt baroreceptor reflux: small dose of beta blocker or clonidine
6. To reduce gastric volume & acidity: Metoclopramide 10 mg or Ranitidine 150 mg or Pantaprazole 40 mg orally

Investigations: All investigations are depending upon condition of patient and disease. Some common are
- Routine blood
- Urine routine
- ESR
- BT, CT
- HIV 1 & 2
- HbsAg
- ECG
- Chest X-ray

Stage of General Anesthesia:
Arthuremes (1920) described these stages.

1. Stage of Analgesia

Till loss of consciousness pain is diminished with normal respiration & reflex. It is used for minor operations like labor incision & I&D.

2. Stage of Delirium (Excitement)

From loss of consciousness to regular respiration patient get excited involuntary movement present, pupils dilated, blood pressure increases, heart rate increases.

3. Stage of Surgical Anesthesia

Regular to irregular respiration, blood pressure decreases, heart rate increases, respiration depresses, muscle tone decreases.

This stage is divided into 4 planes

1. Rolling eye balls
2. Loss of Corneal & laryngeal reflexes
3. Pupils starts dilating & light reflex loss
4. Intercostal paralysis, shallow abdominal respiration, dilated Pupils.

4. Stage of Respiratory Paralysis

Irregular respiration, fall of blood pressure, Pupils fully dilate & finally patient is dead.

Monitoring during anesthesia:

- Inspiratory oxygen concentration
- Oxygen saturation by pulse oxymeter
- Expiratory oxygen tension measurement
- BP
- ECG
- Hourly observation of urine output via urinary catheter

Airway management:

During the state of GA, patient has unable to maintain spontaneous respiration and require support by their anesthesiologist, to maintain an open airway and regulate breathing within acceptable parameters. It involves placement of either an endotracheal tube or a supraglottic airway (Device that sits above the vocal cards). Both devices allow for adequate delivery of oxygen and anesthetic gasses.

Positioning of tongue and jaw:

The anesthetist thrusts the jaw forward from behind the temporomandibular joints, thereby lifting the tongue off the posterior pharyngeal wall, which may also be achieved by inserting an artificial oropharyngeal airway such as the Guedel. The anesthetic gases are given through a face mask.

Complications of GA:

- Myocardial depression & cardiac arrest
- Hypertension
- Laryngeal & bronchial spasm
- Cardiac arrhythmias
- Respiratory failure
- ARDS (Acute Respiratory Distress Syndrome)
- Hypoxia
- Pneumothorax
- Hypothermia

Mode of action of GA:

1. Drugs → depression of brain center → unconsciousness muscle relaxation → sensory loss → motor loss → muscle relaxation
2. More drug use → fully depression of brain centers → respiratory failure → death

Commonly used drugs:

Chloroform:

- 1-5 minutes loss of sensation
- Increases respiratory secretions
- Decreases temperature, BP, heart rate, function of liver & blood supply of kidney

Nitrous oxide (N_2O):

- Laughing gas
- Quick induction (1-2 minutes)
- Colour of cylinder: Black body with blue shoulder
- When stops its administration, patient comes in conscious within 2-3 minutes
- If it administered without oxygen then patient undergo unconscious within half minute
- Nonirritant to patient, pleasant to inhale and post operative complication is less
- No muscle relaxant, no increase in respiration
- Increases BP & pulse

Ethyl ether:

- It quick evaporate & fire also, so kept in cold & dark room
- Killed organisms & act as LA
- Relax the muscles
- Increases secretions in respiratory system & glucose level
- Decreases intestinal movements & secretions, blood supply to kidney & liver function

Halothane:

- Anaesthesia is rapid, smooth and with fast recovery
- Dilatation of blood vessels
- Made heart to sensitive towards adrenalin
- Contraindicated in shock & delivery
- Most costly and it has no analgesic properties.
- Decreases BP & pulse
- It has got hepatotoxic effect such as hepatitis that is why it should not be given to patient who has previously taken halothane anesthesia within 4 weeks.

Ketamine:

- It is also known as "Dissociative (Sudden temporary alteration) anesthesia
- Good for repeated uses
- Useful for burn dressing and I & D
- Reflexes are not abolished
- It elevates heart rate, cardiac output, and BP due to sympathetic stimulation • It is dangerous for IHD patients.

TRIVIDHA KARMA (AGROPAHARNIYA ADHYAYA)

5. Trividha Karma: Purva karma, Pradhana karma, and Paschat karma

Definition:
Agropaharaniya means preparation of patient along with collecting all the required materials needed during any surgical procedure.

Classification:
1. Purva Karma
2. Pradhana Karma
3. Paschat Karma

Purvakarma:
Ekadashaupkrama:
1. Aptarpana
2. Aalepa
3. Parisheka
4. Abhynga
5. Sweda
6. Vimlapana
7. Upnaha
8. Pachana
9. Visravana
10. Sneha
11. Vamana
    Virechana

Shastravaidhya sambhandha:
शौर्यमाशुक्रिया शस्त्रतैक्ष्ण्यमस्वेदवेपथु|
असम्मोहश्च वैद्यस्य शस्त्रकर्मणि शस्यते|| (Su. Su. 5 /10)

1. शौर्य means निर्भयत्वं (Bold/Courageous)
2. आशुक्रिया (Light hand & fast in action, which prevent more discomfort to patient)
3. शस्त्रतैक्ष्ण्यम means sharp instruments which avoids pain to patient.
4. No perspiration during procedure (Asweda).
5. No tremor & fear (Avepathu)
6. असम्मोहश्च means should not get panic during procedure & have knowledge of different stages of Shotha (Pakva & apakva)

Contemporary science:
The qualities of surgeon are
1. Lions heart: Courageous
2. Eagles eye: Keen observer
3. Ladies finger: Smooth & gently handling of patients
4. Thumb in society: Without surgeon medical society cannot be survived.
5. Horse's leg: Stamina
6. Camel's belly: Ability to carry on without food & water
7. Steel bladder: Not thirsty
8. Cast iron stomach: Not hungry
9. Heart of gold: Affectionate/Lovable

Rogi sambhandha:

1. Consent
2. Patient should pass the faeces, urine & flatus from their own places. explanation.
3. Anaesthesia
4. Food management:

Patient should be nil by mouth before undertaking surgical procedures as for Mudhgarbha (Malpresentations), Udara (Abdominal disease), Arsha (Piles), Ashmari (Urinary calculi), Bhagandara (Fistula-in-ano) & Mukharoga (Oral diseases).

Upkarana sambhandha:

The materials required for procedure should be collected like yantra, shastra, kshara, agni, shalaka, shrunga, Jalauka, alabu, pichu, plota, sutra, patta, madhu, ghrita, vasa, payasa, taila, tarpana, kashaya, lepana, kalka, sheeta & ushnodaka, paricharaka, bowls etc.
Paricharaka:
He should be snigdha (love/affection towards patient), Sthira (withstand to blood & surgical procedures) and Balavanta (strong enough to hold the patients during operation).

Pradhana Karma:

Ideal Incision:

आयतश्च विशालश्च सुविभक्तो निराश्रयः|

प्राप्तकालकृतश्चापि व्रणः कर्मणि शस्यते|| (Su. Su. 5/9)

The qualities of good incision are

1. Aayata (Adequate length)
2. Vishala (Extensibility)
3. Sama (Uniform cut edges)
4. Suvibhakta (Heena & ati dosha mukta)
5. Nirashraya (Away from Jihwa, danta, asthi, marma)
6. Should have knowledge of aama and pakva avastha (Incision should made at approximate time)

Different incisions:

1. Counter incision (Pratibhedana):

It should be given at some distance, according to once yukti, in case one incision is not enough to clear the wound completely. It should be given to provide adequate drainage.
Multiple incisions (Bahubhedana):
In whichever the direction tracks lead & wherever pockets (utsanga) are presents, at all those places incisions should be made so that no pus (dosha) remains.

2. Oblique incision (Tiryaka):

Over eye brows, cheeks, temples, forehead, eyelids, lips, gums, axilla, abdomen and groin regions.

3. Circular incision (Chandra aakruti): पाणिपादेषु

Over palms and soles circular incision should be done.

4. Semicircular incision (Ardhachandra aakruti): गुदे मेढ्रे

Semicircular incisions are done over penis and in anal region.

Improper incision (Asamyak bhedana):

अन्यथा तु सिरास्नायुच्छेदनम्, अतिमात्रं वेदना, चिराद्व्रणसंरोहो, मांसकन्दीप्रादुर्भावश्चेति||
(Su. Su. 5/15)

- Injury to blood vessels and ligaments
- Severe pain
- Delayed wound healing
- Growth of excessive granulation tissue or keloids

Abscess drainage:

1. Select the auspicious Tithi, Karana, Muhurta & Nakshatra.
2. Agni, Brahmana & Guru should be worshiped with offering of dadhi, annapan & ratna.
3. Patient should perform Bali, Mangala & Swastika vachana.
4. Patient should have light food and is facing east. should be positioned properly.
5. Surgeon should face west & make incision in single stroke in direction of hairs, until pus is seen, saving the marma, sira, snayu, sandhi & asthi.
6. Knife should be withdrawn softly.
7. Even in big abscess, extent of incision should be 2 or 3 angula breadth only.
8. Break the pus pockets or locules.

Pashchat karma:

1. Patient should be reassured after sprinkling cold water.
2. Pressure should then be applied all around fingers & wound squeezed.
3. It should be irrigated by kashaya & then the liquids should be mopped by plota (Swab).
4. Wound should be packed by gauze which should neither to be wet, nor too dry, but thoroughly soaked in tila kalka madhu sarpi.
5. Medicinal pastes should be applied over the wound, which should then be covered by thick layer of kavalika (Pad) & bandaged.
6. Wound should be fumigated by vednashamak & rakshoghna dravya.
7. At last protection should be ensured by reciting mantra.

Dhupana:
Fumigation should be carried out by using drugs like guggulu, agru, sarja rasa, vacha, gaur sarshapa, lavana, nimbi patra along with goat ghee.

Bandhana:
First change of dressing:
It should be removed on 3rd day & another bandage applied exactly as before after washing by Kashaya.

Climate vs. Dressing:
Hemanta, Shishira, Vasanta rutu → Every 3rd day
Sharada, Greeshma, Varsha rutu → Every 2nd day

Post operative wound management:
If the severe pain due to operative procedures make the patient restless it is relieved by gently applying luke warm ghee mixed with Yashtimadhu.

Pre-operative preparation:
Emergency admission for the urgent operation:

- Diet: Nothing by mouth (NBM)
- Blood tests: Routine blood investigations with grouping and cross matching
- Fluid therapy: To correct dehydration and electrolyte balance
- Medications: No medication should be given for the relief of pain until a diagnosis has been established and a decision made whether or not to operate. Because pain may be the only clue for the diagnosis which must not be masked by the narcotics
- Nasogastric aspiration: This needs to be done if patient has taken a meal within last two hours or if surgical lesion is indicated e.g., Intestinal obstruction
- Antibiotics: They are started preoperatively in septic patients or during surgery involving a hollow viscous
- Shaving and preparation of part to be operated
- Catheterization if necessary

Elective operation:
In case of elective operation, preoperative orders are written one day prior to operation. They include following points.

- Proposed operation and anesthesia
- Written consent for surgery and anesthesia
- Shaving and preparation of local part
- Nothing by mouth after midnight
- Oral medications: These should be given early in the morning with a sip of water.
- Blood tests: Blood is sent for cross matching; ensure in the evening before operation that the required blood is available and kept reserved
- Simple enema is given in the evening & before the operation to empty the distal colon because, on induction of general anesthesia, sphincters may relax and the patient may defecate on operating table.
- Patient is asked to go for voiding urine on call to the operating room, to avoid embarrassment and obviate undue bladder distension.

Post-operative care:
The immediate post-operative period is critical one. The patient should be observed diligently and given intensive physical and psychological support until the effect of anesthesia is worn and the over, all condition of patient stabilizes.
All orders must be written on new page and revised at least daily according to the patient's condition and progress.

1. Name of the operation performed and the type of anesthesia given.
2. Vital signs: Temperature → 6 hourlies. Pulse, BP and respiration rate are taken frequently.
3. Daily recording of fluid intake, urine output and body weight to decide the volume of fluid replacement
4. Care of tube and drains
5. Diet: NBM at least 4 hours after general anesthesia.
6. Medications: IV fluids, antibiotics, analgesics etc
7. Vomiting: It occurs usually due to anesthetic agents. Inj prochlorperazaine IM is effective in suppressing in short term post-operative nausea.
8. Physiotherapy:
   Deep Breathing exercise. Free movements of limbs are allowed

ASHTAVIDHA SHASTRA KARMA

6. Ashtavidha Shastra Karma: Surgical procedures

According to Sushruta Saṁhitā, there are 8 main surgical procedures, known as Aṣṭavidha Shastrakarma.

1. Chedana (Excising, Removing)
2. Bhedana (Dividing, Separating)
3. Lekhana (Scrapping)
4. Vyadhana (Puncturing, Piercing)
5. Eṣaṇa (Probing, Searching)
6. Āharaṇa (Extracting, Pulling out)
7. Visrāvaṇa (Draining)
8. Sīvana (Suturing)

1. Chedana:

A part or whole of the limb is cut off from the parent.

- Bhagandara
- Kaphaja Granthi
- Arbuda
- Asthi Mamsagata Shalya
- Arsha
- Updamsha
- Mamsa kanda
- Tilakalaka

2. Bhedana:

Bhedana karma is the surgical procedure to divide or seperate tissue to open a structure for achieving effective drainage or for adequate removal of underlying structures.

- Vidradhi
- Visarpa
- Dantapupputa
- Stana roga
- Vidarika
- Granthi (Vata/Pitta/Kapha)
- Prameha pidika
- Shopha
- All Kshudra roga

3. Lekhana:

Lekhana karma is the surgical procedure to remove tissue by scrapping.

- Rohini (V/P/K/S)
- Upajihwika
- Dantavaidarbha
- Granthi (Medaja)
- Adhijihwika
- Mandala

4. Vyadhana:

Vyadhana karma is the surgical procedure to puncture or pierce a structure.

- Mutravruddhi
- Dakodara
- Pakva raktaja gulma
- Visarpa

5. Esana:

Eṣaṇa karma is the surgical probing procedure.

- Nadi
- Sashalya vrana
- Unmargi vrana

6. Aaharana:

Āharaṇa karma is the surgical procedure to extract a structure from the body.

- 3 varieties of sharkara
- Danta mala
- Karna mala
- Ashmari
- Shalya
- Mudhagarbha

7. Vishravana:

Visrāvaṇa karma is the surgical procedure to drain liquid from a particular site.

- Vidradhi
- Visarpa
- Dantapupputa
- Kshudra roda
- Stana roga
- Vidarika
- Kustha
- Blood vitiated by toxins
- Krimidanta
- Dantaveshta

Shastrakarma	Shastra used	Anushastra used
Chedana	Maṇḍalāgra, Karaptara, Vṛddhipatra, Nakha shastra, Mudrika, Utpalapatra, Ardhadārā shastra	Tvak sāra, Sphaṭika, Kācha, Kuruvinda, Nakha, Agni, Kṣāra
Bhedana	Vṛddhipatra, Nakha shastra, Mudrika, Utpalapatra, Ardhadārā shastra	Tvak sāra, Sphaṭika, Kācha, Kuruvinda, Nakha, Agni, Kṣāra
Lekhana	Maṇḍalāgra, Karapatra, Vṛddhipatra	Kṣāra, Gojihvā, Shephālikā patra, Nakha
Vyadhana	Kuṭhārika, Vṛhimukha, Ārā, Vetasapatra, Eṣaṇī, Kushapatra	Tvak sāra, Karīra
Esana	Eṣaṇī	Karīra, Bāla, Aṅguli
Aaharana	Baḍisha, Dantashaṅku	Nakha, Aṅguli
Visravana	Kushapatra, Āṭīmukha, Sharārimukha, Antarmukha, Trikūrchaka, Sūchī	Jalauka, Gojihvā, Shephālikā, Shākapatra
Seevana	Suchi	Bala

8. Seevana:

Indications:

सीव्या मेदःसमुत्थाश्च भिन्नाः सुलिखिता गदाः||

सद्योव्रणाश्च ये चैव चलसन्धिव्यपाश्रिताः| (Su. Su. 25/16-17)

Diseases of meda
Bhinna sulikhita vrana
Sadhyo vrana
Wounds around the movable joints

Contraindications:

न क्षाराग्निविषैर्जुष्टा न च मारुतवाहिनः||

नान्तर्लोहितशल्याश्च...| (Su. Su. 25/17-18)

Suturing is contra indicated in wounds caused by

- Kshara (Caustics)
- Agni (Fire)
- Visha (Poisoning)
- Those from which air comes out
- Antarlohita Shalya (Which have blood clot or foreign body within).

Samyak lakshana:
Suturing should be done neither too far from nor too near the margins of wound, because if it is done at a distance, it becomes painful and if sutured too near, it would cut through the margins of the wound.

Materials for seevana:

- Sukshma sutra (Fine thread)
- Ashmantaka valka (Bark of Ashmanth)
- Shana (Thread of Shana)
- Kshaumsutra (Silk thread)
- Snayu (Tendon)
- Baal (Hairs)
- Murva (Fibres of murva)
- Guduchi (Fibres of guduchi)

Seevana prakara:

1. Vellitaka (Continuous)
2. Gophanika (Blanket)
3. Tunnasevani (Subcuticular)
4. Rujugranthi (Interrupted)

Suchiprakara

1. Vrtta suchi (Round body needle): Where the tissues are thin & in the joints the needle should be circular & 2 angula in length.
2. Tryasra suchi (Cutting needles): For thicker tissues, it should be straight, triangular bodies & 3 angula in length.
3. Dhanurvakra (Curved needles): Use at the vital spots, testicles & abdominal viscera.

Shastrakarma vyapat:
Heena chedana (Inadequate)
Atirikta chedana (Excessive)
Tiryak chedana (Irregular)
Aatmagatra chedana (Accidental)

Suture material:
Suture: Any thread or strand which brings in to opposition two surfaces or tissues
Ligature: Any thread or strand which obliterates the lumen of ductular structures

Ideal suture material:

1. Freely available & less expensive
2. Should not promote growth of bacteria around it
3. It should have uniform diameter
4. Non allergic, non-carcinogenic
5. favorable tensile strength
6. It should produce knots which holds securely without cutting or slipping
7. Minimum tissue reactive
8. Easy to handle and easy to sterilize

Varieties:

Absorbable		Non absorbable	
Natural	Synthetic	Natural	Synthetic
Catgut	Vicryl (Polyglactin)	Silk	Steel, Nylon
Collagen	Dexon	Cotton	Silver, Polyester
Fascia lata	Polydioxanone (PDS)	Linen	Polyethylene, Prolene
Kangaroo tendon	Polyglycaprone		Platinum, Silver wired
Beef tendon			
It is absorbed in body, either digested by enzyme & removed by phagocytosis or broken by hydrolysis & removed by phagocytosis.		It remains inside the body & retain its tensile strength for at least 1 year.	

Types of suturing

1. Continuous:

Can be applied easily & controlled hemorrhage
Not used in presence of infection

2. Interrupted:

On interrupted distance
Advantage of individual removal in case of infection or hematoma

3. Mattress:

Needle starts from one side, travels to the other site and then returns to the same side by different punctures
It opposes the skin clearly & reduce the subcutaneous dead space

4. Sub-cuticular:

Cosmetically attractive, no scar mark
Skin sutures have to be removed at earliest as soon as wound edges are secure.
This reduces irritation, chance of infection & scarring

Needles:

Ideal needle:

- Made up of high-quality stainless steel
- Thin and slim as possible without compromising strength
- Should cause minimal trauma to tissue
- Should able to penetrate tissue with minimal resistance
- Should resists bending

Types:

According to shape	According to cutting edge
• Straight needle • Curved needle (Single armed / Double armed)	• Round body • Cutting body (Conventional cutting / Reverse cutting)

According to eye	According to tip	Miscellaneous
• Traumatic (Needle with eye) • Atraumatic (Eyeless)	• Triangular tip • Round tipped • Blunt point	• Spatula needle • Micro point needle

Types of knots:

1. Granny knot
2. Reef knot (Square knot)
3. Surgeon's knot

YOGYA

7. Yogya: Experimental Surgery

Definition
Acharya Sushruta introduced the training of a surgeon to achieve dexterity in performing basic surgical and Para surgical procedures on experimental models, this training protocol was named as Yogya. It offers a safe, non-clinicał environment designed to meet the educational needs of learners.

Karma	Aim	Model (Yogya)
Chedana	To know application of force to excise	Kuṣmāṇḍa (pumpkin gourd), Ālābū (bottle gourd), Kālindaka (watermelon), Trapusa (cucumber), etc.
Bhedana	To know the tension of the wall	Urinary bladder of animals or leather bag filled with water or various other substances having different consistencies.
Lekhana	Avoiding injury to underlying structures. Removal of superficial thin tissue.	Broad sheet of animal leather with hair.
Vyadhana	To penetrate into vessel, gaining dexterity to enter the vessels with precision & accuracy	Vessels of dead animals or lotus stem.
Eshana	To trace the path with least resistance.	Holes eaten by moths in pieces of wood, bamboo, dried bottle gourd, etc.
Aaharana	To appreciate the optimum grip and force and to remove the foreign body causing least damage to the surrounding structures.	Panasa (jack fruit), Bimbī, Bilva phala majja, Mṛta Pashu Danta (teeth of dead animals).
Visravana	To make superficial incision not to going beyond skin.	Surface of Shalmalī covered with Madhucchiṣṭa (bee wax).
Seevana	Suturing of layers of varying thickness. Suturing of different types.	A thin or thick piece of cloth or leather.
Bandhana	The proper application of Bandhana karma	Models made from mud, cloth, etc. (manikin) and parts of the human body.
Agni-kshara	To learn the proper application of Agnikarma and Kṣārakarma	Soft parts of animal muscle / flesh (Māṁsa).
Karnasandhi Bandhana	Reconstruction of tissue	On skin, soft muscle or flesh & stem of lotus lily.
Peedana	Maintain same pressure throughout the process of basti pranidhana	Pitcher containing water with lateral opening, Alabu.

Benefits of experimental surgery:
An intelligent surgeon, who does experimental surgery methodically on such articles as stated above, does not lose his presence of mind while doing the actual operations. Therefore, he who wants to be an expert in the use of surgical procedures should practice the same experimentally on similar objects.

Medical simulation:
It is a branch of simulation technology related to education and training in medical fields of various industries.

Model-based simulation:
This is mainly based on physical models. Procedures commonly include wound closure, urinary catheterization, venipuncture and I.V. infusion. Models are useful for practicing relatively simple surgical procedures such as the removal of cysts and lipomas.

Computer-based simulation:
Computer simulations are more realistic simulations in which computers create illusions of reality the computer creates predominantly a visual environment, with or without haptic feedback. This collection of technologies allows people to interact efficiently with three dimensional computerized databases in real time,
using their natural senses and skills.

Hybrid simulation:
Hybrid simulators combine physical models with computers, using a realistic interface (such as real diagnostic or surgical instruments). This avoids some of the technical difficulties associated with reproducing the feel of instruments and human tissue.

Team based simulation:
Used in performing multiple tasks of entire procedure.
For example, anesthesia simulation

विशिखानुप्रवेश (Entry into medical profession):
Definition:
Vishika literally means highway. In present context it may be taken to be the path to entry in medical profession.

Qualities of doctor:
1. Well equipped with knowledge of science
2. Able to practice what he studied
3. Must have seen and learn things properly
4. Must be certified by his Acharya
5. Must obtain royal permission to practice/ Now registration in board
6. Having cut shorts his nails and hairs
7. Personal hygiene
8. Having put on white dress
9. Having held an umbrella and stick
10. Pure in mind
11. Must aspire peace health to his patients
12. Dears and friendly to all
13. Helpful to others

Method of clinical examination
A doctor after cultivating these qualities, should examine the patient in following methods
1. Shadvidha pareeksha (five sense organs with questioning)
2. Trividha pareeksha (Darshana, Sparshana, Prashana)

Behavior towards ladies:
Good doctor should avoid sitting, staying and cutting jokes with ladies, and they should also not accept anything offered by them except food.

MARMA

8. Marma: Nirukti, types, description and importance

Definition:

मारयन्तीति मर्माण्युच्यन्ते| (Su. Sha. 6/3 Dalhana)

Dalhana says the part of the body which on injury leads to death is called as marma.

Numbers: 107

Types:

1. Depend upon their anatomy

Mamsa marma: 11 (Vagbhata 10)
Sira marma: 41 (Vagbhata 37)
Snayu marma: 27 (Vagbhata 23)
Asthi marma: 08 (Vagbhata 08)
Sandhi marma: 20 (Vagbhata 20)
Dhamani marma: 09 (added by Vagbhata)

2. Depend on their site:

Adhaha shakha marma: 11 × 2 = 22
Bahu shakha mara: 11 × 2 = 22
Udara and Vaksha marma: 12
Prustha marma: 14
Urdhwa jatrugata marma: 37

3. Depend upon their injury:

Sadhyo pranahara marma: 19
Kalantara pranahara marma: 33
Vishalyaghna marma: 03
Vaikalyakara marma: 44
Rujakara marma: 08

Marma	Sankhya	Mahabhuta	Viddha Lakshana
Sadhyo pranahara marma	19	Agni	• Inability to perceive Indriyārtha, Loss of Manas & Jnāna, Tīvra Rujā • Injury to Sadyaḥ Prāṇahara Marma leads to immediate death or within 7 days.
Kalantara pranahara marma	33	Agni & Jala	• Dhātu Kṣaya, Tīvra Rujā • Injury to Kālāntara Prāṇahara Marma leads to death within 15-30 days.
Vishalyaghna marma	3	Vayu	• Tīvra Rujā • Injury to Vishalyaghna Marma leads to death immediately or soon after Shalya is removed.
Vaikalyakara marma	44	Jala	• Injury to Vaikalyakara Marma leads to deformity.
Rujakara marma	8	Agni & Vayu	• Injury to Rujākara Marma leads to severe pain.

Marmāghāta Nidāna:
Chedana (excision), Bhedana (incision), Abhighāta (injury), Dahana (tearing) on the site of Marma leads to Marmāghāta.

Marmaviddha Sāmānya Lakṣaṇa:
Bhrama, Pralāpa, Pātana (falling due to unconsciousness or dizziness), Pramoha, Viceṣṭana, Saṁlayana (numbness), Uṣṇatā, Srastāṅgatā (flaccid limbs), Mūrcchā, Ūrdhvavāta, Vātaja Vedanā, Māṁsodaka & Raktasrava

Importance of marma in surgery:
1. Marmagata diseases are difficult to cure
2. During surgery marma sthana Should be avoided to prevent complications
3. The knowledge of marma constitutes half of Shalya Tantra, as it is known that the person injured at the site of marma does not survive. Even if person stays alive by good efforts made by efficient surgeon, definately suffer from any kind of deformity.
4. Four types of sira are distributed in marma region and they give nourishment to other structures related to marma. Injury to marma leads to hemorrhage, vata kshaya and severe pain which ends with unconsciousness. Because of this reason at the time of surgery, a surgeon should protect these places carefully.
5. Marma is triguna bhutatmaka
6. Marma sameepa aaghata lakshana:
   - Near sadhyopranahara mama: Patient dies after some period,
   - Near kalantara marma: Disability
   - Near vishalyghna marma: Disability
   - Near vaikalyakara marma: Klesha and vedana
   - Near rujakara marma: Alpa vedana
7. Sadhyopranahara marma → within 7 days
   Kalantara pranahara marma → within 15-30 days
   Vishalyghna & Vaikalyakara marma → Sometime dies

KSHARA AND KSHARA KARMA

9. **Kshara and Kshara karma:**
1. **Nirukti, Pradhanyata, Guna, Dosha, Karma, Prakara, Yogya, Ayogya, Procedure, Upadrava and chikitsa**
2. **Kshara nirmana vidhi, knowledge of kshara varti, Taila and Pichu**
3. **Kshara sutra – Preparation, Indication, Contraindication and Method of application, Complications, and their management.**

Definition

तत्र क्षरणात् क्षणनाद्वा क्षारः|| (Su. Su. 11/4)

That which has Ksharana and Kshanana guna is called as Kshara

Kshara is defined as which destroys and removes the unhealthy, vitiated tissues (Ksharana) or it torments the unhealthy tissue (Kshanana)

Importance of kshara

शस्त्रानुशस्त्रेभ्यः क्षारः प्रधानतमः, छेद्यभेद्यलेख्यकरणात् त्रिदोषघ्नत्वाद्विशेषक्रियावचारणाच्च||

(Su. Su. 11/3)

1. Among all shastra and anushastra, Kshara is considered most important
2. It can singly produce many surgical effects like excision (Bhagandara), incision (Vrana shopha) and scrapping (Dushta vrana).
3. Tridoshaghna (As it is prepared by the combination of numerous drugs)
4. It can be used for various special procedures, like kshara can apply externally (Pratidsarneeya) and also can have internally (Paneeya) or mrudu kshara application in pittaja arsha.
5. Useful in Ati-kruchra sadhya roga also
6. The kshara used properly by efficient surgeon, cures even dreadful diseases quickly. In the same way if it is administered by negligence, it will give effect like that of poison. fire, sharp weapon and thunder. So, it should be used wisely.
7. According to dalhana, kshara is pradhanatama

Properties of kshara:

Rasa: Katu
Veerya: Ushna
Varna: Shukla
Guna: Saumya, Teekshna, Agneya
Doshaghnata: Tridoshahara
Karma: Dahana, Pachana, Shodhana, Ropana, Vilayana, Shoshana, Stambhan, Lekhana etc.
Destroys worms, aama, kapha, kushtha, visha, & meda.
Excessive intake leads to Pumsatva nashaka (Impotence)

Types:

1. Pratisaraneeya/ Bahir parimarjana (Used externally)
   - Mrudu (Pitta, rakta): Only herbal drugs
   - Madhyama: Herbal with mineral drugs
   - Teekshana (Vata, kapha): Herbal, mineral and visha dravya
2. Paneeya/ Antaha parimarjana (Used internally):

Also called ksharodaka (Mrudu kshara collected in powder form is mixed with three parts of water and used as paneeya kshara. Since it is difficult to store paneeya kshara, this modified method of liquid form is preferable.)

Indications of pratisaraneeya kshara:

- Kushtha
- Bhagandara
- Arsha
- Dushta vrana
- Mashaka
- Krimi
- Tilakalaka
- Charma keela
- Arbuda
- Kitibha
- Sapta mukharoga

Indication of paneeya kshara:

- Gara visha
- Udara
- Ajeerna
- Aanaha
- Sharkara
- Ashmari
- Abhyantara vidradhi
- Abhyantara krimi
- Abhyantara visha
- Abhyantara arsha

Contraindication of kshara:

1. Raktapitta
   Jvara
   Pitta prakruti
   Person suffering from Bhrama (Giddiness), Mada (Intoxication), Murcha (Unconsciousness) and Timira (Blindness)
2. Persons:
   - Durbala (Emaciated), Bala (Children), Vruddha (Elder person), Bhiru (Coward)
   - Garbhini (Pregnant), Rutumati (Menstruating lady), Napumsaka (Infertile)
3. Diseases:
   - Sarvanga shotha
   - Pramehi
   - Urakshata
   - Trishna
   - Garbhashaya bhramsha
4. Anatomical structures:
   - Marma
   - Gala
   - Sira
   - Nabhi
   - Snayu
   - Nakhanta
   - Dhamani
   - Shepha
   - Sandhi
   - Srotas
   - Tarunasthi
   - Alpa mamsa
   - Sevani
   - Netra

Dosage of kshara:

1. Pratisaraneeya kshara:

It depends upon disease area to be covered with kshara. The thickness mentioned by dalhana is equal to thickness of nail.

2. Paneeya kshara:

Uttama: l pala	Madhyama: 3 karsha	Adhama: ½ pala

Kshara guna (8):

नैवातितीक्ष्णो न मृदुः शुक्लः श्लक्ष्णोऽथ पिच्छिलः|

अविष्यन्दी शिवः शीघ्रः क्षारो ह्यष्टगुणः स्मृतः|| (Su. Su. 11/16)

1. Na atiteekshna (Not very strong)
2. Na mrudu (Not very mild)
3. Shukla (White in colour)
4. Shlakshna (Smooth)
5. Picchila (Slimy)
6. Avishyandi (Not spreading to neighbouring tissues)
7. Shiva (Soothing)
8. Shighra (Quick action)

Kshara dosha:

अतिमार्दवश्वैत्यौष्ण्यतैक्ष्ण्यपैच्छिल्यसर्पिताः|

सान्द्रताऽपक्वता हीनद्रव्यता दोष उच्यते|| (Su. Su. 11/17)

1. Atimardava (Too mild)
2. Atishvaithya (Too white)
3. Ati ushna (Too hot)
4. Ati teekshana (Too strong)
5. Ati picchila (Too slimy)
6. Ati sarpita (Too spreading)
7. Sandrata (Too thick)
8. Apakvata (Incompletely processed)
9. Hina dravyata (Lacks required drugs/less potency)

Method of preparation of pratisaraneeya kshara:

Drugs used to prepare Mrudu kshara: Apamarga, Kutaja, Paribhadra, Ashwakarma, Aragwadha, Tilwaka, Arka, Snuhi, Patala, Palasha, Vasa, Kadali, Chitraka, Agnimantha and gunja

Drugs mixed to make mrudu kshara to madhyama kshara: Bhasma sharkara, kata or Shuddha sharakara, Shukti and Shankhanabhi (Any one)

Drugs mixed to make madhyama kshara to teekshana kshara: Danti, Dravanti, Chitra Langali, Karanja, Swarnksheeri, Hingu, Ativisha, Sarja kshara, Pravala, Bida lavana and saurchala lavana (Anyone)

Preparation:

On auspicious day, in Sharad rutu, having become clean and keeping fast, uproot the undamaged, mature, well developed black mushkaka plant grown on good soil

↓

Then it should be divided in to small pieces, dried, heaped together along with small quantity of shuddha sharkara (Lime stone) in a place free from draughts of wind

↓

Using few twigs of dried tila plant, above heap is burnt

↓

When fire has burnt out, the greyish ash is collected

↓

To this ash, 6 parts of water/cow's urine is added, stirred well

↓

Filtered 21 times through cloth

Clear filtrate is taken in iron vessel and stirred well, then constantly heated over mild fire

↓

As water contents reduces, the solution become reddish and slimy

↓

Heating is continued to finally obtain a clear, white powder

↓

This is Mrudu kshara (Samvyuhima)

↓

The clear filtered obtained from above is taken

↓

To this ash of katasharkara, bhasma sharkara (Ash of lime stone), kshirapaka (Oyster shell), shankha nabhi (Conch shell) all above 8 pala together are added, after heating to red hot

↓

Boiled over fire, til1

↓

A paste neither very solid nor very liquid is obtained

↓

This is Madhyama kshara

↓

During preparation of above kshara, along with other additives if 1 shukti (20gm) quantity of fine powder of each of drugs (Danti, Dravanti, Chitraka, Langali, and Putika pravala, Kanakaksheeri, Hingu, Vacha, and Ativisha) added

↓

Then madhyama kshara will become teekshna kshara (Pakya)

Testing of potency of kshara:

Teekshna kshara: Will burn the eranda nal after counting 100

Ati-teekshna kshara: Will burn the eranda nal before counting 100

mrudu kshara: Will not burn the eranda nal even after counting 100

Paneeya kshara preparation:

Take the ash of Tila, lkshuraka, Palasha, Sarshapa, Yavanala and mulaka

↓

Add 4 parts of urine of cows/ goat/ sheep/ ass/ elephants/ and she buffalos

↓

Mix well and filtered

↓

Add one pala of each of the powders of kushtha, rock salt, madhuyashti, krimighati (Sunthi) and ajmoda
and 10 palas of common salt

↓

It should then be cooked in iron vessel on mandagni till it becomes leha form

↓

It is used by adding appropriate dose of anupana as yogurt, wine, sour gruel, and warm water or with soup of kulattha.

Application of pratisaraneeya kshara:

- The selected site should be roughened by rubbing (Pitta), scraping (Vata), scratching (Kapha) etc. The kshara should be smear by shalaka. Then one should wait for time required for Pronouncing 100 alphabets. Then site is washed with liquids which are amla (Sour) like nimboo swarasa, kanji etc (Reduces burning sensation & neutralize it).
- According to Vagbhatta, physician should wait for 100 matrakala in arshas and 50 matrakala in nasa arsha and karna arsha

Note: Kshara should be considered to have all rasa except amla. Kshara predominant in katu and lavana rasa. When katu and lavana rasa treated with amla, they become sweet (Neutral) and devoid of sharpness. Due to this neutralization, kshara are counteracted as fire gets extinguished when water is sprinkled over it.

Samyak dagdha lakshana	**Heena dagdha lakshana**	**Ati dagdha lakshana**
• Vyadhihara • Krushnata like pakva jambu phala (site acquired black colour) • Laghava (Lightness of body) • Asrava (Cessation of discharge)	• Toda (Pricking pain) • Kandu (Itching) • Jadya (Decreased movement of local part) • Vyadhi vruddhi (aggravation of disease)	• Daha • Paka (Suppuration) • Raaga (Redness) • Srava (Excessive discharge) • Angamarda • Klama (Exhaustion) • Pipasa • Murcha • Marana

Treatment: The lesion produced by kshara application should be treated according to the nature of dosha involved and the disease.

Action of kshara:
After application, there is irritation followed by inflammatory process resulting in oedema dragging pain and pressure pain causing separation of dusta dosha and clearing all features of disease.
The presence of proteolytic enzymes is capable for its corrosive, caustic, anti-microbial. and bactericidal properties.

KSHARASUTRA

The ksharasutra is a medicated thread capable to perform excision slowly by virtue of its mechanical pressure and healing by its chemical action.

Materials:

- Barbour's No 20 linen threads
- Apamarga kshara
- Snuhi ksheera
- Haridra powder

Method:

- Prepared apamarga kshara
- Snuhi ksheera should be collected 2 hrs. before commencement of its use, otherwise it will get solidified
- Snuhi ksheera should be collected carefully in the morning, before sun rise up, preferably in the month of April or October.

Preparation of Ksharasutra:

- 20 number surgical linen thread are spread horizontally throughout the length of hanger
- Then it is mounted over hanger stand
- Each thread is smeared with latex of snuhi with the help of sterile gauze piece
- Threads are smeared uniformly on every side
- Hangers are placed in cabinet one by one
- Cabinet is closed properly & hot air is blown inside for uniform drying of threads for 1 day
- In this way 11 coating of snuhi ksheera are done
- Further 7 coating of snuhi ksheera with apamarga kshara are applied (thread is smeared in snuhi ksheera, then it is dipped in fine powder of apamarga kshara)
- The hanger is tapped slowly & gently to remove excess kshara from thread
- Further 3 coatings are applied with latex of snuhi & fine powder of haridra and dried
- Thus 21 coatings are applied over threads for 21 days
- The pH value of Apamarga ksharasutra is 9-11 (9.72)
- Each thread measuring about 10-11 inches should cut away from hangers and sealed in glass tube or polythene pack.

Kṣāra Sūtra Cabinet:
A special cabinet for the preparation of Kṣāra Sūtra is designed. It has one large chamber for the thread hangers, and one small chamber for the hot air blower.
A thermometer is kept inside to record the temperature.

Sealing of Ksharasutra:

- Threads are folded at middle and sealed in polythene bags.
- Polythene bag is kept in glass tube.
- These sealed glass tubes are once again exposed to UV radiation by keeping in cabinet
- A small silica bag is also kept inside the glass tube to absorb its moisture.
- Now tubes are labelled with description of date of manufacture, sealing and batch number

Date of expiry:
Tight seal: Many years
Open: Up to 6 months.

Application of ksharasutra in ano-rectal disease:
Threading:

- Part (anal area) painted and draped.
- Left index finger is inserted in anus and probe is inserted in external opening of fistulous tract gently by right hand, when it is felt on left index finger the probe should be bring out with the help of left finger.
- Ksharasutra is inserted in eye of probe, and then it is pulled out by right hand.
- Now both ends of ksharasutra tied tightly so that it cannot slip. (Should loose so that it can moved).

Post-op:

- Pancha valkal kwath sitz bath
- Jatyadi taila pichu per rectal

Thread changing: Weekly

Excellence of kshara sutra over surgical management:

- Minimum hospital stays
- Very narrow and fine scar
- Minimum trauma
- No incontinence
- No tissue loss
- Recurrence rate is practically nil
- Cost effective
- It cuts and heals from base
- No bleeding/minimum

Application of Kṣāra Sūtra in Haemorrhoids:
The patient is anesthetized with local anesthesia. The pile mass is held with pile holding forceps and brought out of the anal orifice. An incision is given at the mucocutaneous junction. Slight pull is exerted over the pile mass and transfixed by Kṣāra Sūtra at the base. The ligated pile mass is placed back inside the rectum and a rectal pack with Yaṣṭīmadhu Taila / Ghṛta is applied.

Application of Kṣāra Sūtra in Pilonidal Sinus:
The patient is anesthetized with local anesthesia, then a probe with Kṣāra Sūtra is passed through the external opening of the pilonidal sinus to the skin. Both ends of the Kṣāra Sūtra are tied together. The Kṣāra Sūtra is replaced after one week.
The Kṣāra Sūtra gradually cuts and heals the sinus tract.

Kshara varti:

- When kshara used in the form of varti, it is called as kshara varti
- Its preparation is same as that of ksharasutra
- It is used in dushta vrana and nadi vrana
- It does lekhana, shodhana and ropana

It is mentioned in Bhagandara chikitsa. It is prepared with powder of Aragwadha, Haridra Agru by mixing with ghrita and madhu.

Chakradutta also mentioned another type of varti which is prepared by mixing Snuhi ksheera, Kshara and Haridra powder. The varti is inserted inside track of bhagandara.

Kshara pichu/plota:

- Plota can be used to clean the vrana as well as to cover the vrana.
- It can also be used as varti in those wounds or ulcers which are very deep to clean easily. In such ulcers plota varti removes the entire debris hide inside the wounds.

Advantages:

- It is easy to apply and less irritant
- It acts as both shodaka and ropaka.
- Good tolerance by patient
- Useful to remove slough, devitalized tissues, and pus pockets.
- It can be preserved for long time.
- No other additional local dressing material required.

Disadvantage:
Some allergic reactions may be occurring due to alkaline properties.
It cannot be used near the eyes, above the face, genital parts, and breast, because of delicate and smooth skin.

AGNIKARMA

10. Agnikarma: Mahatva, Upakarana, Vidhi, Akruti bheda, Yogya, Ayogya and Upadrava Chikitsa.
Contemporary techniques and tools of Agnikarma

It is unique form of therapy performed with the help of Agni which is having ability to cure those diseases also, which can't be cured by bheshaja, kshara and shastarakarma.

Definition:

अग्निना क्रियते इति अग्निकर्म| (Dalhana, Su. Su. 12/1-2)

The procedure which is performed with the help of Agni for treating the disease is called as Agnikarma. Or when Samyakadagdha Vrana produced by Agni with the help of various dravyas is known as Agnikama.

Importance of Agnikarma

- Agnikarma treatment has been described to be superior to the caustic alkali (ksharakarma), as the disease treated by it do not relapse and moreover those incurable by medicines (bheshaja), operations (shastra) and caustics (kshara) yield to it.
- Both Agnikarma and Ksharakarma are important in their respective jurisdictions.
- If the curable diseases are properly cauterized, they do not re occur. There is recurrence even burnt by fire; as tumours are eradicated by Agnikarma but due to faulty diet doshas get vitiated and thus again give rise to other similar growths which are taken as the same.
- Dahana karma will cease the bleeding from vessels
- It is self-sterilization method. Dalhana said it kills local bacteria and inhibits formation of infection.

दहनोपकरण (Instruments):

Twacha dagdha: Pippali, goat's excreta (ajashakrut), cow's teeth (godant), arrow (shara) and metal rod (shalaka)
Mamsa dagdha: Jambavostha and rods of other metals.
Pippali
Sira snayu asthi sandhi dagdha: Honey, jaggery and fats (oil, ghee, fat etc);

Agnikarma kala (Suitable season):

Agnikama can be done in all seasons except sharad (autumn) and grishma (summer), Because in these rutus there is aggravation of Pitta and Agnikarma also aggravates pitta, therefore it is contraindicated. Even in these seasons it can be done in diseases of emergency, after adopting counter methods such as cooling apparel, diet and pastes.

Varieties:

1. According to substances:

- Ruksha (Dry): Pippali, Ajashakrut etc
- Snigdha (Moist): Madhu, Ghrita etc.

The liquids at high temperature burn the skin, etc rapidly as they penetrate along the minute pores (which cause deeper burn as compared to dry heat burn at the same temperature); that is why the burns caused by the liquid media are more painful.

2. According to tissue:

a. Twacha dagdha:

Twacha dagdha is indicated in Masha (Black mole), Angaglani (General weakness, Adhimantha, Charmakila (Warts) etc.

b. Mamsa dagdha:

Mamsa dagdha is indicated in Arsha, Bhagandara, Granthi, Nadi, Dushta vrana etc

c. Sira snayu sandhi asthi dagdha:

Sira etc. dagdha is indicated in Shlishtavartama, Asraksrava, Neelam (Blue mole) etc.

3. According to shape or Pattern:

Selection of the design was to be done by surgeon according to site, size and shape of lesion.

1. Valaya (circular, ringlike)
2. Bindu (dot)
3. Vilekha (straight line)
4. Pratisarana (wide spread, flat)

4. According to disease:

- In the disease like Arsha, Kadara etc, it should be done after surgical excision (Chedana).
- In the disease like fistula, sinus etc, it should be done after surgical incision (Bhedana).
- In the disease like Krimidanta, it should be done after filling by the Guda.

Pramada dagdha:

1. Plushta (Singeing)
2. Durdagdha (Blister formation)
3. Samyak dagdha (Superficial)
4. Ati dagdha (Deep burn)

1. Plushta dagdha lakshana:

Plusta dagdha has discoloration on the skin associated with severe burning sensation. Vagbhata told tuccha dagdha instead of plushta one. The signs of tuccha dagdha are discoloration of the skin, severe burning sensation and non-emergence of boils.

Chikitsa:
For phushta dagiha, warming the body and administrations of drugs of hot potency should be Done.
Cold measures do not give relief.

2. Durdagdha lakshana:

Durdagdha is that in which sphota (blister) appear, accompanied with severe pain such as sucking, burning, redness, and agony and which takes a long time to subside.

Chikitsa
Uṣṇa & Shīta Chikitsā; application of Ghṛta, poultices and other cooling measures. Ā. Ḍalhana mentioned that Shīta Chikitsā should be used if the affected part is deeply rooted to; and vice-versa.

3. Samyak dagdha lakshana:

Which is not deep
Has the colour of tala phala (palm fruit)
Having the Purva lakshana yukta means symptoms of burning sensation in skin, muscle, blood vessels, ligaments, joints and bones.

Chikitsa

- Siddha Ghṛta Alepana (Tugakṣīrī, Plakṣa, Chandana, Gairika, Guḍūchī)
- Similar methods are adopted as for Pittaja Vidhradi

Assessment Samyak dagdha lakshanas:

Twak Dagdha lakshana	**Mamsa dagdha lakshana**
Cracking sound Bad smell Contraction of the skin	Manifestation of colour of pigeon (light grey or ash colour) Slight swelling Pain Wound becoming dry (without exudation) and constricted
Sira snayu dagdha lakshana	**Sandhi asthi dagdha lakshana**
Wound becoming black and swollen Caseation of bleeding and drainage	Roughness Dark reddishness Hardness Firm wound

4. Atidagdha lakshanas:

- Hanging of muscles
- Disorganization of affected parts
- Damage to vessels, ligaments, joints, and bones
- Severe complications such as fever, burning, thirst and fainting
- Wound heals with delay and even after healing they remained discolored.

Chikitsa:

- Torn muscles should be removed, followed by cooling therapies
- Alepana (Shāli, Tiṇḍukī tvak & Ghṛta)
- Vraṇa is covered with leaves of Guḍūchī or from an aquatic plant
- Similar methods are adopted as for Pittaja Virsarpa
- Madhuchiṣṭa, Madhuka, Lodhra, Sarjarasa, Mañjiṣṭha, Chandana and Mūrva should be macerated and cooked with Ghṛta. This Siddha Ghṛta is best for healing wounds in all kind of burns.

Indications of Agnikarma:

त्वङ्मांससिरास्नायुसन्ध्यस्थिस्थितेऽत्युग्ररुजि वायावुच्छ्रितकठिनसुसमांसे [१] व्रणे ग्रन्थ्यर्शोऽर्बुदभगन्दरापचीश्लीपदचर्मकीलतिलकालकान्त्रवृद्धिसन्धिसिराच्छेदनादिषु नाडीशोणितातिप्रवृत्तिषु चाग्निकर्म कुर्यात् || (Su. Su. 12/10)

- Severe pain in skin, muscles, vein, ligaments, joint and bone caused by vata aggravation
- Wound with raised, hard and numbed granulation
- Kapahja granthi (cyst)
- Piles
- Tumours
- Fistula-in-ano
- Apachi (above manibhandha, leaving 1 angula make 3 lines of agnikarma)
- Shleepada (Vataja: 4 angula above the gulpha, pittaja: 4 angula below the gulpha and kaphaja: 4 angula above the kshipra marma)
- Wart and mole
- Inguinal hernia (by ardhenduvakra shalaka)
- Diseases of joints
- Cutting of blood vessels
- Sinuses
- Excessive hemorrhage.

Contra indications (Agnikarma anarha):

अथेमानग्निना परिहरेत्- पित्तप्रकृतिमन्तःशोणितं भिन्नकोष्ठमनुद्धृतशल्यं दुर्बलं बालं वृद्धं भीरुमनेकव्रणपीडितमस्वेद्यांश्चेति || (Su. Su. 12/14)

- Paittika constitution
- Internal hemorrhage
- Ruptured viscera
- Foreign body has not been removed
- The debilitated, children, very aged, the fearful
- Those who are affected with multiple wounds
- Persons who are unfit for sudation therapy.
- Vagbhatta added jvara, atisara, hrutroga, shiroroga, pandu, aruchi, timira, garbhini, rajaswala, ajirna, shishu, vrudha, dhamani, sandhi, marma, sira, snayu, sevani, gala, nabhi,vrushna & medra.

Specific sites of Agnikarma (Dahana pradesha):

1. Shiroroga and Adhimantha (Diseases of head and glaucoma)
- Bhru pradesha (Eye brows)
- Lalata pradesha (Frontal arca)
- Shankha pradesha (Temporal area)

2. Vartma-gata-roga (Eyelids diseases)
- Vartma romakupa (at root of eye lashes after protecting eyeball with a wet cloth).

Preparation of the patient (Purva karma):

In all diseases and seasons, Agni karma should be done after the patient has taken picchila/slimy food.

Procedure (Agnikarma vidhi):

- The patient who is eligible for Agni karma should be instructed to perform all auspicious ceremonies;
- (The physician should) keep ready at hand all the equipment needed, (make the patient) sit or lie down with his head held tight by attendants.
- A small open hearth is to be constructed, fixed with bellows similar to that of an ironsmith; into the hearth, wood of khadira or badari are put in and set fire. Now a day's gas burner is used.
- When the smoke has ceased and red burning coal is ready, the physician should put Jambavosta and other instruments into the hearth, make their points (tips) red-hot.
- Take them out and place them on the body of the patient creating marks such as circular, semicircular, swastika, number eight, point, straight line, dotted patch and such others.
- The patient being kept assured by encouraging words all the time. Agni karma should be as much as deep required for the disease and till the symptoms of Samyak dagdha manifest.

Post operative management (Paschat karma):
It should be anointed with mixture of madhu (Sandhanakara) and ghrita (Pacifies rakta and pitta).

Probable mode of action:
According to Ayurveda:

- Agnikama is considered as best therapy for vata and kapha dosha because Agni possesses ushna, sukshma, tikshna, aashukari guna which are opposite to vata and kapha. It removes srotovarodha and increase the rasa rakta samvahana to the affected site.
- Therapeutic heat transferred by Agni karma increase the dhatwagni, so metabolism at dhatu level increases which help to digest the aama dosha of metabolism.

Possible scientific explanations:

1. Gate control therapy: Pain sensations are transferred by two types of fibers. "A" fibers (Stimulated by heat, cold and touch) and "C" fibers (stimulated by pain). Here the gate mechanism is blocked by stimuli from A fiber, so the pain will not be felt.
2. Heat → Thermal receptors → Stimulation of Lateral Spinothalamic Tract → Stimulation of Descending Pain Inhibitory fibers → Release of endogenous Opoid peptide which bind with opioid receptors at Substantia Gelatinosa Rolandi → Inhibition of release of P-substance → blockade of pain sensation.
   Pain receptors of skin and motor end plate stimulated at 45°C. Pathway for pain and thermal signals run parallel and ends into same area but only stronger one can felt. Therefore complete exclusion of pain impulse by heat occurs.
3. Counter irritation theory: A counter irritant stimulate sensory nerve endings and relieves pain
4. Effect on muscle tissue: Heat induces muscle relaxation
5. TENS effect: Trans-electric nerve stimulation relieves pain by burning superficial nerve endings.

RAKTAMOKSHANA

11. Raktamokshana: Mahatva, Prakara - Siravyadha, Pracchanna, Shringa, Alabu, Jaloukavacharana – Yogya, Ayogya, Procedure, Upadrava and Chikitsa.

Introduction:
Raktamokṣaṇa is a type of Shodhanakarma. It is a blood cleansing procedure which is mentioned as one of the Pañchakarma according to Ā. Sushruta and Ā. Vāgbhaṭa.
Ā. Charaka has mentioned the procedure, but did not include it under Pañchakarma.
Same as the other Shodhanakarma, Raktamokṣaṇa may be done for preventive or curative purpose.

Nirukti & Paribhāṣā:
Rakta = Blood
Mokṣaṇa = Releasing
Raktamokṣaṇa is the therapeutic procedure of releasing blood from the body.
रक्तस्य मोक्षणम् रक्तस्राव|

Paryāya:
Shoṅitamokṣaṇa, Raktanirharaṇa, Raktaharaṇa, Raktasravaṇa, Raktasrāva, Asravisṛti, Avasechana

Mahatva:
- Raktamokṣaṇa is the best method to purify vitiated Rakta Dhātu.
- Those who undergo Raktamoḳsaṇa regularly at proper time will not be afflicted with Tvakroga, Granthi, Shopha and other Raktaja Vikāra.
- In Shalya Tantra, Raktamokṣaṇa by Sirāvyadha is considered as half the treatment or even complete treatment for diseases, same as Basti Karma is in Kāyachikitsā.
- Among all Shodhana Karma, Raktamokṣaṇa is the best for treating skin diseases.
- In Visarpa, Raktamokṣaṇa is the best treatment. It alone produces the same effect as all other therapies combined.

General Principles & Rules:
1. Raktamokṣaṇa should be done according to the strength of Rogi, Roga and Āshaya (site of structure from where blood is released). The blood flows easily and properly out from vessels of located in the limbs; less so from the head.
2. If Raktasrāva does not occur properly, vitiated blood should be removed again either on the same day in the evening or on the next day. If the blood is excessively vitiated, Raktamokṣaṇa should be done again after a fortnight.

3. Raktamokṣaṇa Kāla:
- Raktamokṣaṇa should be performed in moderate climatic conditions; neither too hot nor too cold.
- It should be done during the day when the sun is visible.
- During Sharada Ṛtu, Rakta tends to get vitiated so Raktamokṣaṇa is indicated.
- During Varṣa Ṛtu, it should be done when the sky is clear.
- During Grīṣma Ṛtu, it should be done when the atmospheric temperature is comparatively low (morning or evening).
- During Shīta Kāla (Hemanta & Shishira Ṛtu), it should be done during mid-day.

4. Raktamokṣaṇa should not be done on persons who are below the age of 16 or above the age of 70 years.
5. Rakta is Jīvasthāna. So, one should always take care not to cause Atiyoga of Raktamokṣaṇa. Additionally, due to excessive Raktamokṣaṇa, Vāta gets aggravated. Therefore, extra special care should be given if the patient is afflicted with Vātavyādhi.

General Indications:
Kuṣṭha, visarpa, Piḍaka, Raktapitta, Asṛgdara, Guḍapāka, Meḍhrapāka, Mukhapāka, Plīhā, Gulma, Vidradhi, Dadru, Charmadala, Shvitra, Pāma, Vātarakta, Vaivarṅya, Tiktodgāra, Amlodgāra, Kaṭūdgāra, Klama, Krodhādhikyatā, Buddhisammoha, Lavaṇāsyatā, Sveda, Sharīra daurgandhya, Raktatvak, Raktanetratā, Raktamūtratā, Bhrama, Arsha, Apachī, Dantapuppuṭa, Dantaveṣṭa, Granthi, Galashūla, Shlīpada, Ūrustambha

General Contraindications:
Bāla, Vṛddha, Garbhinī, Sūtikā, Abhukta, Daurbalya, Asvinna, Atisvinna, Sarvāṅga Shopha, Kṣīṇa, Pāṅḍuroga, Udara, Mūrcchā, Chardi, Shoṣa, Shvāsa

Vargīkaraṇa / Prakāra:

1. Shastra kṛta visravaṇa
a. Sirāvyadha
b. Pracchāna

2. Anushastra kṛta visravaṇa
a. Jalaukāvacharaṇa
b. Shṛṅgāvacharaṇa
c. Alābū-avacharaṇa
d. Ghaṭīyantrāvacharaṇa

Sirāvyadha:

The surgical procedure of puncturing or sectioning a vein for therapeutic purpose and thereby accomplishing Raktamokṣaṇa is called Sirāvyadha.
It should be done in people who are physically strong and not afraid of the procedure.
The vein which is near the site of the lesion or disease is most ideal for Sirāvyadha.
It is preferred to perform this procedure in the morning after taking light and liquid diet.

Yogya:

Visarpa, Vidradhi, Plīhā, Gulma, Agnimāndya, Jvara, Mukharoga, Netraroga, Mada, Lavaṇāsyatā, Kuṣṭha, Vātarakta, Raktapitta, Kaṭūdgāra, Amlodgāra, Bhrama

Ayogya:

Bāla, Vṛddha, Bhīru, Garbhinī, Rūkṣa, Kṣatakṣīṇa, Shrama, Madyāpa, Klība, Adhva-karshita, Strī-karshita, Vāmita, Virikta, Asthāpita, Anuvāsita, Jāgarita, Karshya, Kāsa, Shvāsa, Shoṣa, Pravṛddha Jvara, Ākṣepaka, Pakṣāghāta, Upavāsa, Pipāsā, Mūrcchā

Vidhi:

1. Pūrvakarma

- Preparation of equipment: Intravenous cannula, 20 cc syringe, tourniquet, Kidney tray, Disinfectants, Cotton swab, Bandage material, Madhuka chūrṇa
- Snehapāna (to be done 2-3 days before the procedure)
- Abhyaṅga & Bāṣpa Svedana (to be done on the day of the procedure)
- Laghu & Drava Āhāra (E.g.: Yavāgū)

2. Pradhānakarma

- The patient should be placed in a comfortable position so that the vein which is to be punctured can be approached easily. Supine position is in most occasions the best choice.
- The circulation in the selected vein is blocked by applying a tourniquet just proximal to the site which will be punctured.
- The site is painted with aseptic solution.
- The vein is slightly stroked by releasing the index finger from the thumb to make it more distended.
- The engorged vein is punctured with the IV cannula. It is inserted into the vein to its fullest length. The needle within the cannula is removed. This will lead to release of blood from the vein. Blood flow is allowed until it stops by itself; or until a maximum amount of 540 ml (1 prāṣṭha) of blood is drained.
- The cannula is removed and the punctured site is bandaged after applying the powder of Madhuka (Glycyrrhiza glabra).

3. Pashchātkarma

- Pathya: Laghu Āhāra, Dīpana, Vishrāma
- Apathya: Atishīta & Atyuṣṇa Āhāra, Guru Āhāra, Adhyashana, Māruta, Agni, Ātapa sevana, Krodha, Shokādi, Vyāyāma, Divāsvapna, Travelling, Continuous studying, Continuous sitting in the same position

Samyak Vidda Lakṣaṇa:

- Svayameva avatiṣthate (bleeding from the punctured site stops by itself)
- Lāghava (feeling of lightness)
- Vedanā shānti (remission of the pain)
- Vyādhirvega parikṣaya (remission of the disease)
- Manoprasāda (feeling of serenity)

Upadrava & Chikitsā:

1. Ayoga / Hīnayoga Vidda

a. Nidāna:

- If Sirāvyadha is done on a cloudy day or if it is done in a windy place.
- If Pūrvakarma is not done properly (Snehana, Svedana).
- If puncturing is done improperly.
- If Sirāvyadha is performed after intake of Guru Āhāra.

b. Lakṣaṇa:
Shopha, Dāha, Rāga, Pāka

c. Chikitsā:
Elā, Kuṣṭha, tagara, Pāṭhā, Bhadradāru, Viḍaṅga, Chitraka, Trikaṭu, Āgāradhūma, Haridrā, Arkāṅkura, Naktamāla phala; either 3 or 4 or as many as available of these Dravya should be powered, mixed with plenty of Lavaṇa and Taila, and rubbed on the punctured site. This will cause proper flowing of Rakta.

2) Atiyoga Vidda

a. Nidāna:

- If Sirāvyadha is done when there is excessive heat.
- If there was Atiyoga of Svedana.
- If the vein is punctured excessively.
- If blood is allowed to flow out excessively by an unskilled, inexperienced or ignorant physician.

b. Lakṣaṇa:
Shiro-abhitāpa, Āndhya, Adhimantha, Timira, Dhātukṣaya, Ākṣepaka, Pakṣāghāta, Ekāṅgaroga, Tṛṣṇa, Dāha, Hikkā, Shvāsa, Pāṇḍuroga, Maraṇa

c. Chikitsā:
Lodhra, Madhuka, Priyaṅgu, Gairika, Sarjarasa, Shālmalī puṣpa, Shaṅkha, Shukti, Māṣa, Yava and Godhūma should be powdered above the punctured site and pressed with the tip of the finger. The patient should be covered with a moist cloth, kept in a cold room, treated with Shīta Upanāha and Pariṣeka; or they are may be burnt (cauterized) either by Kṣāra or Agnikarma.

d. Modern Management:
Ligation of the punctured vein, hemostatic drugs, blood transfusion if needed.

Pracchāna

The therapeutic procedure of incising the skin superficially and thereby accomplishing Raktamokṣaṇa is called Pracchāna.

Yogya:

- Piṇḍita Rakta (congestion of blood), Indralupta, Kṣudrakuṣṭha, Tvakroga, Utsedhyukta Vraṇa
- As Pūrvakarma for Shṛṅga, Alābū or Ghaṭīyantra Avacharaṇa

Ayogya:

- Before or after Sirāvyadha / Jalaukāvacharaṇa
- Marmasthāna

Vidhi:

1. Pūrvakarma

- Preparation of equipment: Scalpel blade, cotton swab, Gauze piece, Disinfectants, Madhuka chūrṇa
- No specific preparation of the patient is necessarily needed. However, Snehana and Svedana can be done to improve the effect of Pracchāna.
- Snehapāna (Hīna Mātrā; for 2-3 days before the procedure)
- Abhyaṅga & Bāṣpa Svedana (on the day of the procedure)

2. Pradhānakarma

- The site of the lesion where incision will be made is painted with disinfectant.
- With a scalpel, a straight (Ṛju) incision is made which should neither be too deep (Nāti gambhira) nor too shallow (Nāti uttāna). The depth is approximately 2 mm. The incision is always made from the distal part to the proximal part of the body. Similar incisions are made parallel to the earlier one involving the complete area of the lesion; the incisions should not be done obliquely (Na tiryak).
- While incising, Sirā, Snāyu and Sandhi should be avoided.
- When the bleeding stops, the incised site is bandaged after applying the powder of Madhuka (Glycyrrhiza glabra).

3. Pashchātkarma

- Pathya: Laghu Āhāra, Dīpana, Vishrāma
- Apathya: Atishīta & Atyuṣṇa Āhāra, Guru Āhāra, Adhyashana, Māruta, Agni, Ātapa sevana, Krodha, Shokādi, Vyāyāma, Divāsvapna, Travelling, Continuous studying, Continuous sitting in the same position

Upadrava & Chikitsā:
Excessive bleeding: Dravya should be applied which are Kaṣāya, Shīta and Stambhaka. If bleeding does not stop, Pāchana should be done with Shaṅkha Bhasma.

Jalaukāvacharaṇa

Jalauka refers to the leech. Jalaukāvacharaṇa is a method of accomplishing Raktamokṣaṇa by applying the leech to a specific site and allow it to suck vitiated blood.
For this purpose, only the non-poisonous (Nirviṣa) leeches are used.

Jalauka Vargīkaraṇa:

A. Based on Poison

1. Saviṣa Jalauka

i. Kṛṣṇā
ii. Karburā
iii. Algardā
iv. Indrāyudhā
v. Sāmudrikā
vi. Gochandanā

Originate from decomposed urine and fecal matter of toads and poisonous fish, in ponds of stagnant and turbid water.

General characters: Thick and elongated middle portion, both ends are thin, Slow moving, Fatigues quickly, Sucks slowly and little quantity of blood.

2. Nirviṣa Jalauka

i. Kapilā
ii. Piṅgalā
iii. Shaṅkhmukhī
iv. Mūṣikā
v. Puṇḍarīkamukhī
vi. Sāvarikā

Originate from decomposed vegetable matter, decayed stems of several aquatic plants such as Padma, Utpala, Nalina, Kumuda, Pundarika, etc. found in clear water.

General characters: Strong and large bodied, “Greedy” (start sucking readily and a lot of blood), Round, Blue colored lining on the dorsal side of the body.

B. Based on Gender

1. Puruṣa Jalauka

Hard skin, big head along with semi-lunar look with a large front portion. Indicated in highly vitiated Doṣa and Jīrṇa Roga.

2. Strī Jalauka

Delicate, thin skin, small sized head, the lower body is large.
Indicated in Alpa Doṣa and Āshu Roga.

Yogya:

- Sāmānya Raktamokṣaṇa Yogya
- Rakta vitiated by Pitta Doṣa
- Bāla, Vṛddha, Sukūmāra, Garbhinī, Bhīru
- Gulma, Arsha, Vidradhi, Vātarakta, Galāmaya, Netraruk, Viṣa-daṁṣṭa, Visarpa, Kuṣṭha, Shiroshūla

Vidhi:

1. Pūrvakarma:

i. Preparation of equipment: Nirviṣa Jalauka (3-4), Cotton swab, Gauze piece, Kidney tray, Needle, Saindhava Lavaṇa, Haridrā chūrṇa, Madhuka chūrṇa
ii. Preparation of the leeches: Water is kept in a kidney tray and mixed with about two spoons of Haridrā chūrṇa. The leeches are placed in the tray.
iii. The leeches become very active. They are kept in the turmeric water for about 48 minutes and are then shifted to another kidney tray containing clear water.
iv. Preparation of the patient: No specific preparation of the patient is necessarily needed. However, Snehana and Svedana can be done to improve the effect of Jalaukāvacharaṇa.
v. Snehapāna (Hīna Mātrā; for 2-3 days before the procedure)
vi. Abhyaṅga & Bāṣpa Svedana (on the day of the procedure)

2. Pradhānakarma

Jalaukāvacharaṇa should be done during the morning time.

i. Virukṣaṇa Chikitsā is done on the expected site of leech application. This is done by rubbing dry powder of properly cleaned soil or cow dung. It is essential to remove the oiliness because the leeches may not attach if the site is greasy.
ii. Application of Jalauka: Jalauka is picked up between the thumb and index finger, and its mouth is held close to the application site. The leech may be grasped between the fingers with a cotton or gauze piece. If the leech fails to attach itself, then a drop of milk or blood may be placed on the site. If even this fails, a small puncture is made with a needle to cause bleeding, and the leech is applied.

iii. Observation & Care: When the leech starts sucking the blood, rhythmic wavy movements of its body are seen. It should then be covered by a wet gauze piece. While draping the leech, the mouth portion is kept free. At frequent intervals, small amount of water is poured on the leech to keep it moist and cool. As the leech continues sucking, one can observe the wavy movements in its body as well as increase in its dimension.
Jalauka only sucks vitiated blood, just like a swan drink only the milk from a mixture of milk and water. When it completes sucking, it falls off by itself.
When itching and pain occur at the site of leech application, it indicates that Jalauka started sucking pure blood. If it does not detach independently, Jalauka should be removed by sprinkling Saindhava Lavaṇa or Haridrā chūrṇa over its mouth.

3. Pashchātkarma

i. Care of Vraṇa: As the saliva of the leech contains hirudin and anticoagulant, even after the leech separated, bleeding continues. Therefore, as soon as the leech detaches, bleeding should be arrested. After cleaning the site and dusting with Madhuka chūrṇa, the wound is bandaged tightly.

ii. Care of Jalauka: In a kidney tray, about one spoon of Haridrā chūrṇa or Saindhava Lavaṇa is kept. The leech is grasped between the thumb and index finger, and its mouth is made to touch the Haridrā chūrṇa or Saindhava Lavaṇa. Sooner or later, the leech starts vomiting the blood. Leech is allowed to expel as much as possible. When it stops vomiting, the remaining portion of the blood is squeezed out. This is done by grasping the tail end between thumb and index finger, and the body of the leech is squeezed from the tail towards the mouth. The leech is then placed in clean water, and becomes more active again.
If the leech is not made to vomit the vitiated blood, it is likely to die.
If it is made to vomit properly, the leech may be reused for Raktamokṣaṇa after about one week. Jalauka should always be handled gently.

Preservation of Jalauka:

Place the leeches in non-chlorinated fresh water. Not more than 50 leeches should be placed in a 2-gallon container.
A tight-fitting lead is necessary to avoid escaping of the leeches.
Multiple small holes should be made to the lid for ventilation.
Leeches should be kept cool, 5°c to 7°c and not exposed to heat above 20°c or direct sunlight.
Change of water is needed twice in a week on a routine schedule.

Feeding:

Leeches do not eat often, blood sucking leeches can be given earthworms, insect larvae, and even raw ground meat etc. for every 6 months.
Leeches can live for many months on blood meal, so feeding is not necessary.

Upadrava:
Complications mainly occur if Saviṣa Jalauka is mistakenly used for Raktamokṣaṇa.

Lakṣaṇa: Atimātra Shvayathu, Kaṇḍū, Mūrcchā, Jvara, Dāha, Chardi, Mada, Sadana

Chikitsā: Viṣa Nāshaka Chikitsā, Raktapitta prashamana
Indrāyudhā = Asādhya; it leads to Mahāgada

Shṛṅgāvacharaṇa

Shṛṅga refers to the horn of a cow which is hollow and can be used for Raktamokṣaṇa. The broad end applied to the skin during the procedure. At the narrow tip, a hole is made which is then covered with a cloth. The mouth is applied and air from the horn is sucked to create a vacuum and promote bleeding.
Alternatively, the hole in the tip of the horn is fitted with a rubber tube, which again is fitted with a 50 ml syringe; a vacuum is created by withdrawing the piston of the syringe.

Yogya:
- Rakta afflicted with Vāta Doṣa or Vāta-Pitta
- Raktaduṣti is restricted to Tvak

Ayogya: Rakta afflicted with Kapha Doṣa

Vidhi:

1. Pūrvakarma
- Preparation of equipment: Shṛṅga fitted with tube and syringe, Scalpel blade, Cotton swab, Gauze piece, Madhuka chūrṇa
- Snehana and Svedana can be done to improve the effect.
- Snehapāna (Hīna Mātrā; for 2-3 days before the procedure)
- Abhyaṅga & Bāṣpa Svedana (on the day of the procedure)
- Pracchāna

2. Pradhānakarma
- When bleeding occurs, the broad end of Shṛṅga is applied on the incised site.
- It is firmly pressed against the skin, and the piston of the syringe is withdrawn to create a vacuum and promote the flow of blood. After several minutes, the piston is released and Shṛṅga is removed.
- The wound is cleaned and bandaged after applying Madhuka chūrṇa.

3. Pashchātkarma
- Pathya: Laghu Āhāra, Dīpana, Vishrāma
- Apathya: Atishīta & Atyuṣṇa Āhāra, Guru Āhāra, Adhyashana, Māruta, Agni, Ātapa sevana, Krodha, Shokādi, Vyāyāma, Divāsvapna, Travelling, Continuous studying, Continuous sitting in the same position

Alābū-avacharaṇa

Alābū refers to the bitter bottle gourd (Lagnaria vulgaris).
The ideal Alābū should be 12 aṅgula in length, 18 aṅgula in circumference, with and opening of 3-4 aṅgula wide.
It is made hollow by removing its soft core after making a hole at its tip, dried in the sun, and painted with varnish internally. It can then be used for Raktamokṣaṇa.

Yogya:

- Rakta afflicted with Kapha Doṣa
- Piṇḍita Rakta
- Lesions involving deeper structures

Vidhi:

1. Pūrvakarma

- Preparation of equipment: Alābū, Scalpel blade, Cotton swab, Gauze piece, Taila, Jātyādi taila, Madhuka chūrṇa
- Snehana and Svedana can be done to improve the effect.
- Snehapāna (Hīna Mātrā; for 2-3 days before the procedure)
- Abhyaṅga & Bāṣpa Svedana (on the day of the procedure)
- Pracchāna

2. Pradhānakarma

- When bleeding occurs, the cotton swab is soaked in oil, ignited and placed inside the Alābū. Now the mouth of the Alābū is applied by holding it horizontally so that the flame of the burning cotton does not come in contact with the body. The cotton burns as long as oxygen is available. As it removes the oxygen, a vacuum is generated in the Alābū which draws blood from the incised wounds. After some time, Alābū is removed.
- The site is cleaned with Jātyādi taila and bandaged after applying Madhuka chūrṇa.

3. Pashchātkarma

- Pathya: Laghu Āhāra, Dīpana, Vishrāma
- Apathya: Atishīta & Atyuṣṇa Āhāra, Guru Āhāra, Adhyashana, Māruta, Agni, Ātapa sevana, Krodha, Shokādi, Vyāyāma, Divāsvapna, Travelling, Continuous studying, Continuous sitting in the same position

Ghaṭīyantrāvacharaṇa

Ghaṭīyantra is described as a Nāḍīyantra by Ā. Vāgbhaṭa. It is an earthen instrument with a larger rounded base and a tubular upper portion used for Raktamokṣaṇa in the same way as Alābū-avacharaṇa.

Yogya: Rakta afflicted with Pitta Doṣa, Piṇḍita Rakta

BANDHAN

12. Bandha Vidhi – Prayojana, Dravya, Indications, Contraindications, Prakara, Upadrava, Pichu, Plota, Kavalika and Vikeshika.

Bandhana:
Bandhana is the bandaging procedure to bind a wound or a part of the body with a protective and supportive strip of material.

Prayojana:
- Helps to keep the wound clean
- Promotes its healing
- Immobilizes the bones & joints

Bandhana Dravya:
क्षौमकार्पासाविकदुकूलकौशेयपत्रोर्णचीनपट्टचर्मान्तर्वल्कलालाबूशकललताविदलरज्जुतूलफलसन्तानि कालौहानीति; तेषां व्याधिं कालं चावेक्ष्योपयोगः; प्रकरणतश्चैषामादेशः|| (Su. Su. 18/16)

- Kṣauma (flax)
- Kārpāsa (cotton)
- Āvika (sheep's wool)
- Antarvalkala (inner layer of barks)
- Kausheya (silk)
- Patrorṇa (plant fibers)
- Chīnapaṭṭa (china cloth)
- Alābūshakala (pieces of bottle gourd)
- Rajju (rope)
- Latā (creeper)
- Viḍala (split bamboo)
- Charma (leather)

Indications:
चूर्णितं मथितं भग्नं विश्लिष्टमतिपातितम्|
अस्थिस्नायुसिराच्छिन्नमाशु बन्धेन रोहति|| (Su. Su. 18/30)

- Chūrṇita (crushed wounds)
- Mathita (lacerated wounds)
- Bhagna (fractures)
- Vishliṣṭa (dislocation of joints)
- Atipātita (completely broken or displaced bone)
- Asthi Snāyu Sirā Chinna (torn bones, ligaments or vessels)

Contraindications:
- Wound caused by pitta, rakta, abhighat, & visha
- Wound associated with oedema, burning sensation, suppuration, redness, pricking pain
- Burn caused by kshara & agni
- Kushtha
- Prameha pidika
- Wound caused by rat bite or poison
- Gangrene

Bandhan prakar & sthana:

No.	Bandha	Modern Correlation	Application Site
1	**Kosha**	Circular / Finger bandage	Thum, fingers, toes
2	**Dāma**	Crepe / Sling bandage	Narrow parts
3	**Svastikā**	Spica / Figure 8 bandage	Joints, palms, soles, ears, eyebrows, intermammary region
4	**Anuvellita**	Spiral bandage	Extremities
5	**Mutolī**	Winding / Circular bandage	Neck, penis
6	**Maṇḍala**	Abdominal binders or similar ones	Circular or rounded parts
7	**Sthagikā**	Supporting bandage with splints / Stump bandage	Terminal parts of fingers, toes, penis
8	**Yamaka**	Twin bandage	To cover two adjoint wounds
9	**Khaṭvā**	Four-tailed bandage	Mandible, temple, cheek
10	**Chīna**	Eye bandage	Outer canthus of eye
11	**Vibandha**	Many-tailed bandage	Back, abdomen, chest
12	**Vitāna**	Head / Cape-line bandage	Head (scalp)
13	**Gophaṇā**	T bandage	Chin, nose, lips, shoulders, pubic region
14	**Pañchāṅgī**	Many-tailed bandage	Supraclavicular regions
15	**Utsaṅgī**	Arm sling	Bāhu

According to site:

1. Gaadha (Tight bandage):
   This produces pressure but not pain. Applied on buttocks, abdomen, axilla, inguinal area, thigh, & head.
2. Shithila (Loose bandage):
   Is lax or moves with respiration of patient. Applied over eyes and joints
3. Sama (Ideal bandage):
   Neither very tight nor very loose. Applied over extremities, face, ear, neck, penis, scrotum, back, flanks, abdomen & chest.

Bandhana vidhi:

- The pack & the paste, which is not atisnigdha, should be applied first & a thick pad put over it, it should be then bandaged with soft cloth.
- The excessively snigdha dressing increases the discharge & the dry one damages the wound. The samyaka snigdha dressing promotes healing of the wound.
- The wrongly placed one rubs the edge & makes it irregular; it may either stop the discharge completely or it may increase it.
- The clinician should manage with appropriate measures after understanding the nature of wound.
- The wise should wind the bandage once only over pittaja & raktaja wounds & more than once over kaphaja & vataja ones.
- Squeezing should be carried out by pressure of the palm applied in the direction of hair.
- All types of bandages should be done in such a way that the ends & the joints get covered well.

Samyaka bandha:

- Alleviate pain
- Make the part soft
- Purify blood
- The wounded person sleeps well & is able to walk & sit comfortably.

Bandhana prayoga:

- To apply medicine on the wound for a longer period of time.
- To bring stability in Asthibhagna and sandhi moksha.
- To keep wound protected from dust, cold, wind, sun, & flies.
- To stop bleeding
- To protect the wound from trauma.
- To stop the spreading of snake poison
- To reduce oedema

Pichu:

Pichu therapy involves utilization of medicated cloth fold over the affected area. It is a palliative measure used for the disorders caused by Vata imbalances. It can used for neck, hip, spine, chest, shoulder and knee, etc. Folded wool or cotton cloth dipped in medicated oils and placed over the affected area. The soaking capacity of Pichu provides delayed and long-lasting effects of medicines over the affected area. Shiro Pichu is used for applying medicated oil over head to promote mental and physical wellbeing. Shiro Pichu offers soothing and healing effect thus provides mental relief. In Ayurveda Pichu mainly used for treating cuts, wounds, and surgical dressing purpose.

Plota:

Plota means medicated gauze used for infected and chronic wounds as well as for treating ulcers. The Plota mainly used as Ksharaplota (medicated gauze) which prepared from Snuhikshira, Apamargakshara and Haridra, etc. The single coating of these drugs mainly used in Plota to heal wounds and ulcers.

Plota helps in draining and healing of wound, removes unhealthy tissue, the caustic action promotes healing, controls infection and provides aseptic condition to restrict microbial action. Plota helps to separate debris and clean wound, gives anti-inflammatory effect and relieves pain. Plota after surgical intervention with Vedanahara and Raksoghana drugs helps to prevent microbial infections and improves healing of wound, ulcer and topical injury.

Kavalika:

Kavalika is medicated tow which is soft stuffing or tow between the medicines and applied over the affected part, such type of bandaging linen is called Kavalika. The Kavalika should be placed thickly over the affected area that after physician pressed it with his hand and firmly tie up the bandage considering patient comfort.

Vikeshika:

Vikeshika is contact layer dressings, prepared by impregnating medicated Taila over 10 cm × 10 cm sterile gauzes. These impregnated gauzes first sterilized and packed. Vikeshika applied as a dressing over wounds after cleaning the affected area. It helps in surgical healing with minimal chances of complications. The Patoladi vikeshika offers great relief in condition like burn injury and deep wound surgery.

BANDAGING

Dressing:

It means an artificial wound cover. It is piece of material used either to support medical devices such as dressing or splint, or on its own to provide support to or to restrict the movement of part of a body.

Dressing materials: Cotton, Gauze, Pad, Adhesive plasters

Uses of bandages:

- To stop bleeding by pressure
- To give rest and support to affected part
- To retain dressing
- To prevent edema or swelling
- To correct deformity as a torniquet.

Ideal dressing:

- Protect the wound from trauma
- Be impermeable to bacteria
- Allow oxygenation
- Retain moisture

Materials for bandage:

- Cotton bandage
- Elastic bandage
- Adhesive plaster

Rules for bandaging:

1. Correct size of bandage must be assessing according to the part to be covered
   - One-inch-wide bandage for finger and toe
   - Two-inch-wide bandage for head
   - Four-inch-wide bandage for limbs and trunk
   - Six-inch-wide bandage for abdomen
2. Stand in front of hand or foot when bandaging a limb.
3. Never bandage without having previously applied a pad of cottonwool. Such a pad should around a limb or a finger. The cottonwool prevents compression of the veins and still allows the bandaging to be firm. If there is a wound, gauze should be placed over it before the cottonwool is applied.
4. The part to be bandaged is placed in a proper position before bandaging
5. The head of bandage should be on the outer aspect of the bandage while applying
6. The turns should be taken from outwards
7. The bandaging is first fixed by taking two turns (known as fixation turns) at the same level to prevent slipping
8. Each succeeding turn should overlap 2/3d of the preceding turn
9. Equal pressure should be used throughout the bandaging, which is not tight nor even loose When tight bandage is necessary to check hemorrhage a thick pad of cottonwood should be applied over the skin before the bandage. In tight bandaging more pressure is applied distally and less proximally to avoid venous and lymphatic

congestion. In tight bandages for haemostatic relieve after 24 hours, finger and toes should be exposed to watch for circulation and movements.

10. Bandage should be applied from below to upwards
11. Absorbent cotton wool should be placed between two skin surfaces, this absorbs discharge and prevent infection or friction,
12. Bandaging should be finished with complete turn and fixed securely.
13. If bandaging the lower limb, it is advisable to include the foot in the bandage. This will help preventing swelling. Pressure points and extremities should be padded out first.
14. If bandaging extremities, start from the distal end to prevent pocketing of blood.
15. If bandaging a fractured limb, includes joint above and below fracture as appropriate.

PRANASTA SHALYA

13. Pranasta Shalya and Nirharana Upaya.

तत्र मनःशरीराबाधकराणि शल्यानि| (Su. Su. 7/4)
Shalya are those (substances) which produce troubles to the mind and body.

Pranaṣṭa Shalya is the foreign body which is lost/vanished (not visible).
Nirharaṇa Upaya are the means of extracting the Shalya.

There are of two types viz.

1. Shareerika (Endogenous): They are teeth, hairs, nails etc. as also the vitiated dhatus, waste products of food and aggravated doshas.
2. Aagantuja (Exogenous): Other than above like metals, arrows, bamboos, trees, straws. horn or bones.

Shalya Gati (Mode of shalya entry):

1. Urdhwa: From below upwards
2. Adho: From above downwards
3. Arvacheena: Backward or reverse direction (Vakra)
4. Tiryak: Sideward or transverse
5. Riju: Straight

Samanya shalyayukta lakshana:

- Swollen wound with blackish discoloration and vesicles around
- Edema
- Pain
- Intermittent foamy blood discharge
- Soft granulation tissue

General tests to determine the site of shalya:
The general features by which presence of the shalya could be localized are
Occurrence of inflammation or local pain when one rides on the nape of an elephant or on back of horse, climbs a mountain or a tree or when one does the physical exercise of a bow, moves on fast vehicle, practices wrestling, takes a long jump or high jump and swims and also by yawning, coughing, sneezing, expectorating, laughing and during deep inspiration and also while passing flatus, urine, stool and semen.

In the skin:
The skin should be oleated, fomented and then rubbed with powdered earth, masi, wheat and cow dung, the shalya should be localized in the part wherever pain or inflammation occurs. It may also be detected by application of frozen ghrit, earth or sandal paste. Ihe shalyà should be known to be where the ghrita melts or paste dries up due to heat of lesion.

In the muscles, koshtha, bones, joints:
The patient should be given special oleation and fomentation therapies etc, when patient has thus become emaciated, the shalya become loose, gets detached and due to irritation causes inflammation and pain.

In the veins, arteries, srotas and ligaments:
The patient should be made to ride fast in chariot with broken wheels on uneven road, thus shalya should be known to be located where inflammation and pain occur.

In the bones:
Oleation, fomentation, bandaging and firm pressure should be applied on the bone and thus wherever the inflammation and pain occur, the shalya should be known to be there.

In the joints and marma:
After oleation and fomentation, extension, flexion, bandaging and pressure should be applied firmly; wherever the inflammation or pain occurs shalya should be known to be situated here.

Shalya nirharana:
Foreign bodies are of two types. They are

1. Avabaddha (Fixed)
2. Anavabaddha (Loose)

Extraction of loose foreign bodies:

1. Swabhava (Natural phenomena)
2. Pachana (Suppuration)
3. Bhedana (Incision)
4. Darana (Splitting by using caustics)
5. Pecdana (Squeezing)
6. Pramarjana (Wiping of)
7. Nirdhamapana (Insufflation)
8. Vamana (Emesis)
9. Virechana (Purgation)
10. Prakshalana (Wound toilet)
11. Pratimarsha (Nasal drops)
12. Pravahana (Straining)
13. Aachushana (Sucking)
14. Ayaskanta (Magnet)
15. Harsha (Cheering)

1) Svabhāva (natural methods)
Lacrimation, Sneezing, Eructation, Coughing, Micturition, Defecation, Flatus
These are the natural methods by which Shalya is removed.

2) Pāchana (suppuration)
If Shalya is deeply situated in the muscles and does not form an abscess, suppuration should be induced. As purification occurs, Shalya comes out with the flow of pus and blood or by its own gravity.

3-5) Bhedana (incision), Dāraṇa (splitting), Pīḍana (squeezing)
A formed abscess which does not burst may be incised or split open. If even after opening, the Shalya does not come out, squeezing should be done manually or with the help of medicines.

6-8) Pramārjana (brushing, rubbing, wiping), Nirdhmāpana (insufflation), Prakṣālana (washing, cleansing)
In case of minute shalyas located in the sense organs, Nirharaṇa should be done by washing, blowing air, wiping or sweeping with a brush, cloth or fingertips.

9-10) Vamana (emesis), Virechana (purgation)
Shalya which entered the body along with food should be removed by inducing vomiting or purgation (depending on whether Shalya is located in Āmāshaya or Pakvāshaya).

11) Pradhamana (sternutatory powder)
Pradhamana is sternutatory powder which is used to induce sneezing to remove Shalya from the nose, throat, etc.

12) Pravāhaṇa (straining)
Pravāhaṇa helps to remove Shalya such as obstructed Vāta, Mūtra, Purīṣa, Garbha.

13) Āchūṣaṇa (sucking)
Āchūṣaṇa by mouth or horn is done to remove gases, fluids, poisonous blood and vitiated breastmilk.

14) Ayaskānta (use of magnet)
Ayaskānta is the use of a magnet to remove metallic foreign bodies that entered the body.

15) Harṣa (cheerfulness, happiness)
Shalya affecting the Hṛdaya or Manas, such as Shoka, Bhaya, etc. should be removed by inducing cheerfulness and providing happiness.

Direction of Removing Shalya:

1. **Pratiloma**

Shalya is removed opposite to the direction of entry when it has penetrated less than half of the depth of the affected body part.

2. **Anuloma**

Shalya is removed in the same direction of entry when it has penetrated beyond half of the depth of the affected body part.

Shalya in sira and snayu:
It should be freed by the rod like and other similar instruments and then extracted. If it is hidden due to edema, shalya should be removed by squeezing the inflamed part, if arrow is fragile, it should be extracted after tying it with kusha etc.

Shalya near the heart:
It should be extracted through its own track after sprinkling cold water. And that which is difficult to extract is taken out by incising.

Shalya stuck in the bone:
It should be removed by means of appropriate instruments after applying counter pressure by the feet. If it fails, patient should be held firmly by strong person while end of shalya is to be caught hold of by an instrument, bend and tied to the string of bow at one end, the other end which is to be fastened to the rein of horse with a panchagi bandage. The horse should then be whipped, so that it lifts his head suddenly with force the shalya comes out; or by bending a firm branch of tree it should be tied and extracted in the same way.
Though acharyas have explained rein of horse and branch of tree, but these are not practically implemented in these days. The literal meaning of this is, putting sudden force for the extraction of foreign body.

Shalya in throat:
If shalya is a jaatusha (lakshadi) and attached to throat, a tubular instrument should be introduced in throat along with a heated rod by which it should be held and sprinkled with cold water and taken out when solidified.
Ajaatusha shalya should be treated with a rod pasted with laksha and bee-wax by above method.

Symptoms of Nishalya (Absence of shalya):
- Less or absence of pain
- Absence of inflammation
- Movement of the place is done easily
- No complication
- The place is not hard or elevated.

Treatment of Nishalya vrana:
Removal of shalya → Rakta stambhan → Svedana with agni or ghrita → Vrana bandhana with the paste of Ghee & madhu → Advice proper aahar & vihar

Symptoms of retained foreign body:
- Infection
- Sepsis
- Bowel perforation or obstruction
- Internal bleeding
- Abscess

Diagnosis:
- History
- X-Ray
- USG
- CT Scan
- Endoscopy

FLUID, ELECTROLYTE, ACID BASE BALANCE, AND NUTRITION

14. Fluid, Electrolyte, Acid Base Balance and Nutrition:

i. Introduction of physiology of fluids and electrolytes.
ii. Dehydration and over hydration.
iii. Specific electrolyte loss, Acidosis, Alkalosis, Symptomatology and Management.
iv. Electrolyte changes in specific diseases like pyloric stenosis, intestinal obstruction, and anuria.
v. Various replacement fluids in surgery, mode of administration and complications.
vi. Nutrition.

Introduction to Physiology of Fluids and Electrolytes:

Well over half of the body's weight is made up of water. The body's water is being restricted to various spaces, called fluid compartments.
The three main compartments are:

1. Fluid within cells
2. Fluid in the space around cells
3. Blood

To function normally, the body must keep fluid levels from varying too much in these areas. Some minerals - especially the macro minerals - are important as electrolytes.

Electrolytes are minerals that carry an electric charge when they are dissolved in a liquid such as blood. The blood electrolytes - sodium, potassium, chloride, and bicarbonate -help regulate nerve and muscle function and maintain acid-base balance and water balance.

Electrolytes, particularly sodium, help the body maintain normal fluid levels in the fluid compartments because the amount of fluid a compartment contains depends on the amount (concentration) of electrolytes in it. If the electrolyte concentration is high, fluid moves into that compartment (a process called osmosis). Likewise, if the electrolyte concentration is low, fluid moves out of that compartment. To adjust fluid levels, the body can actively move electrolytes in or out of cells.

Thus, having electrolytes in the right concentrations (called electrolyte balance) is important in maintaining fluid balance among the compartments.

The kidneys help maintain electrolyte concentrations by filtering electrolytes and water from blood, returning some to the blood, and excreting any excess into the urine. Thus, the kidneys help maintain a balance between daily consumption and excretion of electrolytes and water. Electrolytes are important because they help to:

- Balance the amount of water in the body.
- Balance the body's acid/base (pH) level.
- Move nutrients into cells.
- Move wastes out of cells.
- Make sure that nerves, muscles, the heart, and the brain work properly.

Dehydration:

Definition: A decrease in circulatory volume is called dehydration or Hypovolemia

Causes:

1. Gut: Vomiting, diarrhoea, fistulae
2. Skin & lungs: 0.5ml/kg/hr. normally. increased by 12% for every °C rise in temperature
3. Frequent urination
4. Diabetes

Assessment of dehydration:

1. History: Severity & duration of loss of fluids
2. Examination:

- Thirst
- Dryness of mucosa
- Loss of skin turgor
- Orthostatic hypotension
- Tachycardia
- Reduce jugular venous pressure
- Decrease urine output in normal renal function

Classification:

Sl. No.	**Degree**	**Loss of body weight (%)**	**Clinical Features**
1.	Mild	5	Loss of skin turgor, sunken eye, dry mucus membrane
2.	Moderate	10	Oliguria, Hypotension, Tachycardia in addition to above
3.	Severe	15	Profound oliguria & compromised cardiovascular func.

Lab assessment:

- falsely elevated Hb%, packed cell volume & increased blood urea concentration
- increased urine osmolality (>650mOsm/kg)

Treatment:

- IV fluids
- Treat the cause

Over-hydration

Causes:

1. Excessive infusion of IV fluids
2. Retention of water in abnormal conditions such as cardiac, renal & hepatic failure.
3. Absorption of water as during transurethral resection of prostate using distilled water.
4. A disorder that decreases the body's ability to excrete water or increases the body's tendency to retain water.
5. When people drink much more water than their body needs.
6. Psychogenic polydipsia

Diagnosis / Symptoms:

1. History & physical examination can lead to cause
2. Physical examination

- Distended neck veins
- Body weight gain
- Pedal oedema

3. Circulatory over load: Hypertension, tachycardia, pulmonary oedema
4. Confusion, restlessness, convulsions & coma

Management:

1. Treat the cause
2. Restriction of water & salt
3. Diuretics (or dialysis if necessary) to remove excess water

Types of IV Fluids:

There are different types of IV fluids and different ways on how to classify them.
The most common way to categorize IV fluids is based on their tonicity:

1. Isotonic. Isotonic IV solutions that have the same concentration of solutes as blood plasma.
2. Hypotonic. Hypotonic solutions have lesser concentration of solutes than plasma.
3. Hypertonic. Hypertonic solutions have greater concentration of solutes than plasma.

IV solutions based on their purpose:

1. Nutrient solutions. May contain dextrose, glucose, and levulose to make up the carbohydrate component, and water. Water is supplied for fluid requirements and carbohydrate for calories and energy. Nutrient solutions are useful in preventing dehydration and ketosis. Examples of nutrient solutions include D5W, D5NSS.
2. Electrolyte solutions. Contains varying amounts of cations and anions that are used to replace fluid and electrolytes for clients with continuing losses. Examples of electrolyte solutions include 0.9 NaCl, Ringer's Solution, and LRS.
3. Alkalinizing solutions. Are administered to treat metabolic acidosis. E.g.: LRS
4. Acidifying solutions. Are used to counteract metabolic alkalosis. E.g.: 0.9 NaCl
5. Volume expanders. Are solutions used to increase the blood volume after a severe blood loss, or loss of plasma. Examples of volume expanders are dextran, human albumin, and plasma.

Different IV solutions:

1. **Isotonic solutions (Crystalloid)**

Normal saline solution: It contains 0.9% solution of sodium chloride

Indications:

- Water & sodium deficiency e.g., excessive sweating, vomiting, intestinal obstruction & heat exhaustion
- To flush out infusion set before & after blood transfusion

Precautions:

- Should be used with great caution in patients who have salt retaining tendency. e.g., cardiac failure, cirrhosis of liver, anuria
- In early post-op period where there is sodium retention

2. **Dextrose solution:**

Availability: 5%, 10%, 15%, 20%, 50% dextrose solution

Indications:

- Cheapest source of calories (4cal/g).
- During pre-op period of fasting, IV glucose is given.
- Treatment & prevention of dehydration, hypoglycemia ketosis in starvation, diarrhoea, vomiting & high fever
- To replace loss fluids in case of shock & hemorrhage

Contra-indications:

- Should not give along with blood transfusion
- Water intoxication

3. **Ringer lactate solution (Hartman's solution):**

Composition:

1. Sodium chloride 0.6g%
2. Sodium lactate 0.31g%
3. Potassium chloride 0.03g%

Indications:

- To correct metabolic acidosis
- Diarrhoea, burns, diabetic ketosis, infections etc

4. **Calcium chloride, Calcium gluconate injection:**

Composition:

1. $Cacl_2$: 5-10% solution
2. Ca gluconate: 10% solution

Indications:

- Tetanus
- Hypo-Para-thyroidism
- After removal of Para-thyroid adenoma
- Cardiac asystole
- Hyperkalemia
- Ventricular fibrillation

Precautions: Inj $Cacl_2$, should be administered slowly. It irritates vein, otherwise sudden cardio-vascular collapse may occur.

Daily requirement:

- Na: 100 mEq
- K: 60 mEq
- Ca: 05 mEq
- Mg: 01 mEq
- Glucose: 200g/day
- Fat: 200g/week

Daily fluid loss:

- Kidney: 1500 ml
- Lungs: 400 ml
- Skin: 800 ml
- Stool: 60-150 ml

Fluid absorption: Jejunum (40%), Ileum (70%), Colon (90%)

Hyponatraemia: Sodium level <130 mEq/Liter
Hyponatremia develops when there is too little sodium in the blood. Common causes of low sodium levels include:
Excessive fluid loss through the skin from sweating or burns, Excessive fluid loss due to vomiting or diarrhoea, Poor nutrition, Alcohol use disorder, Overhydration, Thyroid, hypothalamic or adrenal disorders, Liver, heart or kidney failure, Certain medications including diuretics and anticonvulsants.
Investigation: Serum electrolyte (Urine sodium is low)
Treatment

1. IV NS or double: strength saline or RL IV 0.3% NaCl
2. Treat cause

Hypernatremia: Serum sodium level >150 mEq/Liter
Hypernatremia occurs when there is too much sodium in the blood. Abnormally high levels of sodium may be caused by:
Inadequate water consumption, Severe dehydration, Excessive loss of bodily fluids as a result of prolonged vomiting, diarrhoea, sweating, or respiratory illness.
Investigation: Serum electrolyte
Treatment:

1. Restriction of saline and sodium
2. Treat pulmonary edema
3. Initially infusion of NS, then infusion of half strength saline and later with 5% dextrose

Hypokalemia:
Hypokalemia occurs when potassium levels are too low.
This often happens as a result of:
Eating disorders, Severe vomiting or diarrhoea, Dehydration, Certain medications including laxatives, diuretics, and corticosteroids
Treatment:
1. Oral K 2g, 6th hourly
2. IV KCl 40 mmol/liter given in 5% dextrose or NS slowly (total dose is 40 mmol. Max dose per hour is 20 mmol).

Hyperkalemia: When K exceeds 6 mEq/liter
Hyperkalemia may develop due to high levels of potassium. This condition can be fatal if left undiagnosed and untreated.
It is typically triggered by:
Severe dehydration, Kidney failure, Severe acidosis, Adrenal insufficiency.
Investigation:
1. High Sr K level
2. Peak T wave in ECGG

Treatment:
1. IV administration of 50 mL of 50% glucose with low unit soluble insulin slowly
2. Infusions of 10% calcium gluconate can cardio protection.
3. CaCl, is given in severe cases as Ca in this form is released immediately without hepatic metabolism.
4. Diuresis using frusemide injection.
5. Hemodialysis when required.

Hypermagnesemia: Serum mg >2.5 mEq/Liter (rare)
Hypermagnesemia means excess amounts of magnesium. This disorder primarily affects people with Addison's disease and end-stage kidney disease.
Treatment:
Identify and stop the source of extra magnesium
Intravenous calcium, diuretics, or water pills may also be used to help the body get rid of excess magnesium.
People with renal dysfunction or those who have had a severe magnesium overdose may require dialysis if they are experiencing kidney failure

Hypomagnesemia: Serum mg <1.5 mEq/liter
Hypomagnesemia means having too little magnesium in the body.
Common causes include:
Alcohol use disorder, Malnutrition, Malabsorption, Chronic diarrhoea, Excessive sweating, Heart failure
Treatment:
1. 2 gm (16 mEq) of $MgSO_4$, slow IV in 10 mints
2. Later maintenance dose of I mEq/kg/day as slow IV.

Acid-base balance:
An important property of blood is its degree of acidity or alkalinity. The acidity or alkalinity of any solution, including blood, is indicated on the pH scale.
Blood acidity increases when the

- Level of acidic compounds in the body rises.
- Level of basic (alkaline) compounds in the body falls.

Blood alkalinity increases when the level of acid in the body decreases or when the level of base increases.

Regulation of acid-base balance: The pH is regulated in human body by mainly two organs, the lungs (Respiratory system) & Kidney (Renal system)

1. **Respiratory system:**

The arterial CO_2, levels are regulated by the respiratory system. Any increase in CO_2, levels stimulate respiratory centers in medulla, thus leads to augmenting respiration, alveolar ventilation & elimination of extra CO_2, level takes place.
A decrease in CO_2, level may reduce stimulus to breathe. Hypo-ventilation is limited by hypoxia in patient, due to hypoxic drive to maintain respiration. Respiratory response to changes in CO_2, levels occur very fast.

2. **Renal system:**

The plasma bicarbonate levels are regulated by kidneys. Any decrease in $[HCO_3^-]$ stimulates the kidney to retain & synthesize bicarbonate. High $[HCO_3^-]$ results in elimination of more bicarbonate in urine.
In general, pulmonary response to a change in acid-base status is faster & occurs immediately.
However, the renal regulation takes time, a few hours to delay.

Types of Acid-Base Disorders:

1. Acidosis: The blood has too much acid (or too little base), resulting in a decrease in blood pH.
2. Alkalosis: The blood has too much base (or too little acid), resulting in an increase in blood pH.

Acidosis and alkalosis are not diseases but rather are the result of a wide variety of disorders.

Types of Acidosis and Alkalosis:
Acidosis and alkalosis are categorized depending on their primary cause as:

I. Metabolic
II. Respiratory

Metabolic acidosis and metabolic alkalosis are caused by an imbalance in the production of acids or bases and their excretion by the kidneys.
Respiratory acidosis and respiratory alkalosis are caused by changes in carbon dioxide exhalation due to lung or breathing disorders.
People can have more than one acid-base disorder.

NUTRITION

Nutritional requirements:

Average man requires 2200-2500 kcal/day
Average women require 1800-2000 kcal/day
Carbohydrates: 500 kcal/day, because RBC, brain cells & medulla need glucose for their metabolism
Protein: 1gm/kg/day

Nutrition:

1. Enteral route
2. Parenteral route (TPN)

1. **Enteral route:** Nutrition administered via G.I tract

Administration:

- It can be administered through naso-gastric tube or naso-jejunal tube. Alternatively, a feeding gastrostomy or feeding jejunostomy can be used
- Tube feeds are started initially at rate of 50 ml every 2hrs on first day
- If tolerated, this can be increased gradually to 200ml every 2hrs
- Clear fluids are given on first day. Milk & other feeds are added 2nd day onwards
- The feeds can be given as liquidized food (mixture of cooked rice, dal & vegetables can be blended in mixer, diluted & strained)
- Alternatively commercial tube feeds can be used
- When gastric emptying is delayed, absorption of feeds can be encouraged using prokinetic agents such as metoclopramide (10mg TDS) or erythromycin (250mg TDS)

Possible indications:
After a stroke which impairs deglutition ability, cancer, critical illness or injury, failure to thrive, neurological or movement disorders that increase caloric requirements

Complications:

1. In-tolerance to feed: Vomiting, diarrhoea, bowel distension
2. Mechanical problems: Feeding tube block, leak, erosion, sinusitis
3. Nutritional deficiencies: If proper attention to all components is not given

2. **TPN (Total Parenteral Route):**

When enteral nutrition is not possible for more than few days; parenteral nutrition may need to be considered. When all nutrition is administered by parenteral route, is called as TPN

Administration of nutrients:
Carbohydrates: 1gm of glucose provides 4kcal. This needs to be administered in a concentration of 50% so as not to exceed the daily fluid replacement. 100ml of 50% dextrose contains 500gm of dextrose providing 200kcal.

Possible indications:
Crohn's disease, cancer, short bowel syndrome, ischemic bowel disease

Problems:

- Hyperglycemia must be prevented by addition of appropriate amount of insulin
- Potassium supplements to avoid hypokalemia
- Increase CO_2, production may increase work of breathing & result in difficulty in weaning patients from ventilator

Lipids: 1gm of fat provides 9kcal. Since it is more concentrated form of energy, half the daily Caloric requirement can be given using 10% lipid emulsions.

Problems:

- Occasionally it may cause impaired pulmonary diffusing capacity
- Its clearance from plasma may be delayed with impaired liver function
- They are expensive

Proteins: Average protein requirement is Ig/kg/day. Amino-acid replacement solutions are available as 10% & 20% solution. The calorific value of proteins should not be counted as they are building blocks of body. They are not infused to be metabolized for energy

Electrolyte Changes in Specific Diseases

1. **Pyloric Stenosis**

The classic electrolyte imbalance of pyloric stenosis is hypochloremic, hypokalemic metabolic alkalosis.

2. **Intestinal Obstruction**

There is persistent hyponatremia, a gradual drop in serum potassium beginning 5 days after onset of obstruction, a progressive decrease in chloride level over first week followed by a rise in urea level for a week and an initial tendency towards acidosis gradually replaced by alkalosis.

3. **Anuria**

Sodium is generally retained, but may appear normal, or hyponatremic, because of dilution from fluid retention. Following the relief of a urinary tract obstruction, hypovolemia, hyponatremia (true loss of sodium), hypokalemia, hypocalcemia, hypomagnesemia, and bicarbonate loss are most likely to occur.

RAKTA MAHATWA, RAKTASRAVA / HEMORRHAGE: PRAKARA AND LAKSHANA

14. Rakta Mahatwa, Raktasrava / Hemorrhage: Prakara and Lakshana.

i. Raktastambhana – Haemostasis.

ii. Blood Transfusion –Blood groups, Compatibility, Indications, Contraindications and Complications with Management.

iii. Component therapy.

Rakta Mahatva:

- Rakta is one of the Sapta Dhātu and its primary function is Jīvana. Rakta is Jīvasthāna, hence it must be protected.
- Ā. Sushruta, considered Rakta as the fourth Doṣa in addition to Vāta, Pitta and Kapha, as it plays an important role in Shalya Tantra.
- Ā. Charaka has not classified Rakta as a Doṣa, but also gave it greater importance among the seven Dhātus. Vidhishoṇitīyam Adhyāya, Chapter 24 in Sūtra Sthāna, focuses specifically on Rakta.
- Ā. Ḍalhana mentioned that Rakta is the main factor in the formation of the body during foetal life, nourishment of the body after birth, and if there is excessive loss of blood, the person may die.
- Shuddha Rakta is formed by intake of proper Āhāra and performing proper Vihāra. It is responsible for Bala, Varṇa, Sukha and Āyuṣyā.
- Rakta plays a vital role in the sustenance of Prāṇa.

Hemorrhage (Raktasrava):

Hemorrhage is a life-threatening medical emergency. If there is any breach in continuity or rupture of artery, vein or capillary due to any reason blood flows out. A loss of more than 200ml may usually result in death. Slow bleeding may lead to anemia, while sudden loss of a large amount of blood may cause shock. Hemorrhage is often caused by trauma, surgical or obstetrical complication or advanced stage of certain illness. It also manifests as a symptom in bleeding and clotting disorders.

Definition:

Haemo → Blood & Rhage Burst (Bursting of vessel & coming out of blood)

Classification:

1. Based on source of bleeding:
   a. Arteries b. Veins c. Capillary

2. Based on timing of hemorrhage:

a. Primary: Occurs at time of injury or operation.
b. Reactionary: It occurs within 24 hours (commonly in 4-6 hours) after surgery or injury.
c. Secondary: It occurs in 7-14 days after operation.

3. Based on type/nature of hemorrhage:
a. Revealed: It is visible, also called external hemorrhage. E.g.: Epistaxis
b. Concealed: It constitutes internal hemorrhage. E.g.: Liver or spleen rupture
c. Initially concealed but later revealed: Hematemesis, melaena, hematuria.

4. Based on duration:
a. Acute b. Chronic c. Acute on chronic

5. Based on possible intervention;
a. Surgical: Can be corrected by surgical intervention.
b. Non-surgical: It is diffuse ooze due to coagulation abnormalities.

6. Based on quantity:
a. Mild: 500ml blood. loss
b. Moderate: 500-1000ml blood loss
c. Severe: > 1000ml blood loss

Causes:

1. Traumatic bleeding:

An injury can cause traumatic bleeding. Common types of traumatic injury:
Abrasions, haematoma or bruises, lacerations, puncture wounds, crushing injuries, gunshot wounds

2. Medical conditions:

Bleeding due to a medical condition is less common than traumatic bleeding.
Conditions that can cause bleeding include: Hemophilia, leukemia, liver disease, menorrhagia, thrombocytopenia, vitamin K deficiency, lung cancer, acute bronchitis, etc.

Symptoms:

1. **Early changes:**
a. Vasovagal syncope: Slight sweating, pallor, giddiness, decreased blood pressure, decreased pulse, ischemia, emotional stress, anxiety, fear
b. Cardiovascular changes: Increased breathing, tachycardia due to secretion of adrenaline, selective vasoconstriction to increase BP
c. Reaction of blood: Increased platelet count & fibrinogen.
d. Restoration of blood volume: There will be withdrawal of fluid and electrolytes from the interstitial compartments to the plasma compartment, and decrease in lymphatic flow. Water is drawn from dense connective tissue to cause haemodilution.

2. **Late changes:**

Regeneration of lost blood occurs by stimulation of secretion of erythropoietin (EPO) which stimulated the boned marrow to produce new RBCs. EPO is stimulated due to diluted blood and as a result of anorexia.

Atiraktasrāva Lakṣaṇa:
Shiro-abhitāpa, Adhimantha, Timira, Dhātukṣaya, Ākṣepa, Dāha, Pakṣaghāta, Ekāṅga vikāra, Hikkā, Shvāsa, Kāsa, Pāṇḍuroga, Maraṇa

Rakta sthambaka upaya:

1. Sandhana - Joining the edges of the wound
2. Skandana – Promoting clotting
3. Pachana - Bhasmas dusting over bleeding site used to stop bleeding
4. Dahana – Burning or Cauterization

Drugs which are astringent will join or unite the wound. Drugs which are cold makes the blood to clot, Ash or Alkali drugs will adhere and closes the wound and Cauterization will constricts the veins.

Haemostatic drugs:

1. Samudra phena, or laksha churna gharshana, Saladi churna
2. Gaadha bandha
3. Sheeta (Aachadana, bhojana, aagar, parisheka, pradeha)
4. Kakoladi gana with madhu, shrakara pana, Ksheera pana

Haemostasis:
Haemostasis is a process to prevent and stop bleeding, meaning to keep blood within a damaged blood vessel. It is the first stage of wound healing. This involves coagulation, blood changing from a liquid to a gel.

Haemostasis has three major steps:

1. Vasoconstriction
2. Temporary blockage of a break by a platelet plugs
3. Blood coagulation, or formation of a fibrin clot

1. Vasoconstriction / Vascular Spasm:

Vasoconstriction is produced by vascular smooth muscle cells, and is the blood vessel's first response to injury. The smooth muscle cells are controlled by vascular endothelium, which releases intravascular signals to control the contracting properties. When a blood vessel is damaged, there is an immediate reflex, initiated by local sympathetic pain receptors, which helps promote vasoconstriction. The damaged vessels will constrict (vasoconstrict) which reduces the amount of blood flow through the area and limits the amount of blood loss. Collagen is exposed at the site of injury; the collagen promotes platelets to adhere to the injury site. Platelets release cytoplasmic granules which contain serotonin, ADP, and thromboxane A2, all of which increase the effect of vasoconstriction. The spasm response becomes more effective as the amount of damage is increased. Vascular spasm is much more effective in smaller blood vessels.

2. Platelet Plug Formation:

Platelets adhere to damaged endothelium to form a platelet plug (primary haemostasis) and then degranulate. This process is regulated through thromboregulation. Plug formation is activated by a glycoprotein called Von Willebrand factor (vWF), which is found in plasma. Platelets play one of major roles in the haemostatic process. When platelets come across the injured endothelium cells, they change shape, release granules, and ultimately become 'sticky'. Platelets express certain receptors, some of which are used for the adhesion of platelets to collagen. When platelets are activated, they express glycoprotein receptors that interact with other platelets, producing aggregation and adhesion. Platelets release cytoplasmic granules such as adenosine diphosphate (ADP), serotonin and thromboxane A2. Adenosine diphosphate (ADP) attracts more platelets to the affected area, serotonin is a vasoconstrictor and thromboxane A2 assists in platelet aggregation, vasoconstriction and degranulation. As more chemicals are released more platelets stick and release their chemicals; creating a platelet plug and continuing the process in a positive feedback loop. Platelets alone are responsible for stopping the bleeding of unnoticed wear and tear of our skin daily. This is referred to as primary hemostasis.

3. Clot Formation:

Once the platelet plug has been formed by the platelets, the clotting factors (a dozen proteins that travel along the blood plasma in an inactive state) are activated in a sequence of events known as 'coagulation cascade' which leads to the formation of Fibrin from inactive fibrinogen plasma protein. Thus, a Fibrin mesh is produced all around the platelet plug to hold it in place; this step is called secondary haemostasis. During this process some red and white blood cells are trapped in the mesh which causes the primary hemostasis plug to become harder: the resultant plug is called as 'thrombus' or 'clot'. Therefore, 'blood clot' contains secondary hemostasis plug with blood cells trapped in it. Though this is often a good step for wound healing, it has the ability to cause severe health problems if the thrombus becomes detached from the vessel wall and travels through the circulatory system; If it reaches the brain, heart or lungs it could lead to stroke, heart attack, or pulmonary embolism respectively. However, without this process the healing of a wound would not be possible.

In Emergency Medicine:

If an individual acquires a large injury resulting in extreme blood loss, then a haemostatic agent alone would not be very effective. Medical professionals continue to debate on what the best ways are to assist a patient in a chronic state; however, it is universally accepted that haemostatic agents are the primary tool for smaller bleeding injuries.

Some main types of haemostasis used in emergency medicine include:

1. **Chemical/Topical**

This is a topical agent often used in surgery settings to stop bleeding. Microfibrillar collagen is the most popular choice among surgeons because it attracts the patient's natural platelets and starts the blood clotting process when it comes in contact with the platelets. This topical agent requires the normal haemostatic pathway to be properly functional.

2. **Direct pressure or pressure dressing**

This type of haemostasis approach is most commonly used in situations where proper medical attention is not available. Putting pressure and/or dressing to a bleeding wound slows the process of blood loss, allowing for more time to get to an emergency medical setting. This process allows for blood loss to be decreased, giving the system time to start coagulation.

3. **Sutures and ties**

Sutures are often used to close an open wound, allowing for the injured area to stay free of pathogens and other unwanted debris to enter the site; however, it is also essential to the process of haemostasis. Sutures and ties allow for skin to be joined back together allowing for platelets to start the process of hemostasis at a quicker pace. Using sutures results in a quicker recovery period because the surface area of the wound has been decreased.

4. **Physical agents (gelatin sponge)**

Gelatin sponges have been indicated as great haemostatic devices. Once applied to a bleeding area, a gelatin sponge quickly stops or reduces the amount of bleeding present. These physical agents are mostly used in surgical settings as well as after surgery treatments. These sponges absorb blood, allow for coagulation to occur faster, and give off chemical responses that decrease the time it takes for the hemostasis pathway to start.

BLOOD TRANSFUSION

A blood transfusion is a procedure that restores blood to the body.
Blood transfusions work to replace blood that is lost due to injury or surgery. People can also get blood transfusions to treat certain medical conditions.

Types:

1. Red blood cell transfusions: A person may receive a red blood cell transfusion if they have experienced blood loss, if they have anemia (such as iron deficiency anemia), or if they have a blood disorder.
2. Platelet transfusions: A platelet transfusion can help those who have lower platelet counts, such as from chemotherapy or a platelet disorder.
3. Plasma transfusions: Plasma contains proteins important for health. A person may receive a plasma transfusion if they have experienced severe burns, infections, or liver failure.
4. Whole blood transfusion: A person may receive a whole blood transfusion if they have experienced a severe traumatic hemorrhage and require red blood cells, white blood cells, and platelets.

Indications:

Severe anaemia (when the oxygen capacity of the blood compromises major organs), severe haemorrhage, anaemia of chronic disorders (renal failure and cancer), haemoglobinopathies (sickle cell disease, thalassaemia)

Contraindications:

Megaloblastic anaemia (vitamin B12 or folate deficiency - transfusion may cause heart failure and death), iron deficiency anaemia, transfusion in healthy adults and children where use of oral iron could rectify a low hemoglobin.

Blood Groups & Compatibility:

It is important that the correct blood type is used for a blood transfusion. Otherwise, the body might reject the new blood, which can have severe consequences.

Blood Type	Gives	Receives
A+	A+, AB+	A+, A-, O+, O-
O+	O+, A+, B+, AB+	O+, O-
B+	B+, AB+	B+, B-, O+, O-
AB+	AB+	Everyone
A-	A+, A-, AB+, AB-	A-, O-
O-	Everyone	O-
B-	B+, B-, AB+, AB-	B-, O-
AB-	AB+, AB-	AB-, A-, B-, O-

Complications & Management:

1. Allergic reactions like hives and itching - antihistamines
2. Fever - antipyretics
3. Auto-immune hemolytic reaction: It is a serious complication caused by the patient's body attacking the new RBCs. It damages the kidneys, and leads to nausea, fever, chills, chest and lower back pain, dark urine.
4. Blood borne infection: HIV, Hepatitis B & C, Syphilis, West Nile Virus, etc.
5. Transfusion associated circulatory overload: The high osmotic load of blood products draws volume into the intravascular space. It is treated with diuretics.
6. Major incompatibility reaction: Due to mismatched blood transfusion or technical error like sampling, labelling, leading to intravascular haemolysis. Features include haematuria, oliguria, pain in both loins, fever with chills and rigors. Blood transfusion must be stopped and the blood is rechecked. Repeat coagulation profile. Diuretics with frusemide 20-40 mg IV to flush the kidneys.
7. Minor incompatibility reaction: Due to reaction of antibodies to minor antigen leading to extra vascular haemolysis. Features include malaise, jaundice, fever. Supportive treatment should be given.

ANTIBIOTICS, ANALGESICS, ANTI-INFLAMMATORY AND EMERGENCY DRUGS IN SURGICAL PRACTICE

15. Antibiotics, analgesics, anti-inflammatory and emergency drugs in surgical practice.

ANTIBIOTICS

Antibiotics are type of antimicrobial (agent that kills micro-organisms or stop their growth) drug used in the treatment and prevention of bacterial infections. They may either kill or inhibit the growth of bacteria. A limited number of antibiotics is antiprotozoal activity. Antibiotics are not

1. Pencillins
2. Tetracyclines
3. Cephalosporins
4. Quinolones
5. Lincomycins
6. Macrolides
7. Sulfonamides
8. Glycopeptides
9. Aminoglycosides
10. Carbapenems

1. Pencillins:

It contains five group of antibiotics

1) Aminopencillins
2) Antipseudomonal pencillins
3) Beta-lactamase inhibitors,
4) Natural pencillins and
5) Pencillinase resistant pencillins

2. Tetrecyclins:

Treat conditions such as acne, UTIs intestinal tract infections, STD, gum disease and other bacterial infections. E.g.

- Doxycycline
- Minocycline
- Tetracycline

3. Cephalosporins:

Treat throat, ear infections, UTI, skin infection and meningitis.

- Cefuroxime
- Ceftriaxone
- Cefixime

4. Quinolones:

Treat UTIs, hospital acquired pneumonia, bacterial prostates, anthrax, plaque e.g.

- Ciprofloxacin
- Ofloxacin
- Levofloxacin

5. Lincomycins:

Treat serious infections like PID, intra-abdominal infection, lower respiratory tract infection, & bone and joint infections. E.g.

- Clindamycin
- Lincomycin

6. Macrolides:

Treat community acquired pneumonia, pertussis, uncomplicated infections. E.g.

- Azithromycin
- Clarithromycin
- Erythromycin

7. Sulphonamides:

Treat UTIs, pneumocystis, pneumonia, ear infections. E.g.

- Sulfamethoxazole-trimthoprim
- Sulfisoxazol
- Sulfasalazine

8. Glycopeptide:

Treat methicillin resistant staphylococcus aureus (MRSA) infections, complicated skin infections, C. Difficile-associated diarrhoea and enterococcal infections such as endocarditis. E.g.

- Dalbavancin
- Oritavancin
- Telavancin
- Vancomycin

9. Aminoglycosides:

Inhibits bacterial synthesis by binding to the 30S ribosome and act rapidly as bactericidal antibiotics. E.g.

- Gentamicin
- Tobramycin
- Amikacin

10. Carbapenems:

Treat bacterial infections like stomach infections, pneumonias, and kidney infections, multi-drug resistant hospital acquired infections. E.g.

- Imipenem
- Meropenem
- Doripenem
- Ertapenem

ANALGESICS

Analgesic or pain killer is any member of the group of drugs used to achieve analgesia, relief from pain. Analgesic drugs act in various ways on the peripheral and CNS. They are distinct from anesthetics.

Types:

1. Opoid analgesics: They act on brain. It can be used for either short-term or long-term relief of severe pain

2. non-opoid or anti-inflammatory drugs: They alleviate pain by reducing local inflammatory responses. These are used for short-term pain relief and for modest pain such as headache, muscle strain etc.

1. Opoid drugs:

a. Morphine: Dose: 10-15 mg IM or SC, 2-10 mg IV, 2-3 mg intrathecal or epidural
b. Tramadol: Dose: 50-100 mg orally / IM / slow IV

2. Non-opoid drugs:

a. Mephanamic acid: Dose: 250-500 mg TDS
b. Diclofenac sodium: 50 mg TDS/BD orally, 75 mg deep IM, Voveron 1% topical gel
c. Piroxicam: 20mg BD for 2 days followed by 20mg OD
d. Paracetamol: Dose: 0.5-1 gm TDS; Maximum amount for adults is 1 gram (1000 mg) per dose and 4 grams (4000 mg) per day

Side Effects:

Narcotic analgesics have many side effects, although people with cancer or terminal illness taking narcotics for long periods of time may become tolerant to some of these side effects.

Drowsiness, sleepiness, or dizziness is common with most narcotic analgesics.

This can affect driving or a person's ability to operate machinery and perform other hazardous tasks. Alcohol may potentiate these effects.

NSAIDs may also cause side effects, especially when used at higher than recommended dosages for long periods of time. Gastrointestinal side effects that may occur include bloating, diarrhea, constipation, irritation of the lining of the stomach, nausea or vomiting. NSAIDs may also affect kidney function and reduce how quickly blood flows through the kidneys. They may cause retention of sodium and water which can lead to edema and high potassium levels. Occasionally, they may cause more serious damage to the kidneys.

EMERGENCY DRUGS IN SURGICAL PRACTICE

Emergency medicine is the medical speciality involving care for undifferentiated and unscheduled patients with illnesses or injuries requiring immediate medical attention.
Examples of Emergency Drugs:

Adrenaline:
Indication: Allergic reactions (anaphylactic shock), Acute attack of bronchial asthma, Homeostasis, Cardiac arrest due to drowning, electrocaution, etc.
Adverse Reaction: Palpitation, headache, increased BP, tremors, angina, pallor

Noradrenaline:
Indication: Hypotension of circulatory failure, Hypotension following removal of chromatic cell tumor.
Adverse Reaction: Same as adrenaline

Hydrocortisone:
Indication: Anaphylactic shock, status asthmaticus, hypoglycemia, hyperglycemia
Adverse Reaction: Gastritis, peptic ulcer, perforation, hemorrhage, hypertension, osteoporosis, delayed wound healing

Morphine:
Dose: 5-20 mg / IM
Indication: Pain, ventricular failure
Adverse Reaction: Respiratory depression, urinary retention, low BP and low pulse

Diazepam:
Dose: 10 mg IM / IV
Indication: Pre-anesthetic medicine, convulsions, muscle relaxant in tetanus

Insulin:
Indication: Diabetes mellitus, diabetes ketoacidosis, hyperkalemia
Adverse Reaction: Hypoglycemia

Lasix (Frusemide):
Indication: Renal calculi, pulmonary edema, poisoning
Adverse Reaction: Hypotension, dehydration due to excessive loss of potassium, sodium and calcium

Deriphyllin:
Indication: To prevent and treat wheezing, shortness of breath, chest tightness associated with lung diseases like asthma, chronic bronchitis, emphysema, COPD
Adverse Reaction: Irregular heartbeat, convulsions, allergic skin reactions, stomach discomfort.

Depin (Nifedipine):
Indication: Hypertension, angina pectoris
Adverse Reaction: Swelling of face, arms, lower legs; dizziness, headache, muscle cramps.

DIAGNOSTIC TECHNIQUES

16. Diagnostic techniques – X-ray, Imaging techniques, Ultrasonography, CAT Scan, MRI, Biopsy / Cytological study.

X-Ray/Radiography:
X-rays are a form of electromagnetic radiation that can pass through solid objects.
X-rays penetrate different objects according to their density.
Discovered by Wilhelm Conrad Roentgen

To obtain an X-ray image of a part of the body, a patient is positioned so the part of the body being X-rayed is between the source of the X-ray and an X-ray detector. As the X-rays pass through the body, images appear in shades of black and white, depending on the type of tissue the X-rays pass through.

For example, the calcium in your bones makes them denser, so they absorb more radiation and appear white on X-rays. Thus, when a bone is broken (fractured), the fracture line will appear as a dark area within the lighter bone on an X-ray film.
Less dense tissue such as muscle or fat absorbs less, and these structures appear in shades of gray on X-ray film.

Air absorbs little of the X-rays, so the lungs and any air-filled cavities appear black on an X-ray film. If pneumonia or tumors are present in the lungs, they are denser than the air-filled areas of the lungs and they will appear as whiter spots on X-ray film.

Common types of X-rays:
Abdominal x-ray, Barium x-ray, Bone x-ray, Chest x-ray, Dental x-ray,
Extremity x-ray, Hand x-ray, Joint x-ray, Lumbosacral spine x-ray, Neck x-ray,
Pelvis x-ray, Sinus x-ray, Skull x-ray, Thoracic spine x-ray, Upper GI and small bowel series,
X-ray of the skeleton

X-ray can be taken in:

1. In Antero-posterior view
2. In Postero-anterior view
3. In Lateral view
4. Tangential view
5. Axial view

Common uses of X-rays:

- Bone fractures
- Infections
- Calcifications
- Some tumors
- Arthritis in joints
- Bone loss
- Dental issues
- Heart problems
- Blood vessel blockages
- Foreign objects

BARIUM STUDIES:

Features	Barium Swallow	Barium Meal
Definition	Contrast study from the oral cavity up to the fundus of the stomach	Radiological study of oesophagus, stomach, duodenum and proximal jejunum
Indications	• Dysphagia and obstruction • Odynophagia • Mediastinal mass • Achalsia cardia	• Vague symptoms like vomiting, epigastric pain, heart burn, dyspepsia • Upper abdominal mass • GI hemorrhage • Malignancies
Contraindications	• Trachio-esophageal fistula • Perforation	• Suspended perforation • Suspicion of aspiration • Large bowel obstruction
Procedure	One mouthful of contrast media is given, and fluoroscopic observation of the act of deglutition is observed. After a mouthful of barium, films are exposed to the region of interest.	An undiluted barium suspension is given and deglutition is seen under fluoroscopy. Once the barium reaches the stomach, the patient is rotated to coat the entire stomach and filming is done. More barium is given to distend the stomach wall. Filming is done as contrast enters the duodenum and opacifies proximal jejunum.
Interpretation	• Malignant obstructions are seen as annular constrictions. • Benign strictures are long segment narrowing with no mucosal abnormalities. • Achalsia cardia as rat tail appearance of lower end of oesophagus.	• Hiatus hernia is evident as presence of the stomach above the oesophageal hiatus. • Peptic ulcers appear as projections from the normal contour with pooling of contrast • Bezoras of stomach seen as radiolucent masses in the stomach and barium fills the cervices between the particles forming a characteristic appearance.

ULTRASONOGRAPHY (USG):

Definition:

It is an imaging technique which employs sound waves with high frequency in to human tissues, to visualize its texture.

Principle:

If sound waves are passed through tissue, that tissue will absorb some part of sound waves and remaining sound waves are reflected. And these reflected sound waves are received and converted in to electrical energy and an image is obtained.

- If no reflection: No image (black)
- No absorption, full reflection: Bright image
- Some reflection some absorption: Light dark image

Parts:

1. Monitor: Image is shown on screen
2. Processing unit: Different calculations are done based on absorption & reflection; an image is obtained through this unit.
3. Probe (transducer): It is the main & most expensive part of USG. The sound waves are generated from this probe & reflected sound waves are taken back by the same. A transducer is often called probe & is connected scanner by a flexible cable.

Utilities of USG:

1. Abdominal: Structural abnormalities can be diagnosed. Mainly solid structures like liver, spleen, kidney etc.

2. Pelvic:

(a) Pelvic abscess, pelvic tumour, urinary bladder calculi

(b) Inter-uterine abnormalities like fibroid uterus, congenital anomalies & ovarian abnormalities.

3. Gravid uterus:

a. Confirmation of pregnancy
b. Growth of foetus, IUGR, IUD
c. Fetal presentation
d. EDD
e. Site of pregnancy
f. Placental position
g. Exact gestational age

4. Follicular study: Follicles are matured before the ovulation. Maturity & ovulation can be observed.

5. Diagnostic USG: Some surgical procedures are performed for diagnosis under the guidance of USG. They are

a. Amniocentesis
b. Pleural fluid tap
c. Liver abscess aspiration etc
d. Paracentesis abdominus
e. Ovarian cyst aspiration

Disadvantages:

1. It is operator dependent & the operator skill is very important.
2. It cannot image structures beyond bones.
3. Limited in its use in thorax & partly in abdomen, since it does not pass through gases.

CT (Computerized tomography) Scan / CAT Scan (Computerized Axial Tomography):

Definition:

CT is new method of forming images from x-rays. This is multi-directional scanning of human body. By these multiple data is collected, calculated & finally imaged.

A large donut-shaped X-ray machine or scanner takes X-ray images at many different angles around the body. These images are processed by a computer to produce cross-sectional pictures of the body. In each of these pictures the body is seen as an X-ray "slice" of the body, which is recorded on a film. This recorded image is called a tomogram. "Computerized axial tomography" refers to the recorded tomogram "sections" at different levels of the body.

Significance:

To detect the abnormal structures & minor pathologies this could not be detected through other investigatory techniques.

Technique:

Two structures are placed on either side of patient & also opposite to each other. They are

- X-ray source
- X-ray detector

Contrast CT:

To differentiate the similar structures exactly & to visualize the exact pathology, the contrast CT is done.

IV contrast is given after the routine scan. Again, the scan is repeated. Then comparing the films before & after CT, certain tissues show some enhancement in their density. Some pathological structures can take up their contrast. Then they are visualized more clearly.

Precautions:

- Special care is taken during x-ray examination to ensure maximum safety for patient by Shielding the abdomen & pelvis with lead apron, with exception of those examinations in which abdomen & pelvis are imaged.
- Women should always inform their doctor or x-ray technologist, if there is any possibility that they are pregnant.
- Nursing mothers should wait 24 hours after contrast injection before resuming breast feeding.

Advantages:

1. Unlike other imaging methods, CT scanning offers detailed images of many types of tissue including bones. lungs. son tissues & blood vessels.

2. CT scan is non-invasive, painless & accurate.
3. CT examination is fast & simple. For example, in trauma cases they can diagnose internal injuries & bleeding quickly enough to help save lives.
4. Diagnosis made with assistance of CT can eliminate the need for invasive exploratory surgery & surgical biopsy.
5. CT scan can identify normal & abnormal structures, making it useful tool to guide radiotherapy, needle biopsies & other minimally invasive procedures.
6. CT scan has been shown to be a cost-effective imaging tool for a Wide range of clinical problems.
7. CT scan will be taken in various planes, in various sections, so the scanning of the entire part is possible.

MRI (MAGNETIC RESONANCE IMAGE):

Definition:

It is diagnostic technique based on analysis of the absorption & transmission of high frequency radio waves by the hydrogen in water molecules & other components of tissue placed in strong magnetic field.

Principle:

It is based on the principle that any nuclei with unpaired electrons behave like magnet when they spin. When these nuclei are subjected to strong magnetic field, they release some energy in the form of radio signals. These signals are converted in to image.

The MRI scanner is a tube surrounded by a giant circular magnet. The patient is placed on a moveable bed that is inserted into the magnet. The magnet creates a strong magnetic field that aligns the protons of hydrogen atoms, which are then exposed to a beam of radio waves. This spins the various protons of the body, and they produce a faint signal that is detected by the receiver portion of the MRI scanner. A computer processes the receiver information, which produces an image.

Advantages:

- More sensitive and specific than CT scan.
- It does not have ionizing radiation, so it is said to be safe.
- It gives high intrinsic contrast.
- In any plane the image can be taken without changing patient’s position.
- No known biological hazards.

Disadvantages:

- Imaging time is long (20-60mts).
- Highly operator dependent.
- Extremely expensive.
- Patient with pacemaker & any other metal implants cannot be scanned.

Biopsy:
Biopsy is the removal of a sample of tissue for examination under a microscope to check for cancer cells or other abnormalities.

Uses:
1) Diagnosing tumors and cancerous cells:
Tumors may be determined as cancerous (malignant) or non-cancerous (benign) with the help of biopsies.

2) Grading tumors:
Biopsies of cancers help to grade the tumor. The microscopic structure of the tumor often gives clues to the nature, rate of growth, aggressiveness of the cancer. The cancer is staged based on this. Staging helps to determine the plan of treatment and helps to predict the outcome or prognosis of the cancer.

3) Other uses:
Biopsies can help identify other conditions such as infections and autoimmune disorders. Bone biopsy for example helps in diagnosis of bone infections. Bone marrow biopsy is used to diagnose cancer in the blood, such as leukemia and also for effects of drugs, toxins and infections.
Biopsies may be performed on almost all organs like breast, kidneys, liver, bone marrow, bone, skin, lung, lymph nodes, muscles, nerves, testes, thyroid, bladder, heart, neck, prostate.

Types:
There are many different types of biopsy procedures:
1) Needle biopsy: A fine needle is used to remove a small amount of tissue from the tumor or growth. This is called fine needle aspiration cytology (FNAC).
2) Vacuum assisted biopsy: A thicker, hollow needle removes cores of tissue with a single insertion of a vacuum assisted probe.
3) Surgical biopsy: Here a small surgery is performed. A small or whole of the tumor is excised and removed for examination.

Complications:

- Hemorrhage
- Infection
- Poor wound healing
- Spread of tumour cells
- Injury to adjacent organs
- Hypersensitivity to local anesthesia
- Hypertrophic scar or Keloid formation

CYTOLOGY
Definition:
It is the branch of life science that deals with the study of cells in terms of structure, function and chemistry.
Father of cytology: Robert Hooke

Advantage:

- Compare to biopsy it is easier to get
- Causes less discomfort to the patient
- Is less likely to result in serious complications
- Costs less

Uses:

1. A diagnostic test is only used for people who have clinical features or some other reasons to suspect that they might have particular disease (Like cancer). A diagnostic test is finds out if disease is present and, if so, it precisely and accurately classified the disease.
2. A screening test is used to find people who might have a certain disease even before them develop symptoms. A screening test is expected to have the disease, but it does not always prove that the disease is present.

Fistulography / Sinusography:

Fistulography is an internal diagnostic imaging technique performed by an interventional radiologist to determine characteristics of a fistula. This imaging technique can give interventional radiologists information about whether a foreign body or inflammation is present in order to determine proper care.

Fistulography may be warranted in patients with recurrent fistulas or when a prior procedure has failed to identify the internal opening. With this technique, the external opening is cannulated with a small-caliber tube and contrast material is injected under minimal pressure while films are taken in several projections. Fistulography may be useful in identifying unsuspected pathology, planning surgical management, and demonstrating anatomic relationships.

Uses:
For knowing the exact extent / origin of sinus or fistula
Water soluble or Ultra-fluid lipoidal iodine dye is used.

Write uses of trans-rectal sonography (Oct 18)

- TRUS (Trans Rectal Ultra-Sonography) is used particularly in the investigation of anorectal symptoms like fistulous track, polyps, ulcers, fecal incontinence, or obstructed defecation.
- It can detect occult defect such as tearing of the anal sphincters.

Intravenous Pyelography (IVP)

- It is an excretory urogram.

DEXA Scan (Dual Energy X-Ray Absorptiometry):

- To measure bone mineral density (like osteoporosis)

SHALYATANTRA

PAPER 1

PART B

SHAT KRIYAKALA

1. Shat Kriyakala in surgical practice.

Shat kriyakala are appropriate time periods to take action or plan/implement treatment includes diagnosis of disease at six different stages of its manifestation. They are…

सञ्चयं च प्रकोपं च प्रसरं स्थानसंश्रयम् |

व्यक्तिं भेदं च यो वेत्ति दोषाणां स भवेद्भिषक् ||३६|| (सु. सु. 21/36)

Dosha kriyakala	Sanchaya, Prakopa, Prasara
Vyadhi kriyakala	Stahnasamshraya, Vyakta, Bheda

Pre-disease stage of samprapti	Sanchaya, Prakopa, Prasara
Disease stage of samprapti	Stanasamshraya, Vyakta
Post-disease stage of samprapti	Bheda

1. Sanchaya avastha

Gradual accumulation of Dosha in its respective seat is known as Sañchaya.
Vāta Sañchaya in Pakvāshaya, Pitta in Nābhi, and Kapha in Uras.

Lakṣaṇa:
Chaya Kāraṇa Vidveṣa - The person develops aversion towards the causative factors which are responsible for accumulation of the Dosha.

Chikitsā: Nidāna parivarjana, Pathya sevana, Hetu viparīta Chikitsā

If the Doṣas are eliminated in the stage of accumulation itself, they do not progress to the further stages and do not become more harmful.

2. Prakopa avastha

Aggravation and liquification of the accumulated Doṣa within its respective seat are known as Prakopa. It is known as Vilayana Rūpa Vṛddhi; expansion of the Doṣa through liquification.

1) Chaya prakopa: Here typically doshas undergo Chaya avastha and gradually progress to stage of prakopa when it is not attended in the first stage of pathogenesis
2) Achaya prakopa: In this type of dosha vitiation, the doshas jump directly to prakopa stage without passing through Chaya avastha.

Lakṣaṇa:

Chikitsā: Nidāna parivarjana, Pathya sevana, Hetu viparīta Chikitsā

3. Prasara avastha:

Spreading or overflowing of the aggravated and liquefied Doṣa from its respective seat to other places is known as Prasara. The movement of any Doṣa occurs due to Vāta only. The Doṣas are travelling through Srotas in different directions; Ūrdhva Adho Tiryak.

Bheda: - 15

- Single Doṣa → 4
- Two Doṣas → 6
- Three Doṣas → 4
- Four Doṣas → 1

Chikitsa: Nidāna parivarjana, Pathya sevana, Hetu-liṅga Chikitsā
The principle of treatment at this stage is to correct/repair the Āshaya into which the Doṣa has spread.

Lakshana	Sanchaya	Prakopa	Prasara
Vatta	Stabdha Koṣṭhatā, Pūrṇa Koṣṭhatā	Koṣṭha Toda, Sañcharaṇa (gurgling sound)	Vāyu-vimargagamana, Āṭopa
Pitta	Pīta aṅga varṇa	Amlodgāra, Pipāsā, Paridāha	Oṣachoṣa (burning, sucking pain due to heat), Paridāha, Dhūmāyana (sensation of smoke coming from mouth)
Kapha	Mandoṣmatā, Aṅga gaurava, Ālasya	Annadveṣa, Hṛdaya Utkleda (heaviness of the chest)	Arochaka, Avipāka, Aṅgasāda, Chardi

4. Sthana Samshraya

Localization of the spreading Doṣa at a place where there is obstruction of Srotas and Khavaiguṇya is known as Sthānasaṁshraya.
This is known as Doṣa-Dūshya Samūrchana.

Bheda:

1. Udaragata → Gulma, Vidradhi, Udararoga, Agnimāndya, Vibandha, Ānāha, Visūchikā, Atisāra, Pravāhikā, Vilambikā, etc.
2. Bastigata → Prameha, Ashmarī, Mūtrāghāta, Mūtradoṣa, etc.
3. Meḍhragata → Niruddhaprākaṣa, Upadaṁsha, Shukradoṣa, etc.
4. Gudagata → Bhagandara, Arsha, etc.
5. Vṛṣaṇagata → Vṛṣaṇa vriddhi, Shopha, etc.
6. Ūrdhvajatrugata → Ūrdhvajatrugata Vikāra (Shiroroga, Mukharoga, Netraroga, Karṇaroga, Nāsaroga, etc.)
7. Tvak-Māṁsa-Shoṇitagata → Kṣudraroga, Kuṣṭha, Visarpa, etc.
8. Medogata → Granthi, Apachī, Arbuda, Galagaṇda, Alaji, etc.
9. Asthigata → Asthi vidradhi, Asthimajjagata Vāta, etc.
10. Pādagata → Shlīpada, Vātarakta, Vātakaṇṭaka, etc.
11. Sarvāṅgagata → Jvara, Vātavyadhi, Pāṇḍu, Shoṣa, etc.

Lakṣaṇa: Pūrvarūpa and mild Rūpa of the respective disease are seen.

Chikitsā: According to involved Doṣa, Dūshya or both

5. **Vyakta avastha:**

Manifestation / Appearance of main symptoms of the disease occurs in Vyakti Avastha.

Lakshana: Cardinal signs and symptoms of the disease are clearly expressed.

Examples सन्तापलक्षणो ज्वरः

सरणलक्षणोअतिसारः

पूरणलक्षणमुदरमिति

Chikitsa: Vyādhi pratyanīka Chikitsā (according to the respective disease)

6. **Bheda avastha:**

Bheda Avasthā is the final stage which manifests due Dīrgha-kāla-anubandha (chronic presence of the disease) by neglecting the disease in its previous stages or improper treatment. The aggravated Doṣa are deeply rooted and highly aggravated.

The disease which has reached Bheda Avastha is very difficult to manage, will likely develop complications and may even become incurable.

Treatment according to avastha:

Sanchaya, Prakopa, Prasara → Dosha chikitsa
Sthanasamshraya → Dosha-dushaya chikitsa
Vyakta → Vyadhipratyanika chikitsa
Bheda → Upadrava, Nidanarthaka roga, Arista chikitsa

Conclusion:

Early diagnosis of a disease forms the key to unravel the secrets of effective and comprehensive treatment. A physician who thoroughly know and learns the shat kriya kala will be able to not only make a proper and accurate diagnosis of disease but also will be able to detect the disease at its earliest.

2. Nirukti, Nidana, Samprapti, Prakara, Lakshana, Sadhya-asadhyata, Upadrava and Chikitsa of the following disorders.

I. Vrana Shotha/Shopha – Inflammation

Definition:
Shopha is a localised swelling in a part of body involving Tvak and Māṁsa which may be even or uneven, massive and knotty in consistency.

Samprapti:
Nidana sevana → Vitiation of vata → Displacement of vitiated Pitta, Kapha & Rakta to the srotas → Vata is obstructed by circulating doshas → Accumulation of Pitta, Kapha & Rakta between twak and mamsa → Shotha

Bheda: (Ā. Sushruta)

1. Vātaja	3. Kaphaja	5. Sannipātaja
2. Pittaja	4. Raktaja	6. Āgantuja

Sāmānya Lakṣaṇa:
Gaurava, Anavasthita (unstable), Utsedha (elevated/swollen), Uṣmā, Sirātanutva, Lomaharṣa, Aṅgavivarṇatā

Visheṣa Lakṣaṇa:
1. Vātaja → Kṛṣṇa-Aruṇa, Paruṣa, Mṛdu, Anavasthita, Toda, Vedanā
2. Pittaja → Pīta-Sarakta, Mṛdu, Shīghra anusāra (fast spreading), Oṣa, Choṣa
3. Kaphaja → Pāṇḍu, Kaṭhina, Snigdha, Shīta, Manda anusāra, Kaṇḍū
4. Raktaja → Smiliar to Pittaja Lakṣaṇa; colour tends to be more dark
5. Sannipātaja → Tridoṣa Lakṣaṇa
6. Āgantuja → Similar to Pittaja Lakṣaṇa; colour tends to be more reddish

Vraṇashotha Avasthā:
1. Āmāvasthā (stage of minor tissue damage)
2. Pachyamānāvasthā (stage of acute inflammation)
3. Pakvāvasthā (stage of pus formation)

1. Āmāvasthā Lakṣaṇa

Mandoṣmatā, Shītashophatā, Tvak-savarṇatā, Sthairya, Mandavedanatā, Alpashophatā

2. Pachyamānāvasthā Lakṣaṇa

- Feeling as being pricked by a pin, bitten by ants, cut by a sharp instrument, hit by rod, pressed by hands, rubbed by fingers, burnt by Agni or Kṣāra
- Oṣa Choṣa Paridāha
- Pain like being stung by a scorpion

- No relief in sitting or lying position
- Gradually increased swelling
- Discolouration of the skin
- Jvara, Dāha, Pipāsā, Aruchi

3. Pakvāvasthā Lakṣaṇa
- Increased severity of pain
- Pallor, decreased swelling Pāṇḍutā, Alpashophatā
- Appearance of wrinkles, crackling of the skin
- Feeling the pus in the swelling like movement of water in a filled urinary bladder
- When it is pressed on one side, pressure is felt on another site
- Repeated pricking pain, itching and elevation of swelling
- Decrease of complications
- Increased appetite

Shopha Upadrava: Chardi, Hikkā, Shvāsa, Kāsa, Aruchi, Tṛsṇā, Jvara, Atisāra, Daurbalya

Chikitsā:

1. **Saptopakrama**

a. Vimlāpana (Rubbing/Squeezing/Pressing)
b. Avasechana (Bloodletting)
c. Upanāha (Application of poultice)
d. Pāṭana (Draining/Incising)
e. Shodhana (Cleaning)
f. Ropaṇa (Healing)
g. Vaikṛtāpaha (Repairing the scar)

Āmashotha → Vimlāpana, Avasechana, Upanāha
Pakvashotha → Pāṭana
Vraṇa Chikitsā → Shodhana, Ropaṇa, Vaikṛtāpaha

2. **Ekādashopakrama**

a. Apatarpaṇa (Fasting)
b. Ālepa (Application of paste)
c. Pariṣeka (Irrigation)
d. Abhyaṅga (External oleation)
e. Svedana (Fomentation)
f. Vimlāpana (Rubbing/Squeezing/Pressing)
g. Upanāha (Application of poultice)
h. Pāchana (Inducing suppuration)
i. Visrāvana (Bloodletting/Draining)
j. Snehana (Internal oleation)
k. Shodhana (Vamana & Virechana; Emesis & Purgation)

INFLAMMATION

Inflammation is the immune system's natural response to injury and illness. It helps in removing or neutralizing the cause of injury, to draw more blood to the area, to increase the body's defence mechanism, to remove necrotic cells, and enhance repair.

1. Acute

Acute inflammation is typically caused by injuries, like a sprained ankle, or by illnesses, like bacterial infections and common viruses. The acute inflammation process happens quickly and can be severe.

Signs & Symptoms:

- Calor (heat due to arterial dilatation)
- Dolor (pain by swelling and irritation of local nerves)
- Rubor (redness due to increased blood flow and temperature)
- Tumour (swelling due to increased permeability)
- Loss of function

Depending on the cause and severity of the wound, acute inflammation can last from a few days to a few months.

Sometimes acute inflammation is localized to one area, and sometimes it is systemic. When the body identifies a harmful invader, such as a bacteria or virus, it initiates a whole-body immune response to fight it off. White blood cells trigger the release of several inflammatory chemicals.

2. Chronic:

Chronic inflammation is also referred to as slow, long-term inflammation lasting for prolonged periods of several months to years. Generally, the extent and effects of chronic inflammation vary with the cause of the injury and the ability of the body to repair and overcome the damage.

Conditions associated with chronic inflammation include:
High blood pressure, High cholesterol, Kidney disease, Various types of cancer, Depression, Neurodegenerative disorders (like Alzheimer's disease), Autoimmune disorders, Osteoporosis, Fatty liver disease

Chronic inflammation often progresses quietly, with few independent symptoms. Despite its subtlety, chronic inflammation represents a major threat to the health and longevity of a large population of individuals.

Factors which cause Chronic Inflammation:

- Physical inactivity
- Obesity
- Diet
- Smoking
- Low sex hormones
- Stress
- Sleep disorders
- Age

II. Vidhradi - Abscess

Definition:

शीघ्रविदाहित्वाद्विद्रधीत्यभिधीयते|| (Cha. Su. 17/95)

One which undergoes stage of suppuration is called vidradhi.
Vidradhi is a swelling due to collection of pus within the tissues.

Nidāna:

- Guru-Asātmya-Viruddha-Shuṣka-Saṁsṛṣṭa-Vidāhi Āhāra
- Ativyavāya, Ativyāyāma, Vega vidhāraṇa
- Rakta prakopa Nidāna; Ātapa, Agni, Kṣāra, etc.

Samprapti:

Nidana sevana → Dosha around asthi will get vitiated → Contamination of twak, rakta, mamsa & meda → production of swelling which will get bigger in size and hard in consistency → vidradhi

Types:

1. Bahya vidradhi
2. Abhyantara vidradhi

Bahya vidradhi	**Abhyantara vidradhi**
1. Vataja 2. Pittaja 3. Kaphaja 4. Raktaja 5. Tridoshaja 6. Kshataja	1. Guda 2. Bastimukha 3. Kloma 4. Nabhi 5. Kukshi 6. Vankshana 7. Vrukka 8. Yakrut 9. Pleeha 10. Hrudaya

Sāmānya Lakṣaṇa:

- Mahāmūla (deeply rooted)
- Rujāvanta (associated with pain)
- Vṛtta (rounded in shape)

Visheṣa Lakṣaṇa:

1. Vātaja Vidradhi

- Kṛṣṇa-Aruṇa varṇa
- Paruṣa, Atyartha Vedana
- Viṣamasaṁsthiti (uneven swelling; increases & decreases)
- Chitra Utthāna Pāka (develops and suppurates in a variable manner)
- Tanu srāva

2. **Pitaja Vidradhi:**

- Rakta-Tāmra-Shyāva varṇa
- Jvara, Dāha, Tṛṣṇā
- Kṣipra Utthāna Paka (develops and suppurates quickly)
- Pīta srāva

3. **Kaphaja Vidradhi:**

- Pīta-Shveta varṇa
- Shīta, Stabdha, Alpavedana, Kaṇḍū, Hrillāsa, Jṛmbha, Aruchi, Gurutva
- Chira Utthāna Pāka (develops and suppurates slowly)
- Pāṇḍu srāva

4. **Raktaja vidradhi:**

- Kṛṣṇa Sphoṭa (Vidradhi is surrounded by black-coloured blisters)
- Shyāva varṇa
- Tīvradāha, Ruja, Jvara
- Pittaja Vidradhi Lakṣaṇa

5. **Tridoshaja vidradhi:**

- Nānā-Varṇa-Ruja-Srāva (various colours, pains and discharges)
- Viṣama (irregular shaped, uneven)
- Mahān (large in size)
- Viṣama pachyate (irregular in ripening)

6. **Kshataja vidradhi:**

When the body is injured, the person who indulges in Apathya Āhāra Vihāra, the heat of the wound gets dispersed by Vāta, which will vitiate Rakta and Pitta, and gives rise to Jvara, Tṛṣṇā, Dāha and other symptoms of Pittaja Vidradhi.

Abhyantara / Aantar vidradhi:

Samprapti:

Nidana sevana (Indulging in food which is hard for digestion, unaccustomed, dry and unhealthy; excessive copulation, physical exercise and suppression of urges) → Doshas get vitiated singly or in combination → Give rise to an abscess in abdomen resembling shape as gulma or valmika (an ant hill).

Symptoms:

1. Guda → Vātanirodha
2. Bastimukha → Kṛcchra-Alpa Mūtratā
3. Kloma → Adhikā Pipāsā
4. Nābhī → Hikkā, Āṭopa
5. Kukṣi → Māruta prakopa
6. Vaṅkṣaṇa → Kaṭī-Pṛṣṭha Tīvragraha
7. Vṛkka → Pārshva saṅkocha
8. Yakṛt → Shvāsa, Tṛṣṇā
9. Plīhā → Ucchvāsa avarodhana
10. Hṛdaya → Sarvāṅga Tīvragraha

Sadhya asadhyata:

- That abscess which is located on marmas is difficult to treat, irrespective of apakva or pakva avastha, big or small size.
- Abscess situated in organs above the umbilicus. when ripe and burst expel the exudate in the upward route through the mouth, then the patient does not survive.
- Abscess situated in the organs below the umbilicus when ripe and burst expel the exudate in the downward route through the rectum then the patient survives.
- Those abscesses developing in the organs other than the hrudaya, nabhi and basti. when ripe and burst expel the exudate to the exterior Then the patient survives some time and sometime not.

Chikitsā:

Jalaukāvachāraṇa, Mṛdu Virechana, Laghu Anna, Svedana

Āmāvasthā → Shopha Chikitsā & Raktamokṣaṇa
Pakvāvasthā → Pāṭana & Visrāvaṇa, afterwards Vraṇa Chikitsā

External application:

- Āmāvasthā → Yavādi lepa (Yava, Godhūma, Mudga)
- Vātaja Vidradhi → Thick and lukewarm Kalka prepared from Vātaghna Dravya added with profuse Sneha (Taila or Ghṛta), Shigru mūla Upanāha for Vātaja Vidradhi
- Pittaja, Raktaja and Kṣataja Vidradhi → Lepa prepared from Sārivā, Lākṣā, Madhuka and Sharkara or from Payasya, Ushīra and Chandana, pounded with Kṣīra
- Kaphaja Vidradhi → Iṣṭikā-Sikatā-Lauha-Goshakṛt Svedana or Kalka with Uṣṇa Mūtra

Internal medications:

- Apakva Antar Vidradhi → Kvātha prepared from Shveta Punarnavā and Varūṇa
- Vātaja Vidradhi→ Punarnavādi kvātha (Punarnavā, Devadāru, Shuṇṭhī, Dashamūla, Harītakī, Guggulu, Eraṇḍa taila)
- Pittaja, Raktaja & Kṣataja Vidradhi → Triphalā kvātha with Trivṛt
- Kaphaja Vidradhi → Triphalādi kvātha (Triphalā, Shigru, Varūṇa, Dashamūla, Guggulu, Gomūtra)

ABSCESS

An abscess is a collection of pus within the tissue. It is a painful condition which can develop anywhere in the body.

Abscesses usually form because of an infection or because a foreign object becomes trapped in the body. When the body fights an infection or tries to destroy a foreign object trapped inside, white blood cells fill the affected tissues, and the resulting fluid is called pus. Pus contains living and dead bacteria, living and dead white blood cells, and the remnants of the cells and tissue that were killed or injured by the infection or by your body’s immune response.

Etiology:

- Foreign object trapped inside the body, such as a thorn or piece of metal that breaks off in the skin; also, retained foreign body fragments after previous attempted removal
- Infected diverticulum in the large intestine can cause a diverticular abscess
- Infection at the site of previous surgery (perioperative wound contamination)
- Skin infection may result in an abscess
- Tooth infection may progress to a periodontal abscess
- Wound or trauma to the skin, especially a puncture wound, may cause an abscess

Types:

1. Pyogenic abscess
2. Pyemic abscess
3. Cold abscess

1. Pyogenic abscess:

- Commonly seen, usually produced by staphylococcal infection
- May result from cellulites or acute lymphadenitis.
- May entry through soft tissues by-external wound-minor or major.
- May also be due to haematogenous spread from a distant focus such as tonsillitis, carries etc.
- Occur subcutaneous. deep within the viscera such as liver, kidney etc.,

Cardinal features:

1. Calor (Heat)
2. Rubor (Redness)
3. Dolor (Pain)
4. Tumor (Swelling)
5. Loss of function
6. Fluctuation can be elicited. However, in a deep-seated abscess it may be negative.
7. Fever, chills, rigors with browny induration

Treatment:

- When pus is not localized → Conservative treatment with suitable antibiotic.
- Where pus localized → let it out i.e., Drainage.
- Send the pus for culture & sensitivity.
- Give specific antibiotic.

Drainage of pus:

- A stab incision is made liberally over the most prominent part & dependent part of an abscess- so gravity helps drainage.
- Important structures like nerves / vessels — incision should be parallel.
- The incision should be passes through skin, subcutaneous tissue & deep fascia. Muscle must be incised along the line of fibers.

Hilton's Method of Incision and Drainage:

The method of opening an abscess ensures that no blood vessel or nerve in the viscinity is damaged.

1. Topical anesthesia is achieved with the help of ethyl chloride spray.
2. Stab incision made over a point of maximum fluctuation in the most dependent area along the skin creases, through skin and subcutaneous tissue.
3. If pus is not encountered, further deepening of surgical site is achieved with sinus forceps (to avoid damage to vital structures).
4. Closed forceps are pushed through the tough deep fascia and advanced towards the pus collection.
5. Abscess cavity is entered and forceps opened in a direction parallel to vital structures.
6. Pus flows along sides of the beaks.
7. Explore the entire cavity for additional loculi.
8. Placement of drain: A soft yeat's or corrugated rubber drain is inserted into the depth of the abscess cavity; and external part is secured to the wound margin with the help of suture.
9. Drain is left for at least 24 hours.
10. Dressing is applied over the site of incision taken externally without pressure.

2. Pyaemic abscess:

- This is due to pus-producing organisms in the circulation due to infected emboli.
- The are multiple, deep seated, tenderness is minimal. Local rise in temperature is not present. Hence it is called non-reactive abscess to differentiate it from pyogenic abscess.
- This is treated by multiple incisions over the abscess site and drainage with antibiotic cover.

3. Cold abscess:

- Usually, cold abscess is due to tuberculosis.
- There are no signs of acute inflammation, so it is cold and non-reacting in nature.
- Commonest sites → the neck and axilla.
- Other chronic diseases like leprosy, actinomycosis, etc. also produce cold abscess.

Treatment:

- Non-dependent aspiration by using a wide bore needle to avoid a persistent sinus.
- Incision and drainage should not be done as it causes persistent tuberculous sinus.
- Anti-tubercular treatment is given.

III. Pidika - Boils

Definition:
It is hair follicle infection caused by bacterium staphylococcus aureus, resulting in painful swollen area on skin caused by accumulation of pus and dead tissues, often boils opens on its own and subsides.

Carbuncles: Individual boils clustered together are called as carbuncles.

Risk factors:

- Bacterial carriage in the nostrils
- Diabetes mellitus
- Obesity
- Malnutrition
- Use of immunosuppressive drugs
- Familial and poor hygiene

Clinical features:

- Boils are bumpy, red, pus-filled lumps around a hair follicle
- They are tender, warm and very painful
- Range from pea-sized to golf ball-sized
- After 1-2 days yellow or white point at the center of lump can be seen when boil is ready to drain or discharge pus.
- In severe infection, individual may experience fever, swollen lymph nodes and fatigue.

Site:
Buttocks, near anus, back, neck, stomach, chest, arms, legs and ear
Boils appear around the eye is called as Stye
Boil on gum is called Gumboil

Complications:
Lymphadenitis
Cellulitis, folliculitis
Hydradenitis

Treatment:
Incision and drainage with excision of slough
Application of warm moist compress, both before and after a boil opens, can help speed healing.
Area must be clean, hands washed after touching it
Antibiotics

Carbuncle:
In ayurveda corelated with Prameha pidika

Definition:
It is an infective gangrene of the subcutaneous tissue due to staphylococcus aureus infection.
Site:
Carbuncles are mostly seen on the back, in the nape of the neck, hairy chest & abdomen may also be involved.
Pathology:
When the invading staphylococci penetrate the deeper layers of the skin & the subcutaneous fat, a carbuncle is formed.
Risk factors:
Males above 40 years
Diabetic
Clinical features:
Skin becomes red, dusky & edematous. The central part softens and multiple vesicles appear on the skin. Vesicles transform into pustules → pustules burst → discharge → sieve like appearance → cribriform appearance

IV. Nadi Vrana - Sinus / Fistulae

Nāḍīvraṇa:
Vraṇa which has been become chronic, due to improper management or negligence of management, is called Nāḍīvraṇa.

Nidāna:
- Mismanagement of Vraṇa by mistaking Apakva Avasthā for Pakva Avasthā
- Ignoring Pakva Avasthā and not treating it
- Excessive accumulation of pus, which then enters into the deeper tissues involving Tvak, Mamsa, Sirā, Snāyu, Sandhi, Asthi, Marma, etc.

Bheda: (Ā. Vāgbhaṭa)
1. Vātaja
2. Pittaja
3. Kaphaja
4. Sannipātaja
5. Āgantuja/Shalyaja

Lakṣaṇa:
1. Vātaja Nāḍīvraṇa

- Paruṣa, Sūkṣmamukhī, Sashūla
- Discharge with excessive foam which occurs at night

2. Pittaja Nāḍīvraṇa

- Tṛṣṇā, Tāpa, Toda, Sadana, Jvara, Bheda (tearing sensation)
- Yellowish and excessive hot discharge which occurs during the day

3. Kaphaja Nāḍīvraṇa

- Bahu, Ghana, Stimita, Ruk, Kaṭhina, Sakaṇḍū
- Whitish and slimy discharge which occurs at night

4. Sannipātaja Nāḍīvraṇa

- Dāha, Jvara, Shvasana, Mūrcchna, Vaktra shoṣa
- Tridoṣa lakṣaṇa

5. Āgantuja/Shalyaja Nāḍīvraṇa

Shalya remaining inside the body causes Nāḍīvraṇa quickly. Its discharge comes out suddenly along with foam. It is serosanguineous (discharge that contains both blood and a clear yellow liquid known as blood serum), hot, and associated with continuous pain.

Sādhyāsādhyatā:

- Ekadoṣaja & Shalyaja Nāḍīvraṇa → Kṛcchrasādhya
- Sannipātaja Nāḍīvraṇa → Asādhya

Chikitsā:

- Nāḍīvraṇa has to be probed, incised and opened, after which it is cleaned, and measures to promote healing are applied.
- Vātaja Nāḍīvraṇa → Upanāha, Pāṭana, Pūya visrāvaṇa, Kalka made from Apāmārga, Tila & Saindhava lavaṇa
- Pittaja Nāḍīvraṇa → Pāṭana followed by application of Kalka made from Mañjiṣṭha, Nāgadantī, Haridrā and Dāruharidrā.
- Kaphaja Nāḍīvraṇa → Pāṭana followed by application of Kalka made from Tila, Saurāṣṭriī, Nikumba, Ariṣṭa and Saindhava lavaṇa.
- Shalyaja Nāḍīvraṇa → Pāṭana followed by extraction of Shalya, Vraṇa shodhana, application of Kalka made of Tila, Madhu and Ghṛta.

Internal medicines:

- Rāsnādi Guggulu, Panchatikta Ghṛta Guggulu
- Āragvadhādi Varti, Jātyādi Varti
- Jātyādi Ghṛta, Saindhavādhya Taila

Varti:

Varti made up of mixture of ghonataphala twak, lavana, laksha, pugiphala, alavana patra in snuhi ksheera is used.

Ksharasutra chikitsa:

Indications:

In persons who are emaciated, weak, frightful and if ulcer is present in vital organs, the wise physician should treat the sinus by ksharasutra and not using shastras.

Method of application:
The nadivrana is probed with the help of eshana yantra, then introduced the needle (blunt part) having the ksharasutra till the end of Nadivrana is reached, the needle is then lifted up, where there is a prominent pit or a small incision is taken at the other end to convert sinus in to fistula and the end (front tip) of the thread is pulled out and tight knot tied. After considering the strength of kshara, another thread smeared with kshara may insert (After removing the first one by rail road method) by physician till the Nadivrana gets cut.

SINUS

Sinus means 'hollow or a bay' in Latin. It is a blind track lined by granulation tissue leading from epithelial surface into surrounding tissues.

Classification of Sinus:

1. Congenital – like preauricular sinus
2. Traumatic – sinus occurs following a trauma in which a foreign body is implanted into deep tissue and infection occurs
3. Inflammatory – like osteomyelitic sinus, tuberculous sinus, actinomycotic sinus
4. Neoplastic – sinus occurs due to degenerative changes of malignant growth or due to secondary infection of malignant growth which was incised for drainage.
5. Miscellaneous – like Pilonidal sinus

Causes:

1. Presence of foreign body or necrotic tissue (like sequestrum or suture material) in the depth
2. Repeated trauma
3. Nondependent drainage or inadequate drainage of abscess
4. When a specific chronic infection (like T B, actinomycosis) is the cause
5. Prescence of malignant disease
6. Lack of rest in post operative period.

Signs & Symptoms:

Discharges from the opening of the sinus, such as pus, caseating material, bone spicules, sulphur granules, etc.
Pain
Edge is raised and often indurated
Sprouting granulation tissue over the sinus opening often occurs

Local Examination:

1. Inspection

a. Number → single or multiple sinuses
b. Position → Pilonidal sinus in sacrococcygeal region, TB sinus in the neck
c. Opening → Sprouting granulation tissue at the opening suggests presence of foreign body at the depth.
   The opening of TB sinus is often wide and the margin is thin.
d. Discharge
e. Surrounding skin

2. Palpitation
a. Tenderness → Sinus from inflammatory source will be tender
b. Wall of sinus → To check thickening of the wall which is seen in chronic cases
c. Mobility → Sinus fixed to a bone in osteomyelitis is immobile
d. Lump → Presence of a lump in the surrounding area indicates tubercular lymphadenitis

3. Probe examination
a. The direction and depth of sinus is examined
b. Presence of any foreign body
c. Evaluation of discharge (fresh or not) which comes out upon withdrawal

Investigation:
1. Discharge: Culture and sensitivity
2. X-ray, ESR, MRI
3. Biopsy from edge of sinus

Treatment:
1. Treat the cause
2. Removal of foreign body if present
3. Excision of sinus track
4. Antibiotics
5. Analgesics if excessive pain is present
6. Proper dressing

V. Vrana Granthi - Keloid / Hypertrophic scar

Vrana granthi:
Healed wound/healing patient → Follows apathy/injury/wound devoid of bandage → Vata prakopa → Rakta shoshana in vrana → Kandu, dahayukta utsedha (Lakshana) → Vrana granthi

It is complication of wound.
Krichra Sadhya
Treatment is chedana followed by agnikarma.
Re-occurred after chedana also.

KELOID

Means like a claw.
Keloid is a result of over growth of granulation tissue at the site of healing ulcer. It is clinical condition characterized by proliferation of immature fibroblast and immature blood vessels on the top of scar.

Risk factors:

- Common in blacks & in females
- Genetically predisposed
- Often familial (like TB)

Cause: KELOID

Key factors: Surgery, burns
Elevated level of growth factor
Laceration or abrasion
Over the sternum (incision)
Inheritance and injection
Deep pigmented skin

Types:

According to presence of capsule

1. No capsule (Claw like process)
2. Surrounded by capsule

According to mode of origin

1. Acquired (Wo burns or surgical incision)
2. Congenital (Usually occurs in Butterfly chest)

Pathology:

It contains proliferating immature fibroblasts, proliferating immature blood vessels & type III thick collagen stroma.

Common sites:

- Over sternum
- Other sites are upper arm, chest wall, lower neck in front

Sign & Symptoms:

- A localized area that is flesh-colored, pink, or red
- A lumpy or ridged area of skin that is usually raised
- An area that continues to grow larger with scar tissue over time
- An itchy patch of skin
- While keloid scars may be itchy, they are usually not harmful to health. One may experience discomfort, tenderness, or possible irritation from clothing or other forms of friction.

Treatment:

1. Irradiation
2. Excision & irradiation
3. Excision & skin grafting
4. Vit A 5000 I.U per week
5. Vit E or palm oil massage
6. Steroid injection:

- Intrakeloidal triamcilone (synthetic steroid) at regular intervals, may be once in 7-10 days of 6-8 injections
- Inj hydrocortisone 100 mg locally

7. Steroid inj - excision - steroid inj
8. Laser therapy
9. Cryosurgery

Complication:

- Cosmetically ugly
- Infection
- Suppuration
- Ulceration

Keloids vs. Hypertrophic Scars:
Keloids are sometimes confused with another more common type of scar called hypertrophic scars. These are flat scars that can range from pink to brown in color. Unlike keloids, hypertrophic scars are smaller, and they can go away on their own over time.

Hypertrophic scars occur equally among genders and ethnicities, and they are commonly caused by various forms of physical or chemical injuries.

At first, fresh hypertrophic scars can be itchy and painful, but the symptoms subside as the skin heals.

VI. Marmagata - Shock

A shock is a condition of acute circulatory failure.
It is characterized by prolonged hypotension leading to inadequate tissue perfusion.
All forms of shock result in reduction of effective blood flow (hypoperfusion). It leads to reduced delivery of oxygen and nutrients, and further, dysfunction of cells.

Causes:

1. Excessive blood loss in short period as in operations, APH, DUB fracture injuries etc.
2. Burns in which there is leakage of plasma through burnt area
3. Fatigue, starvation etc.
4. Sudden fright, fear, anxiety, injury to vital parts like testes, lower abdomen etc.
5. Fear, terror etc.
6. Nervous patients are most likely to get neurogenic shock duo to minor incidence of fear, ghastly scenes etc & after operation

General Features:

- Pale, cold and moist skin
- Fast, thready pulse
- Shallow respiration
- Decreased BP
- Oliguria

Types:

1. Hypovolemic shock:

Hypovolemia is total decease in blood or fluid volume.
It may be caused due to severe haemorrhage, fluid loss due to vomiting and diarrhoea, burns, dehydration.
Management:
Arrest bleeding, IV fluids, Oral rehydration, Treat underlying causes

2. Obstructive shock:

It may be caused due to obstruction within veins, compression of heart or pressure on vessels.
Management:
Heparin, Thrombolysis, Pericardiocentesis, Chest decompression, Chest drainage

3. Cardiogenic shock:

It is caused due to decreased cardiac output due to myocardial infarction, valve dysfunction, dysrhythmias, cardiomyopathy, cardiac failure.
Management:
Early thrombolysis, Valve replacement surgery, Correction of dysrhythmias

4. Neurogenic shock:

It is the result of autonomic dysregulation following spinal cord injury, usually secondary to trauma. This dysregulation is due to a loss of sympathetic tone and an unopposed parasympathetic response.
Management:
IV fluids, Vasopressors (norepinephrine, epinephrine, dopamine, vasopressin), Atropine

5. Allergic shock:

It is caused due to hypersensitivity manifesting as a shock; Anaphylaxis.
Management:
Epinephrine, Adrenaline, Chlorphenamine, Hydrocortisone, Bronchodilators, Oxygen, Fluids, Prevention

6. Septic shock:

It is caused due to sepsis in the body at any site. It leads to organ hypoperfusion, further to multi-organ failure, resulting in acute respiratory distress syndrome.
Management:
Initial resuscitation, Antibiotics, Identification of exact cause, Vasopressors, Inotropic therapy

General Management:

- Establish and maintain clear airways
- Ensure adequate ventilation
- Adequate intravenous access
- Continuous cardiac monitoring
- Urinary catheter
- Recording of fluid balance
- Centra venous monitoring
- Maintain optimum temperature
- Acid-base balance assessment
- Treatment of underlying disorder

Ayurvedic management of shock:

- Cold water to be sprinkled and to be given internally. It acts as hradhya and murcha nashaka
- Make patient to lie down in taila droni with medicated oil like maha narayana tail& lashunadi taila etc in low temperature & himsagara taila in high temperature
- Jatamamsi taila & susupti taila for pain
- Mamsa rasa pana as bramhana
- Badira patra rasa lepa all over body to control dehydration (B.R)
- Suchimukha rasa or suchika bharana rasa
- Mrutsanjeevani sura or mrutotpaan rasa (B.R)
- Rectal drip of narikela udaka
- Take swastika shaped incision on scalp & touch bleeding point with needle tip dipped in medicine like Suchimukha rasa or sutika bharana rasa

VII. Kotha – Gangrene and Principles of Amputation.

Gangrene is type of necrosis caused by critically insufficient blood supply.
Definition:
Gangrene is macroscopic death of tissue with super added putrefaction.

Causes:

- Atherosclerosis
- Raynaud's disease
- Hemiplegia
- Bed sore
- Thrombosis
- Crushing injuries

Risk factors:

- Smoking
- Obesity
- Diabetes
- Hypertension
- Excessive alcohol

Clinical features:

- Loss in the affected body part. Area will become discolored and eventually turn dry and dark.
- Shiny appearance of skin and the shedding of skin with clear line of demarcation between affected and healthy skin.
- Pain that is later followed by loss of sensation and inability to move
- Foul smelling discharge leaking from sore

Signs: 5L

- Loss of pulsation
- Loss of colour (Pallor, Dusky grey, Mottled, Purple, Dark brown and Black)
- Loss of temperature
- Loss of sensation
- Loss of function.

Types:

1. Dry Gangrene
2. Wet Gangrene

Dry gangrene:

- It occurs when tissue gradually die owing to gradual slowing down of blood flow, which typically occurs as a result of atherosclerosis.
- Affected part become dry, wrinkled, and discolored
- There is definite bright red line of separation appears between living and dead tissues
- The early signs are a dull ache and sensation of coldness in affected area.

Wet gangrene:

Wet gangrene is gangrene due to necrotising bacterial infections. The site becomes swollen, discoloured and blebs may manifest. Wet gangrene may lead to cellulitis, loss of extremity, septicemia, and death.

Difference between dry and wet gangrene:

Features	**Dry Gangrene**	**Wet Gangrene**
Cause	Slow occlusion of blood vessels	Sudden occlusion
Disease (cause)	Arthrosclerosis, Diabetic gangrene	Long standing venous thrombosis, bed sores etc.
Infection	Not present	Usually, present
Part involved	Small area is gangrene	Large area is affected due to absence of collateral circulation
Line of demarcation	Present (Bright red)	Vague / Unclear
Local findings	Dry, shriveled, mummified	Wet, turgid, swollen, edema
Crepitus	Absent	May present
Odour	Absent	Foul odour due to sulphurated hydrogen produced by putrefactive bacteria.
Treatment	Conservative amputation	Major amputation

Treatment:

1. Cause is treated, diabetes is controlled
2. Drugs: Antibiotics, vasodilators, pentoxiphylline, praxiline, small dose of aspirin.
3. Care of feet and toes:

- Part must be kept dry (Dry gangrene as dry as possible and try to convert moist gangrene in to dry one) and elevated to reduce pain
- Any injury must be avoided
- Proper footwear is advised
- Measures for pain relief is taken
- Limb should not be warmed
- Pressure areas must be protected like heel etc.
- Localized pus must be drained

4. Hyperboric oxygen therapy (HBOT) is used to treat gas gangrene.
5. Surgeries to improve limb perfusion
- Lumbar sympathectomy
- Omentoplasty
- Femoro-popliteal thrombectomy
6. Anticoagulants are administered to prevent blood clotting.
7. Intravenous fluids are administered to replenish electrolytes.
8. Antibiotics alone are not effective because they do not penetrate ischemic muscles sufficiently.

Gas gangrene:
Gas gangrene is a highly lethal infection of soft tissue, caused by Clostridium species, with Clostridium perfringens being the most common. This is synonymous with clostridial myonecrosis or myositis and is characterized by rapidly progressive gangrene of the injured tissue along with the production of foul-smelling gas.

Internal gangrene:
This type of gangrene occurs when blood flow to an internal organ is blocked; for example, when the intestines bulge through a weakened area of muscle in the stomach area (hernia) and become twisted. Left untreated, internal gangrene can be deadly.

Fournier's gangrene:
Fournier gangrene is an acute necrotic infection of the scrotum, penis or perineum. It is characterized by scrotum pain and redness with rapid progression to gangrene and sloughing of tissue.

Kotha:
- In Āyurveda, gangrene can be considered as Kotha under Duṣṭa Vraṇa due to Mārgāvaraṇa and Dhātu Kṣaya.
- Pathological probability of gangrene may be accumulation of morbid Kapha and Pitta Doṣa within the channels that the momentum of the Vāta Doṣa in circulation in the channels or impairment of momentum.
- The influence of Mārgāvaraṇa is not limited proximal to the obstruction but distal to the obstruction, the circulation of the nutrients is affected and hence the body part distal to the obstruction is deprived of nutrition and hence suffers from pathology of Dhātu Kṣaya.
- Management includes Kaishora Guggulu, Sañjīvanī Vaṭī and Dashāṅga Lepa.

AMPUTATION

The word amputation is derived from the latin amputare, “to cut away.”

Definition: It is the intentional surgical removal of a limb or body part. It is performed to remove diseased tissue or relieve pain or due to trauma.

Disarticulation: Surgical removal of whole limb or part of the limb through a joint.

Types:

1. Open or guillotine amputation
2. Closed or flap amputation

Indications:

- Congenital or acquired defects
- Gangrene
- Neoplasms
- Trauma
- Circulatory disorders
- Infection

Procedure:

Amputation may be done under general anesthesia or with spinal anesthesia, which numbs the body from the waist down.

When performing an amputation, the surgeon removes all damaged tissue while leaving as much healthy tissue as possible.

General Steps during an amputation procedure:

- Ligation of the supplying artery and vein to prevent haemorrhage
- Muscles are transacted
- Bone is sawed by oscillating saw
- Sharp and rough edges of the bone are trimmed
- Skin and muscle flaps are transposed over the stump
- Distal stabilization of muscle is recommended where the muscle is attached to the bone or its periosteum to allow effective muscle contraction.

Ideal stump:

- Skin flaps should be mobile, sensation intact, no scar
- Muscles are divided 3-5 cm distal to the level of bone resection
- Nerves are gently pulled and cut clearly

VIII. Granthi - Cyst

Circular knotted inflammatory swellings are called as Granthi.

Samprapti:

Nidana sevana → Vata gets vitiated → Along with kapha vitiates mamsa, shonita and meda → produce circular, raised and knotted inflammatory swellings → Granthi

Dosha: Kapha pradhana tridosha

Dushya: Meda, Mamsa & Rakta

Bheda:

Ā. Sushruta = Vātaja, Pittaja, Kaphaja, Medoja, Sirāja

Ā. Charaka = Vātaja, Pittaja, Kaphaja, Medoja, Sirāja, Māṁsaja

Ā. Vāgbhaṭa = Vātaja, Pittaja, Kaphaja, Medoja, Sirāja, Māṁsaja, Raktaja, Asthija, Vraṇaja

Pathyāpathya:
Pathya → Rakta Shāli, Purāṇa Ghṛta, Yava, Mudga, Paṭola, Rakta Shigru, Guggulu
Apathya → Dugdha, Ikṣu, Anūpa Māṁsa, Madhura, Guru, Abhiṣyandi Āhāra

Chikitsā:
Āmāvasthā → Shopha Chikitsā
Pakvāvasthā → Mūlavat Chedana, Agnikarma, Vraṇa Chikitsā

Svarjikādi Lepa (Svarjikā kṣāra, Mūlaka kṣāra and Shaṅkha bhasma) destroys Granthi, Arbuda, etc.
Apakva Granthi not located on Marma should be excised and cauterized. Afterwards, scrapping and application of Pratisāraṇīya Kṣāra is beneficial.

1. **Vātaja Granthi:**

Lakṣhaṇa
Toda, Kṛṣṇa varṇa, Amṛudu (Hard) (similar to a urinary bladder filled with air)
Discharge of serosanguinous fluid in case of rupture.

Chikitsā
- Hiṁsrādi Lepa
- Svedana, especially Upanāha Svedana
- Pakva Granthi should be incised and pus is drained. It should be washed with Kvātha of Bilva, Arka and Narendra.
- Tila bīja ground with Eraṇḍa patra and Saindhava lavaṇa is applied for Vraṇa shodhana.
- Vraṇa ropaṇa is done by application of Taila processed with Kṣīra, Viḍaṅga, Yaṣṭī, Amṛtā.

2. **Pittaja Granthi & Raktaja Granthi:**

Lakṣhaṇa
Dāha, Choṣa, Rakta Sapīta varṇa, Pāka
Discharge of hot blood in case of rupture.
Raktaja Granthi may contain Jantu (worms) and have loss of tactile sensation.

Chikitsā
- Jalaukāvacharaṇa followed by Pariṣeka with Kṣīra-Udaka.
- Madhukādi Lepa (Madhūka, Jambu, Arjuna, Vetasa)
- Shīta Kaṣāya prepared from Kākolyādi Gaṇa mixed with Sharkara.
- Harītakī chūrṇa with Drākṣā svarasa or Ikṣu svarasa
- Pakva Granthi is incised and washed with Kvātha of Vanaspati Dravya
- Vraṇa shodhana by Tila bīja & Madhuka
- Vraṇa ropaṇa by Ghṛta processed with Madhura Dravya

HAEMANGIOMA

Definition:
It is benign vascular tumour composed of increased number of unique endothelial cells that lined blood vessels. It is often called strawberry mark as it looks like the surface of a strawberry.
It appears within the first week of life and grows most rapidly during the first three to six months of life.

Types:

1. Capillary haemangioma
2. Venous or cavernous haemangioma
3. Arterial or plexiform haemangioma

Capillary haemangioma	Venous or cavernous haemangioma	Arterial or plexiform haemangioma
Salmon patch Port wine stain Strawberry angioma	Compressible swelling Non pulsatile Associated with lipoma	Bag of pulsating earthworm Forehead, Scalp

Treatment:

- Mostly it disappears without treatment, leaving minimal to no visible scar
- propranolol (beta blocker): It helps tighten blood vessels and reduce blood flow through them, making haemangiomas become smaller and less red.
- Laser therapy (Pulsed dye laser): It shrivels up blood vessels using heat and light
- Bleomycin injection into haemangioma
- Vincristine (chemotherapy): Required central venous access for administration
- Surgical excision

Salmon patch:
The birthmarks caused by expansion in tiny blood capillaries in babies are called as Salmon patch. When patches occur on face, it is often called as an angel kiss, and when it occurs on the back of neck, it is known as stork bite.
The patches are pink or red, flat, irregularly shaped. On the face they are commonly found between the eyebrows or on one of eyelids. There is no treatment necessary for a Salmon patch. Patches on the face almost go away on their own within a year or two.

3. Kaphaja Granthi:

Lakṣhaṇa:
Shīta, Avivarṇa/Varṇa Tvachat (colour like skin), Alparuja, Atikaṇḍū, Pāṣāṇavat (similar like a stone), Chira vṛddhi
Discharge of white and thick pus in case of rupture.

Chikitsā

- Vamana Virechana, Svedana, Vimlāpana by fingers, iron rods, stones
- Dantīmūlādi Lepa (Dantī, Chitraka, Snuhī, Arka, Guḍa, Bhallātaka, Kāsīsa)
- Surgical excision of Granthi even though it is not Pakva
- Agnikarma

4. Medoja Granthi:

Lakṣhaṇa:
It increases or decreases according to increase or decrease of fat in the body.
Snigdha, Mahān, Alparuja, Atikaṇḍū
Discharge similar like Taila / Ghrita in case of rupture.

Chikitsā:

- Repeated Tāpasvedana with iron
- Pakva Medoja Granthi should be incised and washed with Gomūtra.
- Vraṇa shodhana by Tila bīja, Haratāla, Saindhava lavaṇa, Yava kṣāra, Madhu and Ghṛta
- Vraṇa ropaṇa by Taila processed with Karañja, Guñja, Iṅgudī and Gomūtra

LIPOMA

Definition:
It is a benign tumour arising from yellow fat cells of adult type. It can occur anywhere in the body, so it is often called as "Universal* tumour" or "Ubiquitous tumour".

Types:

1. Encapsulated lipoma (localized): yellowish orange colour
2. Diffuse (Uncapsulated): Seen in palms, head & neck
3. Multiple lipoma:

- Multiple in number.
- More at back, shoulder, & under arm.
- Also called multiple neurolipomatosis.

Histological types of lipoma:

1. Fibrolipoma: Fibrous tissue is mixed with fat, lipoma feels hard
2. Neurolipoma: Painful lipoma because of nerve elements
3. Naevolipoma: Lipoma contains excessive vascularity with telangiectasis of overlying skin

Clinical features:

- Lobular, non-tender swelling
- Slip sign: The edge slips under the palpating finger which is pathognomic sign of lipoma.

- Dimple sign: Fibrous bands connect a lipoma to skin. When the skin is moved, a dimple appears on the skin.
- Pain when nerve compress
- May feel cystic with fluctuation. This is also called pseudo fluctuation because fat at body temperature behaves like fluid.

Treatment: Excision under local or general anesthesia.

5. **Sirāja Granthi:**

Lakṣhaṇa:
Protuberant round, painful & mobile Sirāja Granthi is Kṛcchrasādhya.
Painless, fixed, large situated over Marma is Asādhya.

Samprapti:
Vata gets aggravated → Invades the network of veins, squeezes, constricts and dries up → Give rise to an elevated, quick developing and round swelling of veins, which is non pulsating → Siraja Granthi

Chikitsā:

- Sahachara Taila pāna
- Upanāha with Vātahara Dravya
- Basti karma
- Sirāvyadha

6. **Māṁsaja Granthi:**

Lakṣhaṇa
Snigdha, Mahānta, Kaṭhina, Sirānaddha (network of veins), Kaphākṛti (symptoms of aggravated Kapha)

Chikitsā: Chedana, Rakta stambhana, Agnikarma

FIBROMA

Definition: It is benign tumour, consisting of fibrous tissue.

Features:

1. Soft fibroma: Less fibrous tissue, seen on face as brown swelling
2. Hard fibroma: More fibrous tissue, seen on palm and sole

Neurofibroma: Fibroma mixed with nerve fibers
Fibrolipoma: Fibroma mixed with fat
Myofibroma: Fibroma mixed with muscle fibers
Angiofibroma: Fibroma mixed with blood vessels

Treatment: Excision

7. **Asthija Granthi:**

Protuberant or depressed Granthi developing after a fracture or trauma. It may cause displacement of bones. Asthija Granthi is Asādhya.

OSTEOMA

Definition:

- It is a new piece of bone usually growing on another piece of bone, typically the skull. It is a benign tumour. It is sessile, flattened and bony hard in consistency.
- It is not adhered to overlying fascia, muscles and tendons but fixed to the underlying bone.
- Homoplastic osteoma: When bone tumour grows on another bone.

Treatment: Excision

8. **Vraṇaja Granthi / Vraṇa Granthi:**

Vraṇa Granthi is a complication of a healing wound. It occurs when during the healing process the patient follows Apathya Āhāra Vihāra, gets injured or the wound is not properly treated/bandaged. Vāta prakopa occurs, leading to Rakta shoṣaṇa in the Vraṇa causing Vraṇa Granthi with Lakṣaṇa such as Kaṇḍū, Dāhayukta & Utsedha.
Vraṇa Granthi is Kṛcchrasādhya. It is treated by Chedana followed by Agnikarma.

Sādhyāsādhyatā:
Sādhya → Vātaja, Pittaja, Kaphaja, Medoja, Sirāja, Māṁsaja, Raktaja, Vraṇaja
Asādhya → Asthija, Sthūla, Kaṭhina, Chala, Marma-Kaṇṭha-Udara sthāna

CYST

Definition:
Cyst means bladder. It is soft fluctuant swelling containing fluid in sac lined by epithelium or endothelium.

Causes:

- Tumours
- Genetic conditions
- A fault in an organ of a developing embryo
- A defect in the cells
- Chronic inflammatory conditions
- Blockage of ducts in the body that cause fluids to build up
- A parasite
- An injury that breaks a vessel

Types:

1. True cyst:
   Contain clear, serous fluid, pus, blood, lymph or toothpaste like material.
   E.g., Dermoid cyst
2. False cyst:
   Do not have lining epithelium
   E.g., Hydrocele
3. Congenital cyst:
   E.g., Post anal dermoid cyst, Teratoma, Thyroglossal cyst
4. Acquired cyst:

- Implanted dermoid cyst
- Retention cyst
- Distended cyst
- Degenerative cyst
- Exudation cyst
- Parasitic cyst

DERMOID CYST

The cyst lined by squamous epithelium, containing desquamated cells.

Clinical features:

- Painless. slow growing swelling
- Cystic & fluctuant
- Paget's test positive: Swelling is fixed with two fingers and summit is indented to get yielding sensation due to fluid.
- Underlying bony defect gives clue to diagnosis

Treatment: Excision

SEBACEOUS CYST

Definition:

It occurs due to obstruction to one of sebaceous duct, resulting in accumulation of sebaceous material. Hence this is an example of retention cyst.

Sites:

Scalp, face, back & scrotum

Scalp/scrotum: Multiple cyst

Clinical features:

- Swelling: Smooth, soft, non-tender, freely mobile, fluctuant and painless
- The central keratin filled punctum* which is dark spot is diagnostic feature. It indicates blockage of duct

- 30% cases, instead of opening in to skin, sebaceous duct opens in to hair follicle, hence punctum is not seen
- Sign of molding: The cyst can be molded in to different shapes
- Sign of indentation: Pitting on pressure over swelling
- Unpleasant odour of sebum content
- In scalp: Loss of hair

Treatment:
Small: Excision along with skin
Big: Incision & avulsion of cyst with wall
Rupture: Excise entire cyst wall

Complications:

- Infection: Due to injury or scratch, resulting in abscess. Cyst will be tender, red & hot. Its treatment is I & D, after 1-2 months excision.
- Sebaceous horn: Due to slow drying of contents.
- Cock's peculiar tumor: Surface may get ulcerated leading to formation of painful, fungating mass with discharge.

IX. Arbuda - Tumour

Nirukti:

- Derived from arb dhatu means cause to death.
- Literally it is used to denote mountain.
- In Rigveda it is used to describe a demon like serpent.

Definition:
When granthi becomes too large, it is called arbuda.
Location, etiology, clinical features, involvement of Doṣa and Dushya, and treatment of Granthi and Arbuda are identical. Arbuda is larger in size compared to Granthi.

Samprapti: same as granthi

Bheda:

1. Vātaja
2. Pittaja
3. Kaphaja
4. Raktaja
5. Māṁsaja
6. Medoja

Lakṣhana:

- Vṛtta (round)
- Sthira (stable / fixed)
- Mandaruja (mild pain)
- Mahānt (large)
- Analpamūla (deep seated roots)
- Chiravṛddhi (grows slowly)
- Apāka (never suppurates)

Sādhyāsādhyatā:
Sādhya → Vātaja, Pittaja, Kaphaja, Medoja
Asādhya → Raktaja, Māṁsaja, Mahāmūla, Marmasthāna

Adhyarbuda:
When an additional Arbuda grows over a pre-existing one, it is known as Adhyarbuda or Dvandvaja Arbuda.

Dvirarbuda:
When two Arbuda grow simultaneously or one soon after the other, it is known as Dvirarbuda.

Treatment: Same as Granthi

1. Vataja arbuda:

Repeated raktamokshana by shrunga
Nadi sweda

2. Pittaja arbuda:

Raktavisravana with jalauka
Mrudu sweda
Upanaha sweda
Virechana

3. Kaphaja arbuda:

Raktamokshana by alabu
Maggot therapy

4. Alpamula arbuda chikitsa:

Base is encircled with sheets of tin, copper, lead or iron
The physician should apply kshara, agni and shastra many times without any hesitation. avoiding risk to patient's life
Vrana shodhana by decoction of asphota, jati and karvira leaves.

5. Medoja arbuda chikitsa:

Fomented and incised
Drained out blood and cleaned the wound
Sutured
Apply kalka of haridra, rodhra, patanga, hartala and manashila with plenty of madhu

Krimi chikitsa in Kaphaja arbuda:
Paste of nispava, oil cake and kulattha with plenty of meat, goghrita, and buttermilk should be applied over the tumour so that flies may be attracted to it and produce worms. After the worms have consumed most of the tumour, the remnant should be scraped and perform dahan karma.

TUMOURS (NEOPLASM)

Definition:

A tumour is a new growth consisting of cells of independent growth arranged atypically and serves no function. Cells proliferate without relation to the needs of body. The most important two processes which plays part are abnormal reproduction and abnormal differentiation.

Types:

1. **Benign or Innocent tumours:** Growth of mass of cell may be stopped and there is no tendency to invade surrounding tissue. It is subdivided as follows

- Papilloma
- Lipoma
- Chordoma
- Fibroma
- Neuroma

2. **Malignant tumours:** Growth of cell mass continuous and proliferation is an atypical and relentless way. It is subdivided in to Carcinoma and Sarcoma.

Carcinoma	Sarcoma
It arises from epithelium-ectodermal (skin cancer), endodermal (Gut cancer) or mesodermal (Renal cancer) in origin.	It arises from soft tissues or bone and are derived from mesoblast or mesenchymal tissue.

Etiology:

Cancers are caused by abnormalities in the genetic material of the transformed cells.

1. Mutation: Chemical carcinogen
2. Mutation: Ionizing radiation
3. Viral or Bacterial Infection
4. Hormonal imbalances
5. Immune system dysfunction
6. Hereditary
7. Other causes, such as trans-placental from mother to foetus, unhealthy diet

Risk factors:

Tobacco, Overweight, Obesity, Unhealthy diet, Lack of physical activity, Alcohol, Sexual transmitted infection, Ionizing and non-ionizing radiation, Urban air pollution, Exposure to indoor smoke from household use of solid fuels

Mode of spread:

- Blood stream
- Lymphatic drainage
- Both
- Direct spread

Signs & Symptoms:

1. Local

Unusual lump / swelling, haemorrhage, pain, ulceration, compression of surrounding tissues

2. Metastatic

Enlarged lymph nodes, cough, haemoptysis, hepatomegaly, bone pain, fracture of affected bone, neurological defects

3. Systemic

Weight loss, poor appetite, fatigue, night sweats, anemia, etc.

Pathogenesis:

Causes → Cell proliferation: uncontrolled & uncoordinated cell division or replication → Angiogenesis: new vascular tree grows to supply oxygen & nutrients to neoplastic cells → Growth: continuous cell proliferation leads to formation of lump / mass → Metastasis → Growth: cell proliferation of secondary tumour

Investigation:

Biopsy
FNAC (Fine Needle Aspiration Cytology)
Tumour markers
Polymerase Chain Reaction (PCR)

Treatment:

Primary treatment:
The goal of a primary treatment is to completely remove the cancer from the body or kill all the cancer cells.
Any cancer treatment can be used as a primary treatment, but the most common primary cancer treatment for the most common types of cancer is surgery. If the cancer is particularly sensitive to radiation therapy or chemotherapy, one of those therapies may be chosen as primary treatment.

Adjuvant treatment:
The goal of adjuvant therapy is to kill any cancer cells that may remain after primary treatment in order to reduce the chance that the cancer will recur.
Any cancer treatment can be used as an adjuvant therapy. Common adjuvant therapies include chemotherapy, radiation therapy and hormone therapy.

Palliative treatment:
Palliative treatments may help relieve side effects of treatment or signs and symptoms caused by cancer itself. Surgery, radiation, chemotherapy and hormone therapy can all be used to relieve symptoms. Other medications may relieve symptoms such as pain and shortness of breath.

Cancer treatment options include:

Surgery:
The goal of surgery is to remove the cancer or as much of the cancer as possible.

Chemotherapy:
Chemotherapy uses drugs to kill cancer cells.

Bone marrow transplant:
A bone marrow transplant, also known as a stem cell transplant, can use one’s own bone marrow stem cells or those from a donor. A bone marrow transplant allows the use of higher doses of chemotherapy to treat cancer. It may also be used to replace diseased bone marrow.

Radiation therapy:
Radiation therapy uses high-powered energy beams, such as X-rays or protons, to kill cancer cells. Radiation treatment can come from a machine outside the body (external beam radiation), or it can be placed inside the body (brachytherapy).

Immunotherapy:
Immunotherapy, also known as biological therapy, uses the body's immune system to fight cancer. Cancer can survive unchecked in the body because the immune system does not recognize it as an intruder. Immunotherapy can help the immune system "see" the cancer and attack it.

Hormone therapy:
Some types of cancer are fueled by the body's hormones. Examples include breast cancer and prostate cancer. Removing those hormones from the body or blocking their effects may cause the cancer cells to stop growing.

Cryoablation:
This treatment kills cancer cells through extreme coldness. During cryoablation, a thin, wand-like needle (cryoprobe) is inserted through the skin and directed into the cancerous tumor. A gas is pumped into the cryoprobe in order to freeze the tissue. Then the tissue is allowed to thaw. The freezing and thawing process is repeated several times during the same treatment session in order to kill the cancer cells.

Radiofrequency ablation:
This treatment uses electrical energy to heat cancer cells, causing them to die. During radiofrequency ablation, a thin needle is guided into the cancer tissue. High-frequency energy passes through the needle and causes the surrounding tissue to heat up, killing the nearby cells.

VRANA

3. Vrana – Nirukti and Prakara

Definition:

व्रण' गात्रविचूर्णने, व्रणयतीति व्रणः| (Su. Chi. 1/6)

Vrana is defined as the condition where in tissue undergoes destruction.

Classification:

Based on the cause:

1. Shariraja (Nija): caused by aggravation of doshas.
2. Aagantuja: caused by external factors.

Different stages of vrana:

1. Dushta vrana (Infected wound)
2. Shuddha vrana (Clean wound)
3. Ruhyamana vrana (Healing wound)
4. Rudha vrana (Healed wound)

I. Nija Vrana – Nidana, Samprapti, Vrana Vasthu, Prakara, Lakshana, Vrana Pariksha – Sthana, Vrana Akruti, Srava, Gandha, Vedana. Vrana Avastha- Dustavrana, Shuddha Vrana, Ruhyamana Vrana, Samyak Roodha Vrana, Vrana Sadhya-asadhyatha and Vrana Upadrava.

NIJA VRANA

Definition:

निजः शरीरदोषोत्थ| (Cha. Chi. 25/6)

Nija vrana occurs due to vitiation of vata, pitta, kapha, & rakta doshas.

Nidana: Due to vitiation of doshas.

Samprapti:

Apathya aahar vihar → Dosha vitiation along with rakta → dosha get sheltered and collected in twak and mamsa → Formation of shopha → Puya formation → Rupture of skin → Vrana

Types: Sushruta and Vagbhata were classified the vrana into 15 types:

1. Vataja vrana
2. Pittaja vrana
3. Kaphaja vrana
4. Raktaja vrana
5. Vata pittaja vrana
6. Vata kaphaja vrana
7. Vata raktaja vrana
8. Pitta kaphaja vrana
9. Pitta raktaja vrana
10. Kapha raktaja vrana
11. Sannipataja vrana
12. Vata pitta raktaja vrana
13. Vata kapha raktaja vrana
14. Pitta kapha raktaja vrana
15. Vata pitta kapha raktaja vrana

Samanya lakshana: Ruk/pain

Vishesha Lakshana:

Vataja vrana	Is hard, rough with minimal discharge associated with severe pain, is blackish, with pricking and throbbing type of pain predominantly, tendency to get cracked and with less tissue in the wound area.
Pittaja vrana	Associated with thirst, delusion, fever, sweating, is about to get suppurated. When suppurated gives feature as hot foul-smelling discharge, arises early, has yellowish colour etc.
Kaphaja vrana	The site is unctous, cold with mild pain and itching, pale coloured, minimal discharge with froth edges is thick, hard and is associated for long time.
Raktaja vrana	Coloured like coral, or associated with blackish blister or numerous boils, with a foul smell like that emitted from a horse stable, pain, hemorrhage or other pittaja lakshanas and it appears as though smoke is being emitted from the area.
Vata-pittaja vrana	The area appears yellowish, with appearance of smoke being emitted from the wound with burning and pricking sensation and other vataja and pittaja lakshanas.
Vata-kaphaja vrana	Area is unctous, heavy, hard with repeated, minimal, slimy, cold discharge, with itching and pricking pain etc.
Pitta-raktaja vrana	A sense of heaviness, with burning sensation, the discharge is pale, hot and yellowish.
Vata-raktaja vrana	Discharge is unctous, thin with decreased sense perception locally, pricking pain, reddish colour, and other features of vataja and raktaja vrana.
Pitta-raktaja vrana	Colour like supernatant portion of ghee, odour like fish washed water, is fragile, spreading with blackish hot discharge.
Kapha-raktaja vrana	Discharge is reddish, pale, unctous, slimy with itching.
Vatta-pitta-raktaja vrana	A sense of quivering, pricking, burning or emission of smoke, discharge is yellowish, thin, and mixed with blood.
Vata-kapha-raktaja vrana	Hemorrhage occurs; blood is coagulated and pale, associated with itching, quivering and a sensation of insects crawling over the area.
Pitta-kapha-raktaja vrana	There is burning sensation and itching, the area appears red and inflamed with thick, bloody discharge.
Sannipataja vrana	Discharge, pain, and other features of vata, pitta and kaphaja vrana are manifested together.
Vatta-pitta-kapha-raktaja vrana	Pain as if being burnt or churned, quivering, pricking type of pain, the area is inflamed, red, with itching, numbness with various colours, symptoms and discharges.

Types of vrana according to Charaka: 20

1. Krtya (Incisable)
2. Utkrtya (Unincisable)
3. Dushta (Infected wounds)
4. Adushta (Non infected)
5. Marmasthita (Over vital area)
6. Amarmasthita (Not over vital area)
7. Samvrta (Closed)
8. Vlvrata (Open)
9. Daruna (Callus/hard)
10. Mrudu (Fragile/soft)
11. Sravi (With excessive discharge)
12. Asravi (No discharge)
13. Savisha (Poisonous)
14. Nivisha (Nonpoisonous)
15. Vishama (Irregular)
16. Sama (Regular)
17. Utsangi (With thick edges)
18. Anutsangi (With thin edges)
19. Utsanna (Raised surface)
20. Anutsanna (Depressed surface)

Vrana avastha (Stages of wound):

Dushta vrana:

Vraṇa in a patient who does not control his/her Indriyas, or who follows Mithya Āhāra Vihāra, or even if Pathya is followed but wrong treatment is applied by the physician, such a Vraṇa will become severely vitiated difficult to treat; this is known as Duṣṭa Vraṇa.

Features:

- Atisamvrutha (too narrow)
- Ativivrutha (too wide)
- atikathina or mrudu (extremely hard/soft)
- utsanna or avasanna (extremely elevated/depressed)
- Atishita or ushana (too hot/cold)
- Having one of the colors krishna, rakta, peeta, shukla etc.
- Bhairava (Exhibits unusual and strange features)
- Moving in oblique track (unmargi)
- Having amanoghna darshana (Unfavorable sight)
- Atigandha (Foul odour)
- Vedanayukta (painful)
- Associated with daha, paaka, raga, kandu, shopha pidaka
- Discharging excessively dushta shonitha
- Dheerga, kaalanubandha
- Filled with putrid and sloughing flesh and fetid pus

According to Charaka: 12 features

1. Shveta (White)
2. Avasanna Vartma (Depressed)
3. Atisthūla Vartma (Elevated)
4. Atipiñjara (Excessively grey)
5. Nīla (Blue)
6. Shyāva (Blackish)
7. Atipiḍikā (Covered with boils)
8. Rakta (Red)
9. Kṛsṇa (Black)
10. Atipūtika (Excessive foul smell)
11. Aropya (Non-healing)
12. Kumbhī Mukha (Narrow opening)

Types: 6

1. Vataja
2. Pittaja
3. Kaphaja
4. Raktaja
5. Sannipataja
6. Agantuja

Treatment:

- Vamana and virechana
- Katu, tikta, kashaya predominant food
- Raktamokshana
- Vrana prakshalana by aaragvadhadhi and sursadi gana
- Vrana shodhana and ropana by different drugs

Shuddha vrana:

Shuddha Vraṇa is the wound which is produced without vitiated Doṣa; it is generally caused by a surgical incision. These type of Vraṇa do not require specific treatments but should be protected from contamination.

Lakṣhaṇa: Mṛdu, Shlakṣṇa, Snigdha, Nātirakta, Nātipāṇḍu, Nātishyāva, Nātiruk, Na Utsanna, Na Utsaṅgī, Ropya

Ruhyamāna / Rohī Vraṇa: (Healing wound)

- Kapota varṇa pratimā (colour like a pigeon; grey)
- Kleda varjita (devoid of moisture/exudation)
- Sthira Chipiṭikāvanta (flakes of skin adhering firmly)

Samyak Rūdha Vraṇa: (Healed wound)

- Agranthi
- Ashūna (no swelling)
- Aruja
- Tvak varṇa

Vrana pariksha:

Following factors of Vraṇa should be examined viz.

1. Sthāna (location)
2. Akṛti (shape)
3. Gandha (smell)
4. Srāva (discharge/exudate)
5. Vedanā (pain)

Vraṇa Akṛti:

1. Āyata (Rectangular)
2. Chaturasra (Quadrangular)
3. Vṛtta (Circular)
4. Tripuṭaka (Triangular)

If Vraṇa has other shapes, it is difficult to treat.

Aṣṭa Vraṇa Gandha:

According to Ā. Charaka

1. Sarpi
2. Taila
3. Vasā
4. Pūya
5. Rakta
6. Shyāva
7. Amla
8. Pūtika

Based on Doṣa

1. Vātaja → Kaṭu
2. Pittaja → Tīkṣṇa
3. Kaphaja → Visra
4. Raktaja → Loha
5. Vāta-Pittaja → Lāja
6. Vāta-Kaphaja → Atasī taila
7. Pitta-Kaphaja → Tila taila
8. Sannipātaja → Mixed

Arishta suchaka gandha: Madhu, agaru, ghrita, jati, kamala, Chandana, champa & divya

Vraṇa Srāva:

A) According to Ā. Charaka

1. Lasīka (Serous fluid)
2. Jala
3. Pūya (Pus)
4. Asṛk / Rakta
5. Haridrā (Yellowish)
6. Aruṇa (Reddish)
7. Piñjara (Ash)
8. Kaṣāya
9. Nīla (Blue)
10. Harita (Greenish)
11. Snigdha (Sticky)
12. Rūkṣa
13. Sita (Black)
14. Asita (White)

B) Based on Doṣa

1. Vātaja → Srāva is Paruṣa, Shyāva, resembles Dadhimastu, Kṣārodaka, etc.
2. Pittaja → Srāva is Uṣṇa, resembles Gomūtra, Bhasma, Kaṣāyodaka, etc.
3. Kaphaja → Srāva is Shīta, resembles Navanīta, Majjā, Narikelodaka, etc.
4. Sannipātaja → Srāva resembles Kāñjī, Shuddha Jala, Mudgayūṣa, etc.

C) Based on Vraṇa Sthāna

1. Tvakgata Vraṇa → Srāva resembles water with mild bad smell and yellow color
2. Sirāgata Vraṇa → Srāva will be thin, discontinuous, slimy, adhering
3. Māṁsagata Vraṇa → Srāva resembles Ghṛta which is dense, whitish and sticky
4. Snāyugata Vraṇa → Srāva will be unctuous, thick and mixed with blood
5. Asthigata Vraṇa → Srāva will be unctuous, mixed with Majjā and Rakta
6. Sandhigata Vraṇa → Srāva will be slimy, sticky and mixed with blood. It only occurs due to any movement of the affected joint.
7. Koṣṭhagata Vraṇa → Srāva will be mixed with blood, urine, faeces, pus, water
8. Marmagata Vraṇa → Not mentioned separately as they are included under Tvaksthita Vraṇa

Vraṇa Vedanā:

1. Vātaja:
   Todana (pricking pain), Bhedana (breaking pain), Chedana (cutting pain), Tāḍana (beating pain), Āyāmana (stretching pain), Manthana (drilling pain), Vikṣepaṇa (moving pain), Chumuchumāyana (irritating/itching pain), Avabhañjana (tearing pain), Sphoṭana (bursting pain), Vidāraṇa (crushing pain), Kampana (cramping/trembling pain)

2. Pittaja: Oṣa (local burning pain), Choṣa (sucking pain), Paridāha (general burning sensation), Uṣma vṛddhi (increased temperature), Kṣāravat Siktavat Kṣata (pain as if injured by caustic substance or hot liquid)
3. Kaphaja: Kaṇḍū, Gurutva, Suptatva, Alpavedanā, Stambhana, Shaitya
4. Raktaja: Same as Pittaja
5. Sannipātaja: Mixture of VPK
6. Duṣṭa Vraṇ: Ativedanā due to excessive vitiated Doṣa
7. Upadrava: Ā. Sushruta classified complications related to Vraṇa into:

- Vraṇita Upadrava (generalized complications)
- Vraṇa Upadrava (local complications)

Vranita Upadrava: (wounded person)
According to Ā. Sushruta – Vraṇita Upadrava: - 10

1. Jvara
2. Atisāra
3. Mūrcchā
4. Hikkā
5. Chardi
6. Arochaka
7. Shvāsa
8. Kāsa
9. Avipāka
10. Tṛṣṇā

According to Ā. Charaka: - 16

1. Visarpa
2. Pakṣaghāta
3. Sirāstambha
4. Apatānaka
5. Moha
6. Unmāda
7. Vraṇaruj
8. Jvara
9. Tṛṣṇā
10. Hanugraha
11. Kāsa
12. Chardi
13. Atisāra
14. Hikkā
15. Shvāsa
16. Vepathu

Vrana dosha:

1. Snayu kleda (Sloughing of ligaments)
2. Sira kleda (Sloughing of vessels)
3. Gambhirya (Deep seated ulcers)
4. Krimi bhakshana (Maggots appearance in ulcer)
5. Asthi bheda (Bone fracture near ulcer)
6. Sa-shalyatva (Presence of foreign body in ulcer)
7. Savishatva (Presence ofpoision in ulcer)
8. Sarpanatva (Spreading of ulcer)
9. Nakha kashta prabheda (Injury by nails and wood pieces)
10. Charma ati gattana (excessive hardness of skin)
11. Loma ati gattana (excessive hardness of hair)
12. Mithya bandha (Wrong bandaging)
13. Ati sneha (Excessive oleation)
14. Ati bhaishajya karshana (Excessive drug application leads to emaciation of tissues near ulcer)
15. Ajirna (Indigestion)
16. Ati bhukta (Over eating)
17. Virudha bhojana (Contradictory food)
18. Asatmya bhojana (Unwholesome food)
19. Shoka (Grief)
20. Krodha (Anger)
21. Divaswapna (Day sleep)
22. Vyayam (Excessive exercise)
23. Maithuna (Sexual intercourse)
24. Nishkriyatva (Negligence of using proper therapeutic measures)

Sadhya Asadhyata:

Rogi bala:

- Sadhya: Young, strong, energetic, and self-controlled
- Asadhyata: Emaciated, weak, elder, bhiru, and non-active

Vrana akruti:

- Sadhya: Aayata, chaturastra, vrutta, triputa
- Asadhya: Vakra, ardhachandra, ratha, ashwa samana

Vrana sthana:

- Sadhya: Nitamba, guda, prajanana, lalata, ganda, oshta, prustha, karna, andakosha, udara, mukha, and jatru
- Krachrasadhya: Netra, nasa, karna, bhru, dantamula, srotasa, nabhi, kukshi, vanksha, kaksha, stana, and sandhi
- Yapya: Avapatika, niruddhaprakasha, sannirudhaguda, jathara, grathi, pratishayaya, tvak vikara etc.
- Asadhya: Marma sthana

Vrana upadrava:

- Kushtha
- Shosha
- Vishajushta
- Madhumeha

II. Vrana Chikitsa – Pathya-apathya and Shashti Upakrama, Vranitagara and Rakshakarma.

Shashti Upakrama:

Importance:

- It pacifies the vrana shopha in initial stage itself or preventing its further development
- Or promote suppuration so that vrana shopha gets suppurated. Once pus etc get drained out the patient get relief from pain
- Vrana shodhana and vrana ropana
- Play important role in cosmetic repair

Number:

Sushruta: 60	Charaka: 36

1-12 upakarma: Vrana shopha chikitsa
13-20 upakarma: Bhedana and visravana of puya
21-34 upakarma: Vrana shodhana and vrana ropana
35-60 upakarma: To remove any remanant dosha and to prevent recurrence

1. Apatarpana (Fasting)
2. Aalepa (Application of paste)
3. Parisheka (Spraying/pouring liquid)
4. Abhynga (Anointing)
5. Sweda (Fomentation/sudation)
6. Vimlapana (Gentle masssage/local rubbing with medicated powder or oil)
7. Upnaha (Poultice)
8. Pachana (Induction of suppuration/ripening)
9. Visravana (Bloodletting)
10. Sneha (Internal oleation)
11. Vamana (Emesis)
12. Virechana (Purgation)
13. Chedana (Excision)
14. Bhedana (Incision)
15. Darana (Bursting by medicine application)
16. Lekhana (Scrapping)
17. Eshana (Probing)
18. Aaharana (Extraction)
19. Vyadhana (Puncturing)
20. Seevana (Suturing)
21. Sandhana (Approximation of wound edges)
22. Peedana (Squeezing out)
23. Shonita sthapana (Haemostasis)
24. Nirvapana (Cooling applications)
25. Utkarika (Warming applications)
26. Kashaya (Washing with decoctions)
27. Vani (Wicks)
28. Kalka (Paste)
29. Sarpi (Application of medicated ghee)
30. Taila (Application of medicated oil)
31. Rasakriya (Application of thick decoction)
32. Avachurnana (Dusting powders)
33. Vrana dhupana (Fumigation of ulcer)
34. Utsadana (Encouraging the granulation tissue formation)
35. Avasadana (Removal/depressing of granulation tissue)
36. Mrudukarma (Softening)
37. Daruna karma (Hardening)
38. Kshara karma (Caustics application)
39. Agnikarma (Thermal cauterisation)
40. Krishna karma (Pigmentation/blackening)
41. Pandu karma (Depigmentation/normal colour skin)
42. Pratisarana (Rubbing)
43. Romasanjanana (Encouraging regrowth of hair)
44. Romapaharana (Depilation/removing hair)
45. Basti karma (Enema)
46. Uttarbasti (Urethral and vaginal douche)
47. Bandha (Bandaging)
48. Patradana (Covering by leaves)
49. Krimighna (Disinfection)
50. Bramhana (Restorative measures)
51. Vishaghna (Neutralisation of poisions)
52. Shirovirechanaa (Purgation to head)
53. Nasya (Nasal medication)
54. Kavala (Gargling)
55. Dhuma (Medicinal smoking)
56. Madhu (Use of honey)
57. Sarpi (Use of ghee)
58. Yantra (Instrumentation)
59. Ahara (Dietery regimen)
60. Raksha vidhana (Prophylactic measures)

1. **Apatarpana:** Adhya upakrama. Used to break pathology in very initial stage. Contraindicated in patient suffering from urdhvavata, thirst, hunger, dryness of mouth, physical exhaustion and pregnant women, aged persons, children, weak and timid persons.
2. **Aalepa:** Application of paste is soothing, cleans the wound, reduces the swelling, fills up the wound and heals it.
3. **Parisheka:** Vataja shopha → warm spraying with ghee, oil, sour gruel, meat juice. Pittaja shopha → cold spraying with milk, ghee, honey, sugar, and sugarcane juice. Kaphaja shopha → warm spraying should be done with oil, cow's urine, wine etc.
4. **Abhyanga:** Done before swedana and after bloodletting. For dilution of doshas and to relieve shrotorodha.
5. **Swedana:** Employed for painful, indurated, and hard swellings. Helps in aamapachana.
6. **Vimlapana:** Gentle local massage with fingers for dissolving the shopha.
7. **Upanaha:** Avidagdha stage → It does shamana. Vidagdha stage → It does paka
8. **Pachana:** Induction of suppuration using utkarika.
9. **Visravana:** Useful in lesions which are hard, black, congested, painful, indurated, irregular and caused by poison.
10. **Snehapana:** To alleviate pain and remove suppuration. It brings circulated doshas to mahasrotas.
11. **Vamana:** Beneficial in kapha vitiated ulcers.
12. **Virechana:** Useful in chronic ulcers associated with vitiation of vata and pitta.
13. **Chedana:** For non-suppurative, hard, fixed and necrotising soft tissue lesions.
14. **Bhedana:** Deep seated collection of pus without any opening, for pocket of pus with opening and for sinuses.
15. **Darana:** Indicated in children, aged, debilitated, timid, ladies and when lesions are situated over the vulnerable areas.
16. **Lekhana:** Indicated in hard ulcerative lesions with thick rolled margins, which tend to crack repeatedly and have hard and raised granulating surface.
17. **Eshana:** Probing should be done gently in sinuses, wound with foreign bodies, unmargi, fistula in ano and utsangi (which have curved or irregular tracks) with help of tender bamboo sprouts, hairs, fingers or probes. Bleeding sinus with narrow openings in vicinity of eyes and anus should be probed by fine stems of chuchu, upodaka and karira.
18. **Aaharana:** Extraction of foreign body should be done from the wound with either a narrow or wide opening by the method of extraction.
19. **Vyadhana:** In jalodara & mutravrudhi
20. **Seevana:** For wounds which are widely gaping, involved the muscles and are not complicated by infection.
21. **Sandhana:** For wounds which are widely gaping, involved the muscles and are not complicated by infection.
22. **Peedana:** For the abscess with small openings. For the purpose of peedana, paste should be allowed to get dry.
23. **Shonita sthapana:** Can be achieved by sandhana, pachana, shandana, & dahana

24. **Nirvapana:** For lesions which are engorged with blood, burning sensation, suppuration and fever. In this lepa and seka of sheetal dravya are applied. May help in sandhana karma and subside daha, paka
25. **Utkarika:** For non-suppurative, poorly granulating, hard and rough ulcerative lesions with scanty discharge and associated with pain.
26. **Kashaya:** Vrana shodhana → For the foul smelling, & slimy wounds. Vrana ropana → Should be healed by ropaka Kashaya.
27. **Varti:** Vrana shodhana → For removing foreign bodies deeply embedded in muscles and where wound has a very small opening. Vrana ropana → for painless, clean and deep ulcers.
28. **Kalka:** Vrana shodhana → For ulcers covered with putrefied flesh and associated with vitiated and aggravated doshas. Vrana ropana → For promoting healing for indolent ulcers involving muscles, after foul smelling and putrefying tissues have been cleansed.
29. **Sarpi (Siddha):** Vrana shodhana → For ulcers affected by vitiated pitta, which are deep and associated with burning and suppuration. Vrana ropana → For deeply situated, traumatic and poisoned wounds associated with vitiated pitta and rakta.
30. **Taila:** Vrana shodhana → For dry ulcers with hyper granulation tissue with insignificant discharge. Vrana ropana → Used in wounds afflicted by vitiated kapha and vata.
31. **Rasakriya:** Vrana shodhana → For ulcers that are failed to get cleansed by oils, as well as those having granulating surfaces rigidly fixed to deeper structures. Vrana ropana → For those which are situated over mobile parts, clean but have become infected, regular margins, adherent to deeper tissue but limited to skin only. Haridra is best drug for it.
32. **Avachurnana:** For ulcers vitiated by meda.
33. **Vrana dhupana:** For lesions affected with vitiated vata which are extremely painful and associated with discharge.
34. **Utsadana:** For poorly granulating, deep and dry ulcers, by local application of ghrita processed with utsadana drugs.
35. **Avasadana:** For ulcers with excessive, raised and soft granulation tissue formation.
36. **Mrudu karma:** For vataja ulcers with little granulation tissue formation. Firm bandaging causes softening of ulcer and heals quickly.
37. **Daruna karma:** Indicated when granulation tissue is soft.
38. **Kshara karma:** For indurated, itching and chronic ulcers which are hard to clean and have raised granulation tissue. Acts as chemical debridement.
39. **Agnikarma:** For urinary fistulae, bleeding wounds. Stops bleeding and do a kind of sterilization.
40. **Krishna karma:** When ulcer heals and become whitish, Krishna karma is adopted to normalize the colour.
41. **Pandu karma:** When an ulcer heals and becomes blackish, pandukarma is adopted to normalize the colour.
42. **Pratisarana:** Used for rubbing over the lesions to make it rough which was very shiny after wound healing, so the healed area becomes enough rough as healthy skin.

43. **Roma sanjanana:** If ashes of skin, hairs, hoof, horns and bones of quadrupeds are dusted over previously oleated part it again becomes hairy.
44. **Romapaharana:** During the process of healing, excessive hair growth may be seen in the skin over the ulcer site. Excessive hairs prevent complete healing of ulcer.
45. **Basti:** Indicated for ulcer which is vitiated by vata, dry and are very painful and specially for those situated in lower part of the body.
46. **Uttarbasti:** For cases of retention of urine, urine disorders, seminal disorders, wound by calculus and menstrual disorders.
47. **Bandha:** For keeping the wound clean, soft, and undoubtedly helps in its healing.
48. **Patradana:** Application of leaves should be done over ulcers which are indolent, have little granulation tissue and which do not heal due to dryness.
49. **Krimighna:** To decrease the load of pathogens from wound site. Application of paste of bark of karanja, nimba, arka etc.
50. **Brumhana:** Indicated in chronic cases, lean persons and in those who have become emaciated due to wound, at the same time agni of patient should be preserved.
51. **Vishaghna:** For the treatment of wound made by toxic effect of any substance.
52. **Shirovirechana:** Used to clean the head, for the wounds situated above collar bone and which are associated with itching and inflammation.
53. **Nasya:** It is used for the wounds above the clavicular region, which are caused by vata and are dry.
54. **Kavalagraha:** To dislodge the doshas, to alleviate pain and burning sensation, to remove the mala and for cleansing and healing of ulcers in mouth.
55. **Dhumapana:** For the diseases of the region above the collar bone and ulcers due to kapha and vata, when associated with inflammation, discharge and pain.
56. **Madhu:** Should be used in recent and large traumatic wounds to bring down the heat of injury and to help their healing.
57. **Sarpi:** Should be used in recent and large traumatic wounds to bring down the heat of injury and to help their healing.
58. **Yantra:** Used in lesions which are deep, have small openings and are afflicted by shalya which cannot be extracted manually.
59. **Ahara:** All patients with ulcers should be given light demulcent, warm and appetizing diet in small quantities.
60. **Raksha vidhana:** The ulcer patients should always be protected by the invisible creatures through yama and niyama.

Vraṇitopāsanīya: (Pathya Apathya in vrana)
Vraṇitopāsanīya is the care of the patient who was afflicted with Vraṇa.

Vraṇitagāra:
Vraṇitagāra is the ward of the patient. It should be clean (Shuchi), devoid from exposure to direct sunlight (Ātapa varjita) and wind (Nivāta). The bed (Shayya) should be comfortable with its headend directed towards east. A patient who is suffering from pain and misery should be consoled and distracted by friends and family.

Dhūpa should be performed twice a day for Rakṣakarma. It is done with following Dravya: Sarṣapa, Ariṣṭapatra, Ghṛta, Lavaṇa or with Nimba Vachādya

Pathya:

- Āhāra: Alpamātra of porridge prepared from Purāṇa Shāli with Sneha Dravya. Yūṣa prepared from Taṇḍulīya, Jīvantī, Sunişaṇṇaka, Vastuka, Balāmūla, Vartaka, Paṭola, Karavellaka fried in Ghṛta and added with Saindhava lavaṇa.
  Yava, Godhūma, Ṣaṣṭika, Mudga, Dāḍima
- Vihāra: Vishrama, Dhūpa, Shirodhārā, Ātapa-Māruta varjana

Apathya:

- Āhāra: Navadhānya, Māṣa, Tila, Kalāya (peanut), Kulattha, Niṣpāva, Haritaka shāka, Shuṣka shāka, Amla-Lavaṇa-Kaṭu Rasa, Guḍa, Shītodaka, Piṣṭika, Pāyasa, Dadhi, Dugdha, Takra, Madya, Ariṣṭa, Āsva, Sidhu, Surā, Anūpa-Udaka māṁsa
- Vihāra: Chaṅkramaṇa, Vyāyāma, Divāsvapna, Rātrijāgaraṇa, Maithuna, Ātapa-Māruta sevana

III. Agantuja Vrana:

a. Sadyo Vrana - Traumatic wounds – Nidana, Prakara, Lakshana, Upadrava and Chikitsa.
b. Management of bites and stings.

AGANTUJA VRANA

Definition:

आगन्तुर्बाह्यहेतुजः| (Cha. Chi. 25/6)

Sadhyo vrana are those which occur due to injury.

Nidana:

Bites of animal, birds, snakes, trauma from sharp or blunt objects, agni, kshara, poisons, corrosive drugs, arrows etc.

Types: 6

छिन्नं भिन्नं तथा विद्धं क्षतं पिच्चितमेव च||

घृष्टमाहुस्तथा षष्ठं तेषां वक्ष्यामि लक्षणम्| (Su. Chi. 2/9-10)

1. Chinna vrana (Excised wound)
2. Bhinna vrana (Incised wound)
3. Viddha vrana (Punctured wound)
4. Kshataja vrana (Lacerated wound)
5. Picchita vrana (Crushed wound)
6. Ghrista vrana (Abrased wound)

1. Chinna Vraṇa:

Chinna Vraṇa is an extensive wound due to a sharp edge, either oblique or straight, associated with separation of a part of the body.

2. Bhinna Vraṇa:

Bhinna Vraṇa is an injury to a body cavity which leads to escape of fluids.

Koṣṭha Bhinna Lakṣaṇa:

- When Koṣṭha is injured, it gets filled with Rakta.
- Rakta may escape through urethra, anus, mouth or nose.
- Dāha, Jvara, Mūrcchā, Shvāsa, Tṛṣṇā, Annadveṣa
- Vāta-Viṭ-Mūtra saṅga
- Atisveda, Akṣiraktatā, Āsasya Loha-gandha
- Gātra daurgandhya
- Hrt-Pārsvha shūla

Āmāshaya Bhinna Lakṣaṇa:

- When Āmāshaya is injured, it gets filled with Rakta.
- Rudhira Chardi (repeated haematemesis)
- Atimātra Ādhmāna (severe abdominal distension)
- Bṛshadāruṇa Shūla (excruciating abdominal pain)

Pakvāshaya Bhinna Lakṣaṇa:

- When Pakvāshaya is injured, it gets filled with Rakta.
- Rakta may escape from any of the orifices.
- Ruja, Gaurava, Shītatā

Aantra bhinna lakshana:

- The intestine gets filled up with blood through their small pores.
- Heaviness is noticed as happens in case of closed earthen pitcher dipped in water.

3. Viddha Vraṇa:

Viddha Vraṇa is a punctured wound by a pointed object at any other part than body cavities. The foreign body may either remain inside the injured site or has pierced through and completely come out at the other end.

4. Kṣata Vraṇa:

Kṣata Vraṇa is neither a cut nor a perforation, but it is in between Chinna and Bhinna Vraṇa.

5. Picchita Vraṇa:

Picchita Vraṇa is the injury due to a severe blow or pressure.
It is of 2 types:

i. Savraṇa → the body part gets compressed and a wound is formed, like a laceration.
ii. Avraṇa → the body part gets compressed but there is no open wound; blood capillaries are damaged and form a contusion.

6. Ghṛiṣṭa Vraṇa:

Ghṛiṣṭa Vraṇa is the wound in which skin is removed by rubbing or any similar cause. It is associated with burning sensation and discharge.

Treatment of sadhyovrana:

For chinna, bhinna, viddha and kshata vrana

- Excessive bleeding occurs in these wounds and loss of blood due to vitiation of vayu produces severe pain.
- In such cases snehas given to drink as well as used for irrigation of wound are beneficial.
- Poultices of veshavara and krashara with sufficient sneha should be applied.
- Sudation should be induced by dhanya and oily pastes should also be used.
- Oily enemas processed with vatahara drugs are further indicated.

For picchita and ghrista vrana:

- There is not much bleeding in these wounds
- As blood does not found outlet there is excessive burning sensation followed by suppuration.
- In such cases cold external applications and irrigations should be done to neutralize the heat and burning sensation and to avoid suppuration thereof.

Excised wound (chhina):

The wounds which are situated in head and the sides and are gaping, should be sutured and bandaged tightly.

Cut throat injury:

Ghrita prepared from goat's milk should be sprinkled locally. Should sleep in well controlled position.

Stab wound (Bhinna):

Puncture and avulsion of eyeball:

The eye should be gradually replaced in original socket without injuring vessels. Leaves of lotus should be put over it and gentle pressure with palms should be applied. Then tarpana and nasya should be done.

Abdominal injuries:

Alkalies of astringent trees and black clay should be applied and tied with thread. Honey should be applied.

Repair of extruded intestines:

Joined together by bites of head of ants. The contaminated intestine should be washed with milk, and smeared with ghrita.

Punctured injury (Viddha):

Testicular injury:

Gophanika bandage should be applied encircling the waist for immobilisation. No oily application should be used.

Crushed (Picchita) and Abraised (Ghrista) wound:

Management by immersion in oil:

The patient, who has fallen from height, is crushed, injured and has dislocations and has been given up as lost, should be put in a tub filled with oil and given meat juice to drink. A similar procedure should be adopted for debilitated and for the patients with injuries to their vital parts.

Incurable patient:

- One who had severe internal haemorrhage
- Anaemic
- Whose hands, feet, face, and breath have become cold
- Eyes have become blood shot
- Who has obstruction to passage of faeces, flatus, urine and other excretions

Agantuja vrana upadrava:

- Kotha (Gangrene)
- Visarpa (Erysipelas)
- Jalak vrana (Actinomycosis)
- Uttiya shopha (Cellulitis)
- Dhanustambha (Tetanus)

WOUND

Definition:

The wound is a forcible break in the continuity of soft tissues due to violence or trauma.

Types:

	Tidy wounds	**Untidy wounds**
Causes	Sharp objects and surgical incisions	Burn, vascular injury, crushing, tearing, avulsion, devitalised injury
Features	Wound is clean, healthy without any tissue loss	Features are infection, dehiscence, delayed wound healing and may associated with fracture of underlying bone.
Treatment	Suturing	Treated as debridement and allow to heal by secondary intention or skin grafts

Etiology:

1. Mechanical agents:

Mechanical agents can cause a wound by trauma through a blow, a fall or other forms of pressure. The mechanical agent may be sharp or blunt.

E.g.: Knifes, hammer, firearms, broken glass, traffic/machinery accidents, etc.

2. Chemical agents

Chemical agents in the form of strong acids or alkalis can cause chemical injuries in case of direct exposure.
E.g.: Hydrofluoric acids, formic acid, anhydrous ammonia, phenol, etc.

3. Radioactive agents:

Radioactive agents like x-rays, gamma rays, ionizing radiations have the capacity to incite inflammatory reactions within the exposed tissue. Excessive exposure leads to injury of the tissue and causes radiation injuries.

4. Pathogenic agents:

Pathogenic agents such as bacteria are capable to initiate inflammatory processes. They may not only act as a primary agent; instead, they often enter the body after a mechanical injury occurred. The pathogenic agents attack the local tissue and are capable of provoking necrosis or to invade the entire body.

Classification of wound:

Injuries or the trauma may cause two types of wounds.

1. Closed wounds
2. Open wounds

1. Closed Wounds:

A closed wound does not produce an obvious breach in the skin at the time of injury.
These closed wounds are classified into two types.

a. Contusion | b. Haematoma

a. Contusion:

It is caused by blow or fall against the hard object and it consists of the haemorrhage within the subcutaneous tissues of the skin.

b. Haematoma:

It may result from external violence, injury and blunt objects, where there is collection of blood is localized between the fascial planes depending upon the situation. Haematoma may be classified into following types.

- Subcutaneous
- Intramuscular
- Submuscular
- Sub peritoneal

2. Open wounds:

The open wounds cause a break for a loss of the skin and the tissue. These are usually caused by the sharp weapons or glass. These wounds are relatively cleaned.

The open wounds are classified as follows.

Lacerated wounds:
These wounds are commonly occurred following the road traffic accidents and may also cause by the blunt instruments, machinery, and missiles. These are characterized by jagged edges with certain lacerated and devitalized structures inside the wounds. These are sometimes contaminated with dirt and organic materials. The local destruction of the tissues varies with the violence of injuries but in the presence of devitalized tissue, especially muscles, and the risk of infection increases.

Punctured wounds (crushed or gunshot injuries):
These wounds are caused by the penetration of sharp and pointed weapons, where deeply lying structures may be injured or body cavities opened and naturally the drainage is defected. In such conditions there may be an involvement of internal viscous or viscera and tetanus may come up as an earliest secular and hence the prophylactic gardening of the patient against the tetanus wound might an emergency. It is seldom wise to go chasing broken elements lost in the tissues unless they are readily palpable or causing the symptoms. The x-ray examination may prove helpful although the use of tourniquet and a general anaesthetic recommended for exploration.

Penetrating wounds:
These are caused by a knife, bullet, bomb splinter or sharp nail etc. These are highly deceptive as the external wound the inner end may be deep to involve the internal viscera or inter peritoneal organs.

Perforating wounds:
These wounds are caused by sharp long weapons and mainly associated with the abdominal viscera.

Incised wounds:
These are usually caused by the sharp cutting weapons such as scalpel, knife, broken glass etc. These wounds are cleaned, cut gapping and bleeding wound with minimum contamination. These are characterized by the free haemorrhage, retraction of wound edges. Sometimes the complications like severe haemorrhage, involvement of nerves and tendons, opening of the body cavity and the risk of infection may occur.

Management:

1. **Closed wounds:**

In closed wounds, the main goal of treatment is to control the pain, and keep the bleeding and inflammation to a minimum. This is done by using ice packs, compression, elevation and immobilization of the affected limb or area.

However, in cases of compartment syndrome, a physician can make linear surgical cuts through the fascia to alleviate the pressure. The wound is usually left open for two to three

days while covered with a sterile bandage to allow the swelling to subside and prevent further pressure from building up.

X-ray can be used for diagnosis if bone fracture is suspected. Fractures generally require casting. In cases of severe trauma, other forms of imaging may be used. These include ultrasound, CT scan and MRI, which can detect organ damage and internal bleeding.

Topical antibiotic ointment may be applied locally to wounds in cases of associated skin lacerations and abrasions.

The use of crutches and other walking aids may be prescribed to immobilize the injured limb or area. These can be especially helpful for injuries to weight bearing sites, to prevent further damage, reduce pain and accelerate healing. A tetanus shot, painkillers and anti-inflammatory medications can also be helpful.

2. **Open wounds:**

Minor or acute open wounds may not require medical treatment or only home remedies. However, severe open wounds that involve significant bleeding will require immediate medical attention.

Open wound care should involve the following steps:

1. Stop the bleeding: Using a clean cloth or bandage, gently apply pressure to the wound to promote blood clotting.
2. Clean the wound: Use clean water and a saline solution to flush away any debris or bacteria. Once the wound is clean, pat it dry with a clean cloth. Surgical debridement may be required to remove debris from severe wounds that contain dead tissue, glass, bullets, or other foreign objects.
3. Treat the wound with antibiotics: After cleaning the wound, apply a thin layer of antibiotic ointment to prevent infection.
4. Close and dress the wound: Closing clean wounds helps promote faster healing. Waterproof bandages and gauze work well for minor wounds. Deep open wounds may require stitches or staples. However, leave an already infected wound open until the infection clears.
5. Routinely change the dressing: The Centres for Disease Control and Prevention (CDC) recommend removing the old bandages and checking for signs of infection every 24 hours. Disinfect and dry the wound before reapplying a clean adhesive bandage or gauze. Remember to keep the wound dry while it heals.

BITES & STINGS

Insect bites and stings can cause an immediate skin reaction. The bite from fire ants and sting from bees, wasps and hornets are most often painful. Bites caused by mosquitoes, and mites are more likely to cause itching than pain.

Consideration:
In most cases bites and stings can be easily treated at home.
Some people have extreme reactions that require immediate medical treatment to prevent death.
Certain spider bites such as black widow or brown recluse, can cause serious illness or death. Most spider bites are harmless. If possible, take the insect or spider that bites you with you when go for medical treatment so it can be identified.

Symptoms:
General symptoms:

- Pain
- Redness
- Swelling
- Itching
- Burning
- Numbness
- Tingling

Anaphylactic symptoms:

- Chest pain
- Face or mouth swelling
- Difficulty swallowing
- Fainting or light headedness
- Abdominal pain or vomiting
- Rash or flushing

Treatment:

- Remove stinger if stuck in skin
- If there is only redness and pain at the site of the bite, application of ice is adequate treatment.
- For severe reactions, check the persons airway and breathing, if so then begin CPR
- Reassure the person, try to keep him or her calm
- Remove nearby rings and constructing items because the affected area may swell
- Wash the site thoroughly with soap and water
- Place ice (wrapped in cloth) on the site of sting for 10 minutes and then off for 10 minutes. Repeat this process
- Antihistamine like CPM or apply steroids cream that reduce itching
- Antibiotics and analgesics

IV. Dagdha Vrana – Burns and scalds.

BURNS AND SCALD
Burns and scalds are damage to the skin caused by heat.

- Burns: It is a type of injury to skin and other tissues caused by heat, electricity, radiation and chemical agent transferred from source of body.
- Frostbite: It occurs in cold countries. It is also coagulative necrosis caused by extreme degree of cold
- Scalds: It is a burnt, but caused by moist heat (steam) above 60°.
- Trench foot: Prolonged exposure to 5-80C, such as typically seen in soldiers during winter warfare.

Patho-physiology: Burn injuries result in both local and systemic responses.
Local response:
The three zones of a burn were described by Jackson in 1947.

- Zone of coagulation: This occurs at the point of maximum damage. In this zone there is reversible tissue loss due to coagulation of the constituent proteins.
- Zone of stasis: The surrounding zone of stasis is characterised by decreased tissue perfusion. The tissue in this zone is potentially salvageable. The main aim of burns resuscitation is to increase tissue perfusion here and prevent any damage becoming irreversible. Additional insults, such as Prolonged hypotension, infection, or oedema can convert this zone into an area of complete tissue loss.
- Zone Of hyperaemia: In this outermost zone tissue perfusion is increased. The tissue here will Invariably recover unless there is severe sepsis or prolonged hypoperfusion.

These three zones of a burn are three dimensional and loss of tissue in the zone of stasis will lead to the wound deepening as well as widening.

systemic response: The release of cytokines and other inflammatory mediators at the site of injury has a systemic effect once the burn reaches 30% of total body surface area.

- Cardiovascular changes: Capillary permeability is increased, leading to loss of intravascular Proteins and fluids into the interstitial compartment. Peripheral and splanchnic vasoconstriction occurs. Myocardial contractility is decreased, possibly due to release of tumour necrosis factor α. These changes, coupled with fluid loss from the burn wound, result in systemic hypotension and end organ hypoperfusion.
- Respiratory changes: Inflammatory mediators cause bronchoconstriction and in severe burns adult respiratory distress syndrome can occur.
- Metabolic changes: The basal metabolic rate increases up to three times its original rate. This, coupled with splanchnic hypoperfusion, necessitates early and aggressive enteral feeding to decrease catabolism and maintain gut integrity.
- Immunological changes: Non-specific down regulation of the immune response occurs, affecting both cell mediated and humoral pathways.

Classification of Burns:
Burns are classified as first-, second-, third-degree, or fourth-degree depending on how deeply and severely they penetrate.

1. First-degree (superficial) burns. First-degree burns affect only the outer layer of skin, the epidermis. The burn site is red, painful, dry, and without blisters. Long-term tissue damage is rare, but may consist of an increase or decrease in the skin colour.
2. Second-degree (partial thickness) burns. Second-degree burns involve the epidermis and part of the lower layer of skin, the dermis. The burn site looks red, blistered, and may be swollen and painful.
3. Third-degree (full thickness) burns. Third-degree burns destroy the epidermis and dermis. They may go into the innermost layer of skin, the subcutaneous tissue. The burn site may look white or blackened and charred.
4. Fourth-degree burns. Fourth-degree burns go through both layers of the skin and underlying tissue as well as deeper tissue, possibly involving muscle and bone. There is no feeling in the area since the nerve endings are destroyed.

Rules of nine:

In addition to the depth of the burn, the total surface area of the burn is significant. Burns are measured as a percentage of total body area affected. The "rule of nines" is often used. This calculation is based upon the fact that the surface area of the following parts of an adult body each correspond to approximately 9% of total (and the total body area of 100% is achieved):

- Head = 9%
- Chest (front) = 9%
- Abdomen (front) = 9%
- Upper/mid/low back and buttocks = 18%
- Each arm = 9%
- Each palm = 1%
- Groin = 1%
- Each leg = 18% total (front = 9%, back = 9%)

As an example, if both legs (18% x 2 = 36%), the groin (1%) and the front chest and abdomen were burned, this would involve 55% of the body.

Only second and third-degree burn areas are added together to measure total body burn area. While first-degree burns are painful, the skin integrity is intact and it can do its job with fluid and temperature maintenance.

If more than 15-20% of the body is involved in a burn, significant fluid may be lost. Shock may occur if inadequate fluid is not provided intravenously. As the percentage of burn surface area increases, the risk of death increases as well. Patients with burns involving less than 20% of their body should do well, but those with burns involving greater than 50% have a significant mortality risk, depending upon a variety of factors, including underlying medical conditions and age.

Management:

1. Major Burns

- Protect the burned person from further harm. For electrical burns, make sure the power source is off before approaching the burned person.
- Make certain that the person is breathing.
- Burned areas swell rapidly. Therefore, remove jewellery, belts and other restrictive items, especially from around burned areas and the neck; but do not try to remove anything that is stuck to the burnt skin, as this could cause more damage.
- Cover the area of the burn. Use a cool, moist bandage or a clean cloth.
- Do not immerse large severe burns in water. Doing so could cause a serious loss of body heat and lead to hypothermia.
- Elevate the burned area. Raise the wound above heart level, if possible.
- Watch for signs of shock. Signs and symptoms include fainting, pale complexion or breathing in a notably shallow fashion.

2. Minor Burns

- Cool the burn. Hold the burned area under cool (not cold) running water or apply a cool, wet compress until the pain eases.
- Remove rings or other tight items from the burned area. Try to do this quickly and gently, before the area swells.
- Do not break blisters. Fluid-filled blisters protect against infection. If a blister breaks, clean the area with water (mild soap is optional). Apply an antibiotic ointment. But if a rash appears, stop using the ointment.
- Apply lotion. Once a burn is completely cooled, apply a lotion, such as one that contains aloe vera or a moisturizer. This helps prevent drying and provides relief.
- Bandage the burn. Cover the burn with a sterile gauze bandage (not fluffy cotton). Wrap it loosely to avoid putting pressure on burned skin. Bandaging keeps air off the area, reduces pain and protects blistered skin.
- If needed, take an over-the-counter pain reliever, such as ibuprofen (Advil, Motrin IB), naproxen sodium (Aleve) or acetaminophen (Tylenol).

Ayurvedic formulations:

- Jatyadi taila application
- Tankana malahara
- Ghritkumari swarasa
- Arogyavardhini rasa

Complications:

Complications of deep or widespread burns can include:

- Bacterial infection, which may lead to a bloodstream infection (sepsis)
- Fluid loss, including low blood volume (hypovolemia)
- Dangerously low body temperature (hypothermia)
- Breathing problems from the intake of hot air or smoke
- Scars or ridged areas caused by an overgrowth of scar tissue (keloids)
- Bone and joint problems, such as when scar tissue causes the shortening and tightening of skin, muscles or tendons (contractures)

When death results due to a thermal injury, the causes may be:

a. Primary shock (neurogenic shock)
b. Secondary shock due to exudation of serum from the burnt area and consequent depletion of blood volume
c. Asphyxia due to inhalation of fumes and smoke
d. Fat embolism
e. Septicaemia

FROST BITE

Causes:

- It occurs due to much exposure to cold weather such as winter sports enthusiasts, military personnel, and homeless individuals.
- It is common in old age during cold spells
- Malnutrition, ageing process are the other precipitating factors

Pathology:
High altitude with excessive cold precipitates vasospasm and damage to vessel wall. It causes sludging of blood and thrombosis.

Common site:
It most commonly affects the hands, feet and face.

Treatment:
1. Slow warming of body parts and protection with cotton wool
2. Analgesics, antibiotics, tetanus toxoid and vasodilators
3. Elevation of foot to reduce oedema
4. Wound care: Blister can be drained by needle aspiration, unless they are bloody
5. Debridement or fasciotomy depend on type and extent of damage.
6. Hyperbaric oxygen.
7. Paravertebral inj into sympathetic chain
8. If gangrene develops, amputation is needed.

V. Ulcer - Types and their management.

Definition:
An ulcer is a break in the continuity of the covering epithelium, either skin or mucus membrane due to molecular death.

Parts:
1. Margin | 2. Edge | 3. Floor | 4. Base

1. Margin: It is the junction between normal epithelium & ulcer i.e., the boundary of ulcer. It may be regular or irregular, may be round or irregular.
2. Edge: Connects floor of the ulcer to the margin.
a. Slopping edge: in healing ulcers
b. Undermined edge: in TB ulcer
c. Punched out edge: Due to end arteritis
d. Raised and beaded edge: in rodent ulcer
e. Everted edge: in carcinoma cancer
3. Floor: It is the one which is seen, may contain discharge, granulation tissue or slough.
4. Base: Base is the one on which ulcer rests. It may be bone or soft tissue.

Classification:
1. Clinical
2. Pathological
3. Traumatic

1. Clinical:

a. Spreading ulcer:

Surrounding skin: Inflamed
Floor: Offensive slough
Edge: Inflamed and oedematous, painful
Lymph node: Enlarged and tender, may suppurate (abscess)
Discharge: Plenty with purulent smell

b. Healing ulcer:

Edge: Sloping with pick/red granulation tissue with serous discharge.
Margin: Bluish with growing epithelium
No slough
No smell

c. Callous ulcer (chronic):

Floor: Contains pale (or wash-leather slough), unhealthy granulation tissue.
Edge: Indurated (Hardened) at base, edge, and surroundings
Discharge: Scanty or absent
Ulcer do not show any tendency to heal. It is due to callous (insensitive and cruel) attitude of the patient.

2. Pathological:

a. Specific
b. Malignant
c. Non specific

3. Traumatic:

a. Mechanical
b. Physical
c. Chemical

Granulation tissue:

It is proliferation of new capillaries and fibroblasts mixed with RBC and WBC with thin fibrin cover over it.
Fibroblast: Which produce collagen and other fibres.
Fibrin: Insoluble protein formed as a fibrous mesh during the clotting of blood.

Healthy granulation tissue:

Local features	Specific features (5 Ps)
• Ulcer: Healing • Edge: Sloping • Discharge: Serous • On touch: Bleeds	• Pink • Punctuate (dots) haemorrhages • Pulse full • Painless • Pin head granulations

Management of ulcer:

1. Cause should be found and treated
2. Correct the deficiencies like anaemia, protein and vitamin deficiencies.
3. Transfuse blood if required
4. Control pain and infection
5. Rest to part, elevation of part
6. Care of ulcer: Debridement (removal of damaged tissue or foreign body from wound), cleaning and dressing.
7. Remove the exuberant granulation tissue
8. Topical antibiotics for infected ulcer only like framycetin (sofra-tulle), Mupirocin (T-bact), Silver sulphadiazine (silvadex, silverex)
9. Antibiotics are not required once healthy granulation tissues are formed.
10. Once granulates, defect is closed with secondary suturing, skin graft or flap.

Ulcer cleaning:

By dilute povidone iodine and normal saline.
Twice a day or depend on severity.

Debridement of ulcer:

Slough should be separated adequately before debridement.
All dead, damage, necrotic tissue are removed.
Often damage tissues separates on its own by autolysis (by enzyme like collagenase).

Dressing of ulcer:

- To keep ulcer moist
- To keep surrounding skin dry
- To reduce pain
- To soothed tissue
- To protect wound
- As an absorbent for discharge.

TROPHIC ULCER / BED SORES / PRESSURE SORES / DECUBITOUS

Sore means suffering / painful
Definition: An ulcerated area of skin caused by continuous pressure on part of body.

Pathogenesis:

Prolonged bed ridden → Continue pressure → Blood flow to skin stops once external pressure becomes >30 mmHg (>then capillary occlusive pressure) → Tissue hypoxia (deficiency of oxygen reaching tissue) → Necrosis → Ulceration (more prominent between bony prominence and external surface)

Neurological causes:

1. Diabetic neuropathy
2. Peripheral neuritis
3. Tabes dorsalis
4. Spina bifida
5. Spinal injury
6. Paraplegia
7. Syringomyelia

Sites:

- Ischial tuberosity
- Buttocks
- Heel
- Sacrum
- Occiput
- Shoulder

Neurogenic ulcer:

Due to presence of neurological deficit, trophic ulcer is also called as neurogenic/neuropathic ulcer, due to repeated trauma and pressure. → Callosity (a thickened and hardened part of skin or soft tissue) → Suppuration occurs → This gives way through central hole which extends down into deeper plane up to the underlying bone as **perforating ulcer (Penetrating ulcer).**

Prevention:

1. Frequent change of posture 2 to 4 hourly
2. Part should always keep dry by powder
3. Water bed
4. Gentle massage of vulnerable skin with lanolin lotion
5. Care of perineum and genitalia, especially in patients with incontinence
6. Polyvinylchloride (PVC) blocks, foam (light weight form of plastic made by solidifying foam), sheep skin may be used to protect pressure points.
7. Aerosol silicone spray may use to keep part dry.
8. Haemoglobin of patient should be maintained.

Treatment:

1. Cause should be treated
2. Nutritional supplement
3. Rest
4. Antibiotics
5. Slough excision
6. Regular dressing
7. Vacuum assisted closure (VAC): It is the creation of intermittent negative pressure of minus 125 mm Hg, to promote formation of healthy granulation tissue. Negative pressure reduce edema, clear the interstitial fluid, improves the perfusion, and increase cell proliferation.
8. Once ulcer granulates well, flap cover or skin graft is done.
9. Proper care:

- Change position in 2 hrs
- Lifting the limb upwards for 10 seconds once in 10 mts.
- Use of water bed/airbed/air fluid floatation bed
- Urinary and faecal care
- Hygiene and Keeping skin clean and dry (talcum powder).
- Psychological counselling and regular skin observation

Ayurvedic management:

- Triphala kashaya prakshalana
- Guggulu dhupana
- Nimbadi kalka local application
- Jatyadi dressing
- Panchatiktaka guggulu I TDS
- Navyasa lauha I TDS

VI. Wound healing stages and their management.

Stages of Wound Healing:
The stages of wound healing proceed in an organized way and follow four processes: haemostasis, inflammation, proliferation and maturation. Although the stages of wound healing are linear, wounds can progress backward or forward depending on internal and external patient conditions.

1. **Haemostasis Phase:**

Haemostasis is the process of the wound being closed by clotting. Haemostasis starts when blood leaks out of the body. The first step of haemostasis is when blood vessels constrict to restrict the blood flow. Next, platelets stick together in order to seal the break in the wall of the blood vessel. Finally, coagulation occurs and reinforces the platelet plug with threads of fibrin which are like a molecular binding agent. The haemostasis stage of wound healing happens very quickly. The platelets adhere to the sub-endothelium surface within seconds of the rupture of a blood vessel's epithelial wall. After that, the first fibrin strands begin to adhere in about sixty seconds. As the fibrin mesh begins, the blood is transformed from liquid to gel through pro-coagulants and the release of prothrombin. The formation of a thrombus or clot keeps the platelets and blood cells trapped in the wound area. The thrombus is generally important in the stages of wound healing but becomes a problem if it detaches from the vessel wall and goes through the circulatory system, possibly causing a stroke, pulmonary embolism, or heart attack.

2. **Inflammatory Phase:**

Inflammation is the second stage of wound healing and begins right after the injury when the injured blood vessels leak transudate (made of water, salt, and protein) causing localized swelling. Inflammation both controls bleeding and prevents infection. The fluid engorgement allows healing and repair cells to move to the site of the wound. During the inflammatory phase, damaged cells, pathogens, and bacteria are removed from the wound area. These white blood cells, growth factors, nutrients and enzymes create the swelling, heat, pain and redness commonly seen during this stage of wound healing. Inflammation is a natural part of the wound healing process and only problematic if prolonged or excessive.

3. **Proliferative Phase:**

The proliferative phase of wound healing is when the wound is rebuilt with new tissue made up of collagen and extracellular matrix. In the proliferative phase, the wound contracts as new tissues are built. In addition, a new network of blood vessels must be constructed so that the granulation tissue can be healthy and receive sufficient oxygen and nutrients. Myofibroblasts cause the wound to contract by gripping the wound edges and pulling them together using a mechanism similar to that of smooth muscle cells. In healthy stages of wound healing, granulation tissue is pink or red and uneven in texture. Moreover, healthy granulation tissue does not bleed easily. Dark granulation tissue can be a sign of infection, ischemia, or poor perfusion. In the final phase of the proliferative stage of wound healing, epithelial cells

resurface the injury. It is important to remember that epithelialization happens faster when wounds are kept moist and hydrated. Generally, when occlusive or semi occlusive dressings are applied within 48 hours after injury, they will maintain correct tissue humidity to optimize epithelialization.

4. **Maturation Phase:**

Also called the remodelling stage of wound healing, the maturation phase is when collagen is remodelled from type III to type I and the wound fully closes. The cells that had been used to repair the wound but which are no longer needed are removed by apoptosis, or programmed cell death. When collagen is laid down during the proliferative phase, it is disorganized and the wound is thick. During the maturation phase, collagen is aligned along tension lines and water is reabsorbed so the collagen fibres can lie closer together and cross-link. Cross-linking of collagen reduces scar thickness and also makes the skin area of the wound stronger. Generally, remodelling begins about 21 days after an injury and can continue for a year or more. Even with cross-linking, healed wound areas continue to be weaker than uninjured skin, generally only having 80% of the tensile strength of unwounded skin.

The stages of wound healing are a complex and fragile process. Failure to progress in the stages of wound healing can lead to chronic wounds. Factors that lead up to chronic wounds are venous disease, infection, diabetes and metabolic deficiencies of the elderly. Careful wound care can speed up the stages of wound healing by keeping wounds moist, clean and protected from reinjury and infection.

Management of Wounds

1. Wound Cleaning- is achieved by removing visible devitalized tissues or dressing materials or excess exudates or crusts. Warm sterile isotonic normal saline (370C) is ideal.
2. Wound is measured either in two dimensions (length and width) or in three dimensions (length, width, and depth).

Specific management:

Incised wound → primary suturing
Lacerated wound → wound is excised and primary suturing
Crushed or deviated wound → oedema and tension in the wound, so delayed primary suturing (after 2-6 days)
Deep devitalised → after wound debridement it is allowed wound to granulate completely. Later, if the wound is small secondary suturing is done. If the wound is large a split skin graft is used to cover the defect.
Wound with tension → Fasciotomy, to prevent the development of compartment syndrome.

Vessels and Nerves are sutured with 6-zero polypropylene nonabsorbable suture material.
Internal injuries (intracranial by craniotomy, intrathoracic by intercostal tube drainage, intra-abdominal by laparotomy) must be dealt with accordingly.
Fractured bone is also identified and properly dealt with.

Antibiotics, fluid arid electrolyte balance, blood transfusion, tetanus toxoid (0.5 ml intramuscular to deltoid muscle), or antitetanic globulin (ATG) injection.

Suturing type	Duration
Primary suturing	Immediately within 6 hours
Delayed primary	Suturing the wound in 48 hours to suturing 10 days. This time is allowed for the oedema to subside.
Secondary suturing	Suturing the wound in 10-14 days or later. After the control of infection, once healthy granulation tissue appears.

Complication of wound healing:

1. Infection
2. Ugly painful scar
3. Implantation cyst
4. Keloid painful scar
5. Incisional hernia
6. Skin pigmentation
7. Marjolin's ulcer

Factors affecting wound healing:

A. General:	B. Local factors
1. Age: Children: fast, old age: delayed 2. Debilitation: Delayed, Vit C, zinc, copper, and magnesium deficiency 3. Diabetic: delayed 4. Jaundice and uraemia: Poor wound healing 5. Cytotoxic drugs and malignancy 6. Generalized infection 7. Corticosteroids: Delayed	1. Poor blood supply: • Heals quickly: Face • Delay: on knee and shin of tibia. 2. Local infection 3. Haematoma 4. Faulty technique of wound closure 5. Tension while suturing 6. Tissue hypoxia 7. Pressure of necrotic tissue and foreign body and recurrent trauma

VII. Pramehapidaka - Diabetic carbuncle and wounds.

DIABETIC WOUND/CARBUNCLE

Diabetic wounds are open wounds or sores usually found on the bottom of feet. These ulcers affect many people with diabetes and experts suggest that about 15 percent of diabetics will develop one or more at some point in their lifetime.

Aetio-pathogenesis:

1. High glucose level in tissue is good culture media for bacteria, so infection is common.
2. Diabetic neuropathy: Due to sensory neuropathy, minor injuries (like thorn prick, trimming of nail, shoe bite) are not noticed and so infection occurs.
3. Due to motor neuropathy dysfunction of muscles arches of foot and joints occurs, which leads to loss of refluxes of foot causing more prone for trauma and abscess.

4. Increased glycosylated haemoglobin in blood causes defective oxygen dissociation leading to more hypoxia.
5. Diabetic microangiopathy cause blockage of microcirculation leading to hypoxia.
6. Diabetic atherosclerosis itself reduces blood supply and causes gangrene. Thrombosis can be precipitated by infection. Blockage occurs at plantar, tibial and dorsalis pedis vessel.

Clinical features:

1. Pain in foot
2. Ulceration
3. Absence of sensation
4. Absence of pulses in foot
5. Loss of joint movement
6. Abscess formation
7. Changes in temperature and colour when gangrene sets in.

Investigation:

1. Complete blood count
2. Blood and urine sugars estimation
3. Pus for culture/sensitivity
4. X-ray of foot to rule out osteomyelitis
5. LET, ECG, chest x-ray, blood urea, creatinine as for routine diabetic patients
6. Lower limb angiography to check potency of vessels

Treatment:

1. Control of diabetes
2. Control of infection
3. Local treatment of ulcer
4. Various type of surgery for diabetic ulcer foot
5. Care of patient as whole

1. Control of diabetes:

As diabetes precipitate the infection which worsens the condition, its important part of treatment of diabetic foot. It is better managed, at least initially period by insulin then with Oral drugs. Inj plain insulin is given 3-4 times/day depends upon requirement. All the time of admission after measuring blood sugar level, urine is checked 3-4 times/day by benedict test and chart is maintained.

2. Control of infection:

- Once culture/sensitivity report is available, appropriate antibiotics are started.
- Presence of high-grade fever with chills and rigors suggests development of multiple abscess pockets which need to be drained.
- If infection not controlled, ketoacidosis results.

3. Local treatment of diabetic foot:

It is non healing ulcer; hence initial treatment is with hydrogen peroxide or EUSOL or iodine solution. When ulcer is converted into healing ulcer (pink granulation tissue) Split Skin Graft is applied.

4. Various types of surgeries (to save the leg):
a. Spreading ulcer with slough: Debridement
b. Healing ulcer: Skin grafting
c. Abscess: I & D
d. Gangrene toe: Disarticulate toe
e. Involvement of metatarsal bone: Excision of metatarsal bone
f. Gangrene confined to toes: Forefoot amputation
g. Spreading cellulitis: Multiple fasciotomy
h. Spreading cellulitis with gangrene: Amputation below/above knees

5. Care of patient as whole:
a. Nutrition factor: Diabetic diet
b. A bedridden patient may have difficulty in passing urine: Catheterization under aseptic measure, frequent change of catheter
c. Chest infection like pulmonary TB or pneumonia: Control of TB, pneumonia
d. Bed sore: Frequent change of position and nursing care.

PRAMEHA PIDIKA

Prameha Piḍakā are complications occurring in patients afflicted with Prameha due to prolonged presence of vitiated Doṣas. Prameha Piḍakā are diabetic carbuncles / boils.

Bheda: (Ā. Sushruta & Ā. Vāgbhaṭa)

1. **Sharāvikā** are the boils which resemble Sharāva (curved earthen pan) in shape.
2. **Sarṣapikā** are the boils which resemble white mustard in colour and size.
3. **Kacchapikā** are the boils which are elevated like a tortoise shell, with a rough surface, and causing burning sensation.
4. **Jālinī** are the boils which cause severe burning sensation and appear like a network of fibres on the skin.
5. **Vinatā** are the boils which are deep rooted, large, painful, moist and appear on the back and abdomen.
6. **Putriṇī** are the boils which are spread over a large area with multiple blisters at the center.
7. **Masūrikā** are the boils which resemble red lentils.
8. **Alajī** are the boils which are red or white in color, appear as they are about to rupture and cause severe pain.
9. **Vidārikā** are the boils which resemble the tubers of Vidārī.
10. **Vidradhikā** are the boils which possess similar features like Vidradhi Roga.

Sādhyāsādhyatā:
Sādhya → Sarṣapikā, Vinatā, Masūrikā, Alajī, Vidradhikā
Kṛcchrasādhya → Sharāvikā, Kacchapikā, Jālinī, Putriṇī, Vidārikā; Piḍakā which are associated with burning sensation, excessive thirst, fever, hallucinations, which spread easily, and have red or black discolouration.

Chikitsā:

- Prameha should be controlled.
- Apakva Piḍakā -> Raktamokṣaṇa / Jalaukāvacharaṇa
- Pakva Piḍakā -> Pāṭana & Vraṇa Chikitsā
- Nyagrodhādi Gaṇa Kaṣāya with Gomūtra is administered internally.
- Āragvadhādi Gaṇa Kaṣāya should be used internally and externally for Udvartana.
- Mudgaparṇyādi Kvātha, Anantādi Kvātha
- Prameha Piḍakāhara Lepa (Udumbara kṣīra & Bākuchī chūrṇa)
- Gandhaka chūrṇa with Guḍa is taken internally; it cures 20 types of Prameha and 10 types of Prameha Piḍakā.
- Sārivādi Lauha (250-500 mg) with Madhu and Ghṛta is indicated in 10 types of Prameha Piḍakā, all types of Ashas, and Tvak vikāra.

Carbuncle:
In ayurveda corelated with Prameha pidika

Definition:
It is an infective gangrene of the subcutaneous tissue due to staphylococcus aureus infection.

Site:
Carbuncles are mostly seen on the back, in the nape of the neck, hairy chest & abdomen may also be involved.

Pathology:
When the invading staphylococci penetrate the deeper layers of the skin & the subcutaneous fat, a carbuncle is formed.

Risk factors:
Males above 40 years
Diabetic

Clinical features:
Skin becomes red, dusky & edematous. The central part softens and multiple vesicles appear on the skin. Vesicles transform into pustules → pustules burst → discharge → sieve like appearance → cribriform appearance

TWAK VIKARA

4. Twak Vikara - Nidana, Samprapti, Lakshana and Chikitsa of Chippa – Paronychia, Kadara – Corn and Kshudra rogas.

CHIPPA

Dosa: Vata and pitta
Dushya: Vitiate mamsa in the region of nail bed
Symptoms: Burning sensation and suppuration
Synonyms: Upanakha, akshata, anguliveshtaka

Management:

- Affected part should be washed with hot water
- Excision of unhealthy tissue
- Chakra taila abhyanga
- Bandage
- If above said treatment fails, then go for agnikarma.

PARONYCHIA

Para means around and onukh means nail. Paronychia means infection of the nail fold where nail and skin meet at the site or base of the finger or toe nail.

Types:

1. Acute
2. Chronic

Causes:

- Infection: It may be bacterial, fun al orb east infection of soft tissue around nail.
- Affects more in women due to those who do much washing and trauma to cuticle such as form of biting.
- Can occur with diabetes, drug induced immunosuppression.
- Common organism is staphylococcus aureus and pyogens and candid.

Symptoms:

- Red and swelling skin of nail
- Severe pain
- Itching
- Pus along with gradual thickening and browny discolouration of nail plate.

Treatment:

- Antibiotics, antifungals, and analgesics
- If abscess forms, then I & D
- In chronic condition, use topical antifungal and topical steroid
- If all measure fails then go for removal of nail fold surgically.

KADARA

Cause: Walking bare foots may injure the sole by gravel or thorn prick
Samprapti: Vitiation of Meda and Rakta

Symptoms:
A knotty and painful hard growth raised at the middle or sunk at the sides, which exudates a secretion and resembles of kola beeja (Indian plum).

Treatment:
Kadara should be removed/scrapped off without leaving any residue and then site burn with hot oil.

CORN

Definition:
Corns are hard, thickened areas of skin that form as a consequence of rubbing, friction or pressure on skin.

Etiopathology:
Corn form when the pressure point against the skin traces an elliptical or semi-elliptical path during the rubbing motion, the centre of which is at the point of pressure, gradually widening. If there is constant stimulation of tissue producing the corns, even after corn is surgically removed, the skin may continue to grow as corn.

Site: Soles, tip of toes and dorsal surface of interphalangeal joints

Types:

1. Hard
2. Soft

Symptoms: common in females

- The hard part at the centre of corn resembles a barley seed, that is like a funnel with broad raised top and a pointed bottom
- Because of their shape, corn intensify the pressure at the tip and can cause deep tissue damage and ulceration
- Difficulty in walking due to pain

Treatment:

- Soft shoes, soft pack at the pressure point of the sole
- Corn plasters a felt ring with a core of salicylic acid that relieves pressure and erodes the hard skin
- If all measures fail, then excision may be performed.

KSHUDRA RODA

Kṣudra means small or minor. The diseases caused by minor factors, having less symptoms and complications, less severe symptoms, and which require little treatment are called Kṣudra Roga.

Numbers:

- Sushruta → 44
- Vagbhata → 36
- Madhava → 43
- Sharangdhara → 60

Sushrutokta Kṣudra Roga:

1. Ajagallikā
2. Yavaprakhyā
3. Andhālajī
4. Vivṛtā
5. Kacchapikā
6. Valmīka
7. Indravṛddhā
8. Panasikā
9. Pāṣāṇagardabha
10. Jālagardabha
11. Kakṣā
12. Visphoṭaka
13. Agnirohiṇī
14. Chippa
15. Kunakha
16. Anushayī
17. Vidārikā
18. Sharkarārbuda
19. Pāmā
20. Vicharchikā
21. Raktasā
22. Pādadārikā
23. Kadara
24. Alasa
25. Indralupta
26. Dāruṇaka
27. Aruṃṣikā
28. Palita
29. Masūrikā
30. Yauvanapiḍakā
31. Padminīkaṇṭaka
32. Jatumaṇi
33. Māṣaka
34. Charmakīla
35. Tilakālaka
36. Nyaccha
37. Vyaṅga
38. Parivartikā
39. Avapāṭikā
40. Niruddhaprakāsha
41. Sanniruddhaguda
42. Ahipūtana

Ajagallikā:

Ajagallikā is compared to a form of subcutaneous lymph gland enlargement. It is due to vitiation of Kapha and Vāta Doṣa. This condition is commonly seen in children.

Lakṣaṇā:

Snigdha, Savarṇā (colour as the surrounding skin), Grathitā (knotty), Niruja (painless), its shape resembles Mudga

Chikitsā:

Jalaukāvacharaṇa, Application of Shaṅkha bhasma, Yavakṣāra and Shukti; After it has become Pakva, Ajagallikā should be punctured with a fresh thorn of Kaṇṭakārī.

Visphoṭaka:

Visphoṭaka are vesicles resembling those which occur due to burns. They are predominantly produced by Pitta and Rakta. Visphoṭaka may occur anywhere on the body and are associated with Jvara.

Nyaccha:

Nyaccha are round painless eruptions which may be large or small, dark-coloured or whitish, and may be present from birth.

Vyaṅga & Nīlikā:
Vāta combined with Pitta get aggravated due to anger and exertion, reach the face and give rise to painless, thin, and brownish patches on the skin. This is known as Vyaṅga (freckles). That which develops on the body or face, with similar features but black in colour, is known as Nīlikā.

Chikitsā:
- Sirāvyadha, Pralepa, Abhyaṅga
- Kalka of Arjuna tvak or Mañjiṣṭha mixed with Madhu
- Vyaṅgahara Lepa -> Kola majjā mixed with Guḍa, Navanīta and Madhu
- Kalka of Varuṇa tvak and Ajādugdha
- Jātīphala Kalka for Vyaṅga & Nīlikā
- Kanaka taila, Kumkumādya taila, for Abhyaṅgārtha
- Application of Sarṣapa taila in the evening on the face provides Vaktra prasādana.

Maṣaka:
Māṣaka are painless, firm, blackish eruptions which resemble Māṣa in shape. They occur mainly due to Vāta Doṣa.
It can be treated by excision followed by Agnikarma or Kṣārakarma (e.g.: Kṣāra Ghṛta).

Tilakālaka:
Tilakālaka are blackish, painless spots on the skin which are not elevated and about the size of a Tila bīja.
It can be treated by excision followed by Agnikarma or Kṣārakarma (e.g.: Kṣāra Ghṛta).

Charmakīla / Tvak Arsha:
Charmakīla is compared with warts. It occurs mainly due to vitiated Vyāna Vāyu and Kapha Doṣa. The vitiated Doṣa which localize in the skin produce small nail-like growths.
Vāta pradhāna → Toda
Kapha pradhāna → Grathita & Vaivarṇya
Pitta Rakta pradhāna → Rūkṣa, Kṛṣṇa varṇa
It can be treated by excision followed by Agnikarma or Kṣārakarma (e.g.: Kṣāra Ghṛta).

Warts:
Warts are small, firm bumps on the skin caused by viruses in the human papillomavirus (HPV) family. Warts are common in children and can affect any area of the body.

Types:
1. Common warts. Usually found on fingers, hands, knees, and elbows, a common wart is a small, hard bump that is dome-shaped and usually grayish-brown. It has a rough surface that may look like the head of a cauliflower, with black dots inside.

2. Flat warts. These are about the size of a pinhead, are smoother than other kinds of warts, and have flat tops. Flat warts may be pink, light brown, or yellow. Most children who get flat warts have them on their faces, but they can grow anywhere and can appear in clusters.
3. Plantar warts. Found on the sole of the foot, plantar warts can be very uncomfortable, and feel like walking on a small stone.
4. Filiform warts. These have a finger-like shape, are usually flesh-colored, and often grow on or around the mouth, eyes, or nose.

Management:
- Topical creams → salicylic acid, imiquimod
- Electrodessication, Cryosurgery, Surgical curettage

Mukhadūṣikā / Yauvanapiḍakā:
Mukhadūṣikā is compared to acne vulgaris. It occurs mainly due to vitiated Kapha, Vāta and Rakta. Piḍakā (eruption) resembling thorns of Shālmalī appear on the face of young people (Yauvana).

Chikitsā: Vamana, Sirāvyadha, Pralepa, Abhyaṅga
- Kalka of Lodhra, Dhānyaka and Vachā
- Haridrādi Kalka (Haridra, Dāruharidrā, Yaṣṭīmadhu, Mañjiṣṭha, Kālīyaka, Kuchandana, Kamala, Padmaka, Kumkuma, Kapittha, Tiṇḍuka, Plakṣa, Nyagrodha, Kṣīra)
- Haridrādi taila

Acne Vulgaris:
Acne vulgaris is the formation of comedones, papules, pustules, nodules, and/or cysts as a result of obstruction and inflammation of pilosebaceous units (hair follicles and their accompanying sebaceous gland). Acne develops on the face and upper trunk.

Etiology:
The most common trigger is puberty. During puberty, surges in androgens stimulate sebum production and hyperproliferation of keratinocytes.
Other triggers include:
- Hormonal changes that occur with pregnancy or the menstrual cycle
- Occlusive cosmetics, cleansers, lotions, and clothing
- High humidity and sweating

Signs & Symptoms:
- Skin lesions and scarring can be a source of significant emotional distress. Nodules and cysts can be painful. Lesion types frequently coexist at different stages.
- Whiteheads are flesh-colored or whitish palpable lesions 1 to 3 mm in diameter; blackheads are similar in appearance but with a dark center.

- Papules and pustules are red lesions 2 to 5 mm in diameter. Papules are relatively deep. Pustules are more superficial.
- Nodules are larger, deeper, and more solid than papules. Such lesions resemble inflamed epidermoid cysts, although they lack true cystic structure.
- Cysts are suppurative nodules. Rarely, cysts form deep abscesses. Long-term cystic acne can cause scarring that manifests as tiny and deep pits (icepick scars), larger pits, shallow depressions, or hypertrophic scarring or keloids.

Niruddhaprakāsha / Niruddhamaṇi / Phimosis:
Niruddhaprakāsha is the condition in which the glans penis is covered by constriction of prepuce (foreskin) leading to obstruction of urinal flow. Prepuce cannot be pulled back to expose the complete glans penis.

Causes:

- Foreskin is too narrow to pass over glans penis
- Inner surface of foreskin is fused with glans penis
- Frenulum is too short to allow complete retraction of foreskin

(Frenulum is an elastic band of tissue under foreskin that connects to the glans penis.)

Signs & Symptoms:

- Prepuce cannot or only slightly be retracted
- Slow urination with mild pain
- Swelling due to urine
- Greater risk of inflammation of glans penis

Treatment:

- Dilatation of preputial meatus
- Topical steroid creams like cortisone
- Surgery: Circumcision - complete removal of the foreskin

MANYA VIKARA

5. Manya Vikara – Nidana, Samprapti, Lakshana and Chikitsa of Galaganda – Goitre, Gandamala, Apachi –Lymphadenitis, Pashanagardhabha – diseases of parotid gland.

GALAGAṆḌA

The swelling which hangs like scrotum in the throat region is called Galagaṇḍa.

Samprapti:
Duṣṭa Kapha Doṣa along with Vāta Doṣa localize at throat region to vitiate Meda Dhātu and cause Galagaṇḍa.

Bheda:

1. Vātaja
2. Kaphaja
3. Medoja

Lakṣaṇa:

1. Vātaja Galagaṇḍa:

- Toda
- Kṛṣṇa-Sirā avanaddha (covered by a network of blackish veins)
- Kṛṣṇa / Aruṇa varṇa
- It may be rough and discharge pus
- Āsasya Vairasy
- Tālu-Gala Shoṣa
- When associated with Medo duṣṭi, it grows slowly but gradually, is painless and unctuous.

2. Kaphaja Galagaṇḍa:

- Savarṇa (same colour as the surrounding skin)
- Sthira, Alparuk, Kaṇḍū, Shīta
- Mahān (large swelling)
- Chiravṛddhi
- Āsasya Mādhurya
- Tālu-Gala Pralepa

3. Medoja Galagaṇḍa:

- Snigdha, Mṛdu, Pāṇḍu varṇa
- Niruja, Atikaṇḍū
- Decrease or increase of Meda Dhātu influence the size of the swelling
- Snigdhāsyatā

Asadhya lakshana:

- Dyspnea
- Flaccid body
- Diseases is associated for more than a year
- If patient suffers from thirst, emaciation, and hoarseness of voice

Chikitsā:

Pathya: Vamana, Virechana, Svedana, Dhūmapāna, Sirāvyadha, Agnikarma, Kṣāra, Pralepa, Laṅghana, Purāṇa Ghṛta pāna, Guggulu, Shilājatu
Rakta Shāli, Yava, Mudga, Paṭola, Rakta Shigru, Rūkṣa Kaṭu Dravya, Dīpana Dravya

Apathya: Kṣīra, Ikṣu, Māṁsa, Piṣṭānna, Amla Madhura Guru Abhiṣyanda Dravya

- Varuṇa mūlatvak kvātha with Madhu
- Kāñchanāra tvak kvātha with Shuṇṭhī chūrṇa
- Kāñchanāra tvak chūrṇa pounded with Taṇḍulodaka and mixed with Shuṇṭhī.

1. Vātaja:

Nāḍī Svedana with Vātahara Dravya
Nichulādi Lepa (Nichula, Shigru bīja, Dashamūla, Uṣṇodaka)

2. Kaphaja:

Upanāha Svedana with Kaphahara Dravya
Devadāryādi Lepa (Devadāru & Indravāruṇī)
Vamana, Shirovirechana, Virechana

3. Medoja:

External application of Sneha followed by Sirāvyadha
Kalka from Shyāmā-Trivṛt, Snuhī, Maṇḍūra Bhasma, Dantī, Rasāñjana
Khadira sāra Kvātha with Gomūtra for internal administration

GOITER

Diffuse enlargement of thyroid gland is called as goiter. It is derived from latin word gutter means throat.

Incidence:
Physiological goiter occurs at puberty, pregnancy and menopause
25-35 years (Primary thyrotoxicosis)
35-45 years (Secondary thyrotoxicosis)
M:F = 8:1 (Thyrotoxicosis)
Toxic goiter is more common in persons working under stress and strain
Himalaya. vindhya, satpuda regions in India are known as goiter belts and porbandar is iodine deficiency goiter belt.

Classification:

1. Simple goiter
- Puberty goiter (Diffuse hyperplastic)
- Colloid goiter (Iodine deficiency goiter)
- Multinodular goiter

2. Toxic goiter
- Grave's disease (Diffuse toxic goiter)
- Secondary thyrotoxicosis (Plummers disease)
- Toxic nodule

3. Neoplastic goiter
- Benign tumour (Follicle adenoma)
- Malignant tumour

4. Thyroiditis
- Granulomatous thyroiditis
- Riedel's thyroiditis
- Hashimoto's autoimmune thyroiditis

➢ **Simple goiter:**

It is developed as result of increased levels of TSH. It is due to stimulation of thyroid gland by the anterior pituitary. The main factor is iodine deficiency.

Types:

- Diffuse hypertrophic goiter: The goiter is soft, diffuse and may become large enough to cause discomfort.
- Nodular goiter: Appear between 20-30 years of age. Usually multiple nodules, or cellular degeneration. Hemorrhage and subsequent calcification occurs. Due to fluctuation in TSH level, leads to iodine deficiency.

Clinical features:

- Slow progressive disease with many years of history
- Swelling: Firm, nodular, non-tender and moves with deglutition
- Later hardness and irregularity due to calcification

Diagnosis:

- Thyroid function test (T_3, T_4, TSH)
- FNAC
- Ultrasonography neck

Complications:

- Secondary thyrotoxicosis
- Follicular cancer of thyroid
- Tracheal obstruction

Treatment:

- **Early stage:** Hyperplastic goiter may regress if Thyroxine is given daily for few months
- **Nodular stage:** Irreversible. Operation is indicated on cosmetic grounds
- **Subtotal thyroidectomy:** 8 gm of thyroid is retained in each lateral lobe
- **Total thyroidectomy:** Entire gland is dissected

➢ **Toxic goiter (Thyrotoxicosis or Hyperthyroidism):**

Thyrotoxicosis: Biochemical and physiological manifestation of excessive thyroid hormone.
Hyperthyroidism: Over production of hormone by thyroid gland.

Types:

- Primary thyrotoxicosis/Diffuse toxic goiter (GRAVE'S DISEASE): Disease with increased level of specific antibodies in blood (TSH receptor antibodies). A diffuse vascular goiter usually in young women and frequently associated with eye sign, due to abnormal thyroid stimulating antibodies.
- Toxic nodular goiter (Secondary thyrotoxicosis): A simple nodular goiter, usually in middle age or elderly and eye sign absent
- Toxic nodule: A solitary overactive nodule. Thyroid is > 3 cm in size

Clinical features:

- Loss of weight in spite of good appetite
- Tiredness
- Heat intolerance
- Thyroid swelling
- Exophthalmos
- Cardiac arrhythmias
- Unexplained behavioral problems
- Insomnia
- Myopathy
- Unexplained diarrhoea

Diagnosis:

- Sleeping pulse rate: 2 hours before the scheduled time of awakening
- X-ray neck AR, lateral view
- Thyroid hormone assay
- FNAC

Treatment:

- Rest & sedation
- Antithyroid drugs e.g., carbimazole
- Surgery: In diffuse toxic and toxic nodular goiter to reduce the mass of overactive tissue below a critical level.
- Haemithyroidectomy
- Subtotal thyroidectomy
- Total thyroidectomy

GANDAMALA

Gaṇḍamālā is the condition in which Kapha Doṣa along with association of Vāta and Pitta, vitiates Meda Dhātu leading to a series of glandular swellings in axillae, shoulders and neck region.

Nidāna: Divāsvapna, Meda vṛddhikara Āhāra, Duṣṭa Ambupāna

Chikitsā:
Pathya: Vamana, Virechana, Svedana, Vairechanika Dhūmapāna, Sirāvyadha, Agnikarma, Kṣāra, Pralepa, Laṅghana, Purāṇa Ghṛta pāna, Guggulu, Shilājatu
Rakta Shāli, Yava, Mudga, Paṭola, Rakta Shigru, Rūkṣa Kaṭu Dravya, Dīpana Dravya

Apathya: Kṣīra, Ikṣu, Māṁsa, Piṣṭānna, Amla Madhura Guru Abhiṣyanda Dravya

- Kāñchanāra Guggulu
- Bhallātakādi Lepa
- Gandhakādi Lepa
- Nasya with either one of the following: Nirguṇḍī mūla, Nimba taila, Vachā and Pippalī with Madhu

CERVICAL LYMPHADENOPATHY

Cervical lymphadenopathy refers to a local form of lymphadenopathy in which only the lymph nodes in the cervical area are enlarged.
It is an acute condition, common in children.

Causes:

- Staphylococcus infections
- Streptococcal pharyngitis
- Cat scratch diseases: Bartonella henselae bacteria
- Viral respiratory infections; bronchitis, common cold, etc.
- Ear infection, Tonsillitis, Chickenpox, Cancer

Symptoms:

- Swollen lymph nodes, prolonged tenderness and pain
- Fever, Runny nose
- Sore throat
- URT infections
- Weight loss

Diagnosis:
CBC, CT scan, PET, Lymph node biopsy, Chest radiography

Management:

- Antibiotics: Clindamycin, Trimethoprim, Sulfamethoxazole, Amoxicilli
- Antiviral, NSAD, Ibuprofen
- Adequate rest
- Symptomatic treatment for pain, fever, etc.
- Warm and wet compress

If the lymph nodes are swellings because of cancerous growth, treatment may include:

- Chemotherapy
- Irradiation therapy
- Lymphadenectomy

APACHI

Apachī is the condition in which there is chronic presence of Gaṇḍamālā, glandular swelling in axillae, shoulders & neck region. It is mainly due to vitiated Kapha and Meda.

Lakṣhaṇa:

- The lumps are Sthira, Vṛtta, Snigdha
- Alparuja, Kaṇḍū
- The swelling grows steadily, but slowly
- When injured, the lumps start suppurating and discharging pus. The swelling disappears and recurs at another location in the body.

Treatment:

- Agnikarma: By making three linear incisions above the wrist, at a distance of one angula between each.
- An incision is made in the leg, 12 fingers from heel avoiding the vital part named indravasti, remove the retinaculum similar to the of fish and apply dahan karma.
- During healing stage, kshara prepared from peacocks, crows, godhas, snakes and tortoises should be mixed with oil of ingudi is used
- Vairechanik dhuma
- Regular diet of barley and mudga

CERVICAL LYMPHADENITIS

Inflammation of lymph node in cervical region

Source of infection:
Nasal and oral cavity, larynx, pharynx, ear, scalp etc.

Types:

1. Acute
2. Chronic
3. Tuberculous

1. Acute lymphadenitis	2. Chronic lymphadenitis
• Affected lymph nodes are enlarged and tender • Pyrexia, general malaise • Appropriate antibiotics • If abscess occurs go for I & D	• Painless • In children/adults may be tuberculous • In elderly due to secondary malignant metastasis

3. Tuberculous lymphadenitis:
- Commonly seen in children and young adults
- Deep upper cervical lymph nodes are commonly involved, but due to widespread lymphadenitis, matting together of numerous lymph nodes is evident
- These caseated lymph nodes enlarged and result in formation of cold abscess
- Gradually pus drains out through skin resulting in chronic discharging sinus called as collar stud abscess.
- Treated with ATT
- Drainage of abscess and excision of surrounding lymph nodes

PASHANAGARDABHA

Pāṣāṇagardabha is characterized by an immovable Shopha at the root of the lower jaw associated with mild pain. It is due to Kapha and Vāta Duṣṭi.

Chikitsā:
- Svedana
- Kapha-Vātahara Kalka for Shopha; Manaḥshila, Haratāla, Kuṣṭha, Devadāru
- Once it is in Pakvāvasthā, Visrāvaṇa is done.

PAROTIDITIS

It is an inflammation of one or both parotid glands.

Causes: Infection → Staphylococcus aureus. Poor oral hygiene. Allergy for food and drug.

Symptoms:
Painful swelling of aggravates the pain
Fever and headache
Anorexia and malaise
Drooling (Drop saliva uncontrollably from mouth)
Lymph nodes are palpated in neck.
Red, tender, warm, well localized, firm swelling is seen in parotid region.

Treatment:
- Broad spectrum antibiotics
- Surgical drainage of abscess
- Proper hydration
- Mouth wash with antiseptic

SIRA VIKARA

6. Sira Vikara - Venous disorders – Superficial and Deep venous thrombosis, Haemangioma, Varicose veins - Diagnosis and their Management.

SUPERFICIAL VENOUS THROMBOSIS

Superficial venous thrombosis is a blood clot in a superficial vein of the upper or lower extremities or, less commonly, in one or more veins of the chest or breast (Mondor disease).

Superficial venous thrombosis in the upper extremity most commonly results from IV infusions or catheterization; varicose veins seem to be the main risk factor for the lower extremity, especially among women. Superficial venous thrombi rarely cause serious complications and rarely become emboli.

Signs & Symptoms:

Typically, patients present with pain, tenderness, or an indurated cord along a palpable superficial vein. The overlying skin is usually warm and erythematous.

Migratory superficial venous thrombosis, which develops, resolves, and recurs in normal veins of the arms, legs, and torso at various times, is a possible harbinger of pancreatic cancer and other adenocarcinomas (Trousseau syndrome).

Diagnosis:

Diagnosis is based on history and physical examination. Patients with superficial venous thrombosis above the knee have an increased risk of deep venous thrombosis (DVT) and should have ultrasonography.

Management:

- Warm compresses and nonsteroidal anti-inflammatory drugs (NSAIDs)
- Sometimes anticoagulation:

In patients with extensive superficial venous thrombosis, anticoagulation (e.g., with low molecular weight heparin, fondaparinux) is often beneficial. The optimal regimen and duration are unknown, but most experts recommend using either low molecular weight heparin (e.g., enoxaparin 40 mg subcutaneously once a day or fondaparinux 2.5 mg subcutaneously once a day) and treating for about 1 month.

DEEP VENOUS THROMBOSIS (PHLEBOTHROMBOSIS)

It is the formation of blood clot (thrombosis) within a deep vein, most commonly the legs.

Causes: **THROMBOSIS**

1. Trauma: Injury to vessel wall
2. Hormones: Altered blood coagulation protein levels and reduced fibrinolysis.
3. Road traffic accidents
4. Operations: Cholecystectomy

5. Malignancy: Cancer grows in and around veins causing venous stenosis
6. Blood disorders: Polycythemia
7. Orthopedic surgery, Obesity, Old age
8. Serious illness: MI, Stroke
9. Immobilization
10. Splenectomy

Symptoms:

- Asymptomatic 60%
- The maximum incidence occurs on 2nd and 5th-6th days in the post operative period.
- Dull aching pain in calf muscle
- Low grade fever with increased pulse rate
- Leg is tense, tender, warm, pale or bluish with stretched and shiny skin.
- White leg: It occurs when thrombus extends from calf region to iliofemoral vein.
- Blue leg: almost total venous occlusion of entire extremity outflow with loss of superficial tissues of the toes.

Investigation:

1. Doppler study: It is ideal for femoral vein thrombosis or thrombus when extends in to popliteal vein. It shows

- Vein larger than normal because of occlusion
- Not completely compressible
- Lack respiratory variation
- Does not show flow augmentation with calf compression
- May have collateral flow.

Treatment:

1. Bed rest and elevation of limbs (It decreases pressure in vein which in turn reduces edema and pain while increases rate of blood flow).
2. When walking is started, elastic stocking should be used (It increases rate of flow in veins)
3. Crepe bandage to entire limb
4. Anticoagulants: heparin
5. Fibrinolytic drugs: Like streptokinase indirectly converts plasminogen to plasmin, which can lyse clots in deep veins.
6. Surgery: It is done in chronic cases where venous bypass has been attempted with moderate success.

Complications:

1. Permanent edema of limb. The limb has an inverted beer bottle appearance
2. Pulmonary embolism, because thrombus is not attached to vessel wall
3. Secondary varicosity and non-healing ulcer
4. Recurrence 30%

HAEMANGIOMA

Haemangioma is a benign tumor that occurs in the endothelial lining of the blood vessels. These tumors usually develop within the first few weeks of life but often resolve independently by the time a child is ten years of age. Haemangioma is the most common type of tumor found in children.

Stages of Development:

There are essentially three stages of haemangioma development:

1. The proliferation stage, where the hemangioma grows rapidly. This stage can last as long as one year.
2. The resting stage, where very little change occurs in the lesion's appearance. This stage lasts until the child is aged around one to two years.
3. The involution stage, where the tumor starts to shrink. In 50% of cases, the tumor has disappeared by the time the child reaches five years of age and most cases have disappeared by time children are ten years old.
   In a few rare cases, hemangiomas do not diminish in size nor disappear.

Sign & Symptoms:

Haemangiomas of the skin usually appear as small red scratches or bumps. As they grow, they look like burgundy-colored birthmarks. Skin haemangiomas are sometimes called strawberry haemangiomas because of their deep red appearance.

Haemangiomas inside the body present with symptoms specific to the organ that is affected. For example, a haemangioma affecting the gastrointestinal tract or liver may present with symptoms such as nausea, vomiting, abdominal discomfort, loss of appetite, a feeling of fullness in the abdomen.

Investigations: Visual inspection on physical examination, Ultrasound, MRI, CT scan

Management:

Treatment options include:

Beta-blockers: The beta-blockers can be used for small, superficial haemangiomas. They may also have a role in treating smaller ulcerated haemangiomas.

Corticosteroid medication: Corticosteroids may be injected into a haemangioma to reduce its growth and to stop inflammation.

Laser treatment: used to remove haemangiomas on the top layers of the skin.

Surgery: If the hemangioma is small enough, it can be surgically removed.

For hemangiomas on the organs: Haemangiomas within the body may require treatment if they grow too large or cause pain.

Treatment options for these haemangiomas include:

Surgical removal of the haemangioma

Surgical removal of the damaged organ or damaged area

In haemangiomas of the liver, tying off of the main blood supply to the haemangioma may be an option.

VARICOSE VEIN

Definition:

It is defined as elongation, dilatation, tortuous and sacculation of veins.

Risk factors:

1. Prolonged standing
2. Old age
3. Obesity
4. Pregnancy

Causes:

Primary varicose vein:

- Congenital competence or absence of valve
- Defective connective tissue and smooth muscles in venous wall
- Stretch of deep fascia
- Valveless syndrome is congenital venous abnormality where in superficial and deep veins do not have any valves.

Secondary varicose vein: It occurs due to venous obstruction. For example

- Mechanical factors: Pregnancy or tumours in pelvis
- Deep vein thrombosis leading to damage of valves
- Hormonal cause: Progesterone may cause varicosity in multiparous women
- Acquired arterio-venous fistula: Due to trauma or deliberate shunting for dialysis
- Extensive cavernous haemangioma

Pathophysiology:

Under normal conditions the blood from superficial venous system is passed to deep veins through the competent perforators and from the deep veins the blood is pumped up to heart by muscle pump, competent valves and negative intrathoracic pressure. But if this mechanism breaks down, either due to destruction of valves of deep veins, perforators or of superficial venous system, the blood becomes stagnated in the superficial veins which become the pray of high-pressure leaks and thus become distended and tortuous to become varicose vein.

Clinical feature:

1. Prominent and tortuous vein in the leg. They are minimal to start with and at the end of day become large due to venous engorgement.
2. Dragging pain and postural defect: It gets worse as the day passes and is exacerbated by prolonged standing.
3. Heaviness in leg
4. Visible veins which are like a thread, known as venous flare or thready veins
5. Night time cramps
6. Swelling of leg around ankle joint (pitting edema)
7. Itching sensation in leg (due to destruction of haemoglobin)
8. Discolouration or ulceration in feet

Investigation:

Doppler ultrasound	Duplex ultrasound imaging

Treatment:

Conservative management:

- Elevation of limbs during rest, which improves venous drainage and reduces edema.
- Support: A crepe bandage is applied which compress minor varicosities.
- Unna boots provides nonelastic compressive mechanism. It is three-layer dressing. It comprises gauge compression dressings that contain zinc oxide, calamine and glycerine.

Drugs used for varicose vain:

- Calcium dobisilate 500 mg BD
- Doismin 450 mg + Hesperidin 50 mg
- Toxerutin 500 mg BD or TID

Surgeries:

- Trendeleneburg operation
- Stripping of vein
- Subfascial endoscopic perforator ligation surgery (SEPS)
- Radiofrequency ablation method (RFA)

Complications:

- Recurrent thrombophlebitis
- Eczema and dermatitis
- Venous ulcer
- Haemorrhage
- Calcification

Ayurvedic formulations:

- Sahacharadi Kashaya or Mahamanjistadi Kashaya
- Tab viscovas
- Tab kaishore guggulu or tab pilex
- Murivenna or mahanarayana taila massage locally
- Raktamokshana (Jalauka/Siravyadha)

DHAMANI VIKARA

7. Dhamani Vikara - Arterial disorders – Nidana, Samprapti, Lakshana and Chikitsa of Aneurysm, Buerger's disease, Atherosclerosis, Raynaud's disease.

ANEURYSM

Abnormal permanent dilatation of localized segment of arterial system (balloon like buldge) is called as aneurysm. It is derived from Greek word aneurynein means to dilate.

Types:

1. True: It contains all three layers of artery (Intima, media and adventia) e.g. Atherosclerotic, Syphilitic and congenital aneurysm.
2. False: Contains single layer of fibrous tissue as wall of sac and does not contain 3 layers of arterial wall as covering, Major cause is trauma. E.g.; Mycotic aneurysm
3. Fusiform: Uniform dilatation of entire circumference of arterial wall. It is commonest one. They are spindle in shape.
4. Saccular: Dilatation of part of circumference of arterial wall. They are spherical in shape.
5. Dissecting: Through a tear in intima blood dissects between inner and outer part of tunica media of artery, it is not true aneurysm, hence artery is not dilated and it is known as haematoma of arterial wall. It usually occurs in old age and associated with hypertension.

Causes: Aneurysm is due to weakness of arterial wall. It may be congenital or acquired.

1. Congenital: Berry aneurysm (Aneurysm in cerebral blood vessels particularly in circle of Willis due to congenital deficiency of elastic lamina at the site of branching), congenital Arterio-venous fistula.
2. Acquired:

- Degenerative: Atherosclerosis (90%) with associated degenerative changes in tunica media.
- Traumatic: Penetrating wound to artery or radiation therapy
- Infective: Syphilis, mycotic, TB, arteritis etc

Clinical feature:

1. Commonest presentation is dull aching pain. Acute pain (Vessel stretching), severe pain (ruptured aneurysm), referred pain (pressure on nerve)
2. Swelling at the site which is pulsatile, smooth, soft, warm, and compressible with thrill on palpation and systolic bruit on auscultation.
3. Swelling reduced in size when pressed proximally
4. Distal oedema due to venous compression
5. Ischaemia: It is due to dissecting aneurysm. If not treated, results in death or gangrene.

Investigation:

- Lipid profile
- Straight X-Ray
- Arteriography

Management:

1. Arterial ligation
2. Wiring of aneurysmal sac: Indicated in elder and poor risk patients
3. Wrapping the sac: A strip of fascia lata or polythene may be wrapped around aneurysmal sac.
4. Excision and grafting or excision and end to end anastomosis.

Abdominal aneurysm: It should be operated when

- It is painful or tender
- Any size causing embolism
- Size > 5.5 cm

BUERGER'S DISEASE / THROMBOANGITIS OBLITERANS (TAO)

Buerger's disease, also called thromboangitis obliterans (TAO), is an inflammation of small- and medium-sized blood vessels.

It usually presents with blockages of the arteries to the feet and hands.

The disease is found worldwide and can affect people of any race and age group. However, it mainly affects Asian and Middle Eastern men between the ages of 40-45 who heavily use, or have heavily used, tobacco products, including chewing tobacco.

The specific cause of Buerger's disease remains unknown.

Signs & Symptoms:

Buerger's disease begins by causing arteries to swell and blood clots to form. This restricts normal blood flow and prevents blood from fully circulating through the tissues. This results in necrosis because the tissues are starved of nutrients and oxygen.

Buerger's disease usually starts with pain in the areas affected, followed by weakness. The symptoms include:

- Recurring pain in the hands and feet, or legs and arms
- Open sores on the toes or fingers
- Pale toes or fingers when in cold temperatures
- Inflamed veins

Management:

There is no cure for Buerger's disease. However, the single-most important factor in improving symptoms and preventing its progression is quitting smoking.

In rare cases, the pain may be so severe that a surgical procedure called a sympathectomy may be performed to eliminate the pain. In this procedure nerves to an affected area are cut.

On the other hand, some patients report symptom improvement by drinking plenty of fluids and staying active, which increases the circulation.

Vasodilators may be helpful as well.

Amputation might be necessary in case of severe infection or gangrene.

ATHEROSCLEROSIS

It is a disease in which the inside of artery narrows due to build of plaque. Plaque is made up of fat, cholesterol, calcium and other substance found in blood.

Arteriosclerosis: It is a general term describing for hardening of medium or large arteries.

Arteriolosclerosis: Any hardening of arterioles (small arteries)

Risk factors:

- High blood pressure
- Hypercholesterolaemia
- Hyperlipidaemia
- Diabetes
- Smoking
- Obesity
- Family history

Pathology:

It constitutes of atherosclerotic plaque which contains smooth muscle cells, connective tissue matrix, macrophages and lipid. Ulceration and calcification occur in these plaques. Ulcerated plaque is highly thrombogenic causing thrombosis and furthers critical block of the vessels leading to tissue ischemia and infarction distally.

Clinical features:

- Chest pain of angina
- Sweating
- Light headedness
- Shortness of breath
- Nausea
- Breathlessness or palpitation

Investigation:

1. Blood sugar
2. Lipid profile
3. Angiography
4. Stress testing
5. CT
6. Intravascular ultrasound (IVUS)

Treatment:

- Stop smoking, control weight and practice regular exercise
- Drugs: To lower cholesterol, to maintain hypertension, blood sugar and to decrease clotting
- Procedures like Percutaneous coronary intervention, Thrombectomy, Coronary artery bypass graft or Carotid endarterectomy.
- Amputation if limb is gangrenous.

Complications:

- Ischaemia, ulceration, and gangrene due to narrowing of arteries, which reduces blood flow
- Embolism due to atheromatous plaque
- Aneurysm
- Fatty streaks

RAYNAUD'S DISEASE

Definition:

A condition where in environmental factor such as cold climate and or emotional factors, result in episodes of vasospasm resulting in closure of small arteries of distal part is called Raynaud's disease.

Incidence:

- Fingers and hands are commonly involved
- More common in women (M: F = 1:10) and western countries in white skinned people
- It usually occurs before puberty and after menopause.

Precipitating factors:

- Greater exposure to chronic cold
- Occupations where in vibrating tools are used

Types:

1. Primary:

It is most common form, isn't the result of associated medical condition. It can be so mild that there is no need of treatment and may resolve on its own.

2. Secondary:

It is also called as Raynaud's phenomenon. It is caused by underlying problem. Although it is less common; it tends to be more serious. The causes are

- Connective tissue diseases like scleroderma, lupus etc
- Disease of arteries like atherosclerosis, TAO etc
- Vibration white fingers: Working with vibrating tools like wood cutting, road drills, chain saw etc
- Carpal tunnel syndrome
- Smoking and injuries to hand
- Certain medications like beta blocker, ergotamine, birth control pills etc.

Pathophysiology:

On exposure to cold, hyperactivation of sympathetic nervous system causing extreme vasoconstriction of peripheral blood vessels, leading to tissue hypoxia.

Stages:

1. **Stage of syncope:** Abnormal exposure to cold causes arteriole vaso spasm along with tingling and numbness. As result of this part becomes blanched (white/pale) and severe pallor develops.
2. **Stage of asphyxia:** After brief period of vasoconstriction capillaries dilate, filling with deoxygenated blood resulting in bluish discoloration of part (Cyanosis) with burning sensation.

3. **Stage of recovery or rubor:** As attack passes off relaxation of arterioles occurs; circulation improves and red engorgement of part occurs.

Clinical features:

1. Sensation of coldness
2. Burning pain
3. paraesthesia Semscehk'0
4. Typically causes bilateral episodic digital ischemia.
5. Usually, medial 4 digits and palm are involved. Thumb is spared.
6. Peripheral pulses are normal
7. Triphasic (Pallor, cyanosis and rubor) are colour changes during attack along with pain.
8. In few patients, because of recurrent attacks, gangrenous patches occur on tip of fingers.

Diagnosis:

1. Cold and Warm Water Test

Initially, the fingers/toes are kept in cold water. After 5 minutes, pallor of digits is observed. Then, warm water is poured over the affect area which results in cyanosis. Then the full spasm relaxes in warm water and rubor is seen.
This test is positive for Raynaud's disease.

2. Digital Artery Pressure

Pressure in the arteries of fingers is measured before and after the hands have been cooled. A decrease of at least 15 mmHg is diagnostic for Raynaud's.

Management:

1. Reassurance
2. Avoid triggers such as cold, tobacco/cigarette, emotions, stress and stay in warm area
3. Treat the secondary causes
4. Vasodilators e.g.: Reserpine 0.25-0.5mg daily orally for 2 weeks
5. I.V low molecular weight Dextron is beneficial during attack.
6. Antibiotics, analgesics, and occasionally surgical debridement may be necessary for ischaemic ulcers.
7. When symptoms are severe go for cervico thoracic sympathectomy
8. Amputation, when necrosed tissue is present.

SNAYU VIKARA

8. Snayu Vikara - Diseases of tendons and ligaments – Tennis elbow, Ganglion and their Management.

GANGLION

It is localised, tense, cystic fluid filled swelling associated with joint capsule or tendon sheath. It contains viscus jelly like gelatinous fluid. In olden days it was termed as "Bible cyst."

Common site:

- Dorsum of the wrist & fingers
- Front of the wrist
- Dorsum of foot
- Palmar aspect of hand

Causes:

- Degeneration of fibroid tissue of capsule, ligaments, and retinaculate.
- Injury

Pathology: Cystic degeneration of tendon sheath → Leakage of synovial fluid through joint capsule → there are small islets of micro spaces in synovial sheath which often fuse together or one of them gets enlarged → Ganglion.

Clinical features:

- Majority of patients are between 20-50 years
- A round to oval, painless swelling in dorsum of hand with smooth surface and round borders. Skin over swelling is normal
- Pain particularly after strenuous work of hand due to nerve irritation
- The swelling is tensely cystic and fluctuant. It is mobile in transverse direction
- When the tendons are put in contraction, the mobility of swelling get restricted

Treatment:

- Asymptomatic: Better left alone
- Traditional method: Strike the lump with a large and heavy book (Historically a Bible was the largest or only 00 in any given household), causing cyst to rupture and drain in to surrounding tissues. This treatment risks injuring the patient and is however discouraged.
- Aspiration of ganglion and injection of sclerosant followed by crepe bandage may reduce size of ganglion
- Surgical excision, but recurrence rate is 30%

TENNIS ELBOW

It is a condition in which the outer part of the elbow becomes sore and tender at the lateral epicondyle.

Causes:

- Direct trauma to epicondyle and sudden forceful pull or forceful extension
- Repeated athletic activity (especially in tennis play repetitive injury to extensor muscle of forearm)

Pathophysiology:

It is degenerative and non-inflammatory condition. Here unaccustomed use of extensor muscle of forearm injures the common extensor Origin at the lateral epicondyle of humerous. Damage is followed by adhesions, which bind the tendon to the joint capsule.

Since this commonly occurs while playing tennis, this condition is termed as tennis elbow.

Clinical features:

- Patients are usually young adults
- Pain on outer part of elbow
- Pain from gripping and movements of the wrist extension especially during pouring of tea or turning the handle of door etc
- Tenderness over lateral epicondyle of humerous

Treatment:

- Rest to elbow either in sling or a cast
- Exercise: It involves grasping a rubber bar, twisting it, and then slowly untwisting it. It is highly effective at eliminating pain and increasing strength.
- Orthosis: It is a device externally used on limbs to improve function or reduce pain. In this case can used counterforce elbow orthoses and wrist extension orthoses.
- Local injection of anaesthetic or hydrocortisone
- Operation: Surgically extensor muscle is detached from lateral epicondyle or any entrapment of nerve (within a muscle etc) is released.
- Agnikarma has shown the better result in the management of Tennis elbow.

9. Care of AIDS - HIV and hepatitis infected patients.

In OPD:

1. All bodily fluids of HIV patients should be regarded as hazardous substance. Barrier protection is the key word
2. Any patient with open wound, or when examining for per rectal/per vaginal high quality latex gloves should be worn.
3. Eye protection during flexible endoscopy.
4. Use disposable instruments.
5. Reusable instruments like endoscopes are handled carefully after use and sterilized properly.

In OT:

1. Operating table is covered with single sheet of polythene.
2. Number of theatre personals is reduced to minimum. It is better not to allowed inexperienced personnel such as medical students to assist in operation.
3. Staff with abrasions & laceration on their hands is not allowed inside theatre.
4. Staffs that enter theatre wear over-shoes, gloves & disposable water-resistant gowns & eye protection.
5. Double gloves & eye protection- by staff directly involved with operation like surgeon, assistant, scrub nurse.
6. Any blood spilled in theatre should be decontaminated by chlorous as soon as possible.
7. Well-marked disposable bags should be used for the collection of waste from theatre and the waste should be incinerated.
8. Surgical techniques:

- Avoid sharp injuries.
- Prefer scissor or diathermy to scalpel.
- Use skin clips.
- Avoid needle stick injuries.
- For purpose of wound drainage, closed apparatus should be used.
- Proper autoclaving at end of surgery.

Hurray!
You are one book closer to your B.A.M.S. degree.