# A text book of
# SHALAKYA TANTRA

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As per updated syllabus of CCIM New Delhi

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# INDEX

# SHALAKYA TANTRA

# PAPER 1

INTRODUCTION

## 1. Shalakyatantra nirukti, Parichayam, Ithihasam

**Nirukti:** Shalaka (A probe) + Tantra (Teaching and practice found in scriptures)

**Definition:**
Wherever shalaka is used in the treatment of disease is called as shalakya and science dealing with it is called shalakya tantra.

The branch of science which deals with the treatment of disease occurring in the organs situated above the neck such as ear, eye, nose, oral cavity etc. is known as shalakya tantra.

Synonyms:
Uttamanga chikitsa
Jatrurdhva chikitsa
Urdhwanga chikitsa (Vagbhata, Arundatta)
Shalakya chikitsa

**Importance:**
Life of the living beings & all the indriyas are situated in the head → Uttamanga
Vagbhata → Importance of shira co-relates it to the root of tree. → Urdhwamoola
Sushruta → mukha roga → nidana sthana, chikitsa sthana
Netra, Karna, Nasa, Shiroroga → Uttara sthana
Netra roga → Aupdravika adhyaya → Uttara sthana 1st adhyaya

In Uttara tantra of sushruta Samhita
Beginning → Description of disease of shalakya tantra told by Videha.

**Itihas:**
Vedik period:
Nahush → Deafness → Treated by ashwini kumar (Rigveda)
Rujaswa and kalpa → Treated for blindness by ashwini kumars (Rigveda)
Several prayers for normal functioning of sense organs (Yajurveda)
Structure and function of mastishka (Atharva veda)
Mantra for disease of eyes, ears, oral cavity etc. (Atharva veda)

Upanishada period:
Eyes → Located in 2 of 7 cavities of the skull.
Part of eyes → Urdhwa & adha vartma
Shuklam
Lohinam & Krishnam are described

Samhita period:
Sushruta Samhita:
Netra, Karna, Nasa & Shiro roga (Uttara tantra 1-26)
Details regarding mukha & kantha roga nidana & chikitsa. (Nidana 16th & chikitsa 22nd)
Description: Karna chedana, bandhana, sandhana, Nasha-aushtha sandhana etc. (su. 16th)

Charaka samhita:
Explanation: Shiroroga sutra sthana 17th
Galaroga – Upajihwika, Galashundi, Rohini sutra sthana 18th
Nasa roga, Shiro, Karna, Netra chikitsa chi. 26th

Description: lakshana & chikitsa: Shankhaka
Ardhawabhedaka
Ananta vata
Shiro virechana
Shiro basti → Siddhi 9th

Ashtanga sangraha:
Detailed description: Shalakya tantra → Uttara tantra 11-28 chapters
Description of kriya kalpa → sutra 32-33 chapter

Astanga hridaya:
Detailed description shalakya tantra Uttara tantra 8-24 chapters
Kriya kalpa sutra 23-24 chapter

Bhela Samhita:
Chakshurvaisheshika & buddhir visheshika aalochaka pitta

Medieval period:
References: Madhava nidana, Sharangadhara Samhita, Bhava prakasha, Chakradatta, Yogaratnakara, Vangasen, Harita Samhita, Bheshaja ratnavali

**Contributors of shalakya tantra:**
Nimi:
Nimi is considered as the father of shalakya tantra. There are controversies regarding his name and personality. According to some Nimi, Videha, and Janaka are different but majority accept them as one. Nimi is considered as the son of King Ikshvaku.

Kankayana:
No shalakya tantra related text is available in his name.
He took part in the symposium held during the time of charaka.
He was the one among the best physician of Bahlika
Kankayana vati is used in the digestive disorders and piles.

Karala:
Nimi is considered as the guru of Karala.
He has mentioned 96 diseases of eye.

Satyaki:
His name is mentioned many times in Mahabharata and considered as brother of lord krishna and friend of arjuna.
He was a renowned physician of shalakya tantra and authored the book "Satyaki tantra."
He has mentioned 80 diseases of eye.
His name is famous as he introduced a couching method for treating cataract.

Gargaya:
He was one of the participants in the conference held in the Himalayas.
He is said to have authored books on vastu shastra and shalakya tantra.
Panini → The vyakaranakara describes about Gargya in his work. So, it can be predicted that Gargya lived before panini.

Galava:
He attended the conference held in the Himalayas.
Galava is considered as disciple of Lord Dhanvantari.
In Mahabharata, Shanti parva, Galava is being told as an expert in Rigveda teaching method.
He has also written books on education and grammar.

Chakshushyena:
He was an expert eye surgeon who wrote Chakshushyena tantra.

Bhoja:
Bhoja was considered well-versed in shalakya tantra even though he was expert in shalya tantra.
The name of the book written by him is Bhoja Samhita / Bhoja Prabandha.

## 2. Netra rachana shariram (Mandala, Patala, Sandhi, Drishti Vichara) and Netra Kriya Sharira along with modern anatomy of Eye.

Netra is the chaksurendriya adhisthana meant for the perception of vision.

**Derivation of Netra:**
The word Netra is derived from the root 'Ni' which means to guide or to lead. Netra means Chakshu or visual sensory faculty which is guiding in nature.

**Synonyms:**

- Lochana
- Nayana
- Netram
- Akshi
- Drika
- Drashti
- Darshanam
- Tarpanam
- Vilochanam
- Devdip

**Utpatti of Netra:**
Indriyas are the essence formed by the action of bhutagni or kaphavaha & raktavaha srotas.
Shukla mandala & Krishna mandala are formed by kapha and raktavaha srotas respectively.

Shukla mandala is pitruja & Krishna mandala is matruja bhava & Drishti mandala is formed by both matruja and pitruja bhava.

**Panchabhautikatva of Netra:**

| **Netra bhaga** | **Mahabhuta** | **Part of eye** |
|---|---|---|
| Pala (mamsa) | Pruthvi | Muscular part |
| Rakta | Teja | Vascular part |
| Krishna | Vayu | Cornea (Black) |
| Sita | Jala | Sclera (White) |
| Asru marga | Akasha | Tear channels |

**Netra pramana:**
1. Bahulya (Anteroposterior diameter) → 2 angula
2. Ayama Vistara → (From above downwards) → 2 angula
   (From side to side) → 2½ Angula
3. Sarvataha (Circumference) → 3½ Angula

**Pramana of krishna mandala:**
It is 1/3$^{rd}$ of Netra ayama.
It is dwi yava pramana i.e., size of 2 barley seeds.
It is 1/3$^{rd}$ of Shukla mandala.

**Pramana of Drishti mandala:**
It is 1/7$^{th}$ of krishna mandala
It is size of masura seed.

**Patala pramana:**
The thickness of the patala is 1/5$^{th}$ of Drishti pramana.

**Space between 2 eyes:** 4 Angulas

**Akruti (Shape) of Netra:**
Suvruttam: Round / Spherical
Gostanakar: Tout of cow / Grape fruit

**Netra bhaga: (Parts of the eyes)**
Acharyas have classified & described anatomical parts of Netra as mandala, sandhi & patala.

5 mandala (circular visible parts of eye):

1. Pakshma mandala: Circle of eye lashes
2. Vartma mandala: Circle of eye lids
3. Shukla mandala: Scleral & bulbar conjunctiva
4. Krushna mandala: Cornea & Iris
5. Drishti mandala: Pupil – lens – Retina

6 Sandhi (Junctions between mandala / Junctions of eye ball)

1. Pakshma vartma sandhi: Lid margins → Junctions between eyelids & eye lashes
2. Vartma Shukla sandhi: Fornix → Junction of palpebral conjunctiva.
3. Shukla Krushna sandhi: Limbus → Sclero corneal junction
4. Krushna drashti sandhi → Pupillary margin
5. Kaninaka sandhi → Inner canthus
6. Apanga sandhi → Outer canthus

6 Patala: (Tunics of eye ball / layers of eye)
2 vartma patala
4 akshi patala: Prathama patala → Tejojalashaya
Dwitiya patala → Mamsashrita
Trutiya patala → Medo Ashrita
Chaturtha patala → Asthi Ashrita

**Netra mandala:**
Externally circular visible part of eye with unique characteristics.
Anatomically arranged in concentric circles from periphery to center as pakshma, vartma, Shukla, Krushna, Drishti.

1. **Pakshma mandala:**

Pakshma → Eye lashes
Situated in lid margins of eye
Root of each pakshma situated in a cavity called pakshmakupa from there it gets nourishment.
Arranged in 2-3 rows and externally curved.
Lashes – more numerous in upper than lower lid.
Pakshma – can be considered as kesha → mala of asthi & predominance of vayu mahabhuta.

2. **Vartma mandala:**

Vartmas → eyelids
Two in number upper and lower.
Meet laterally in apanga sandhi medially in kaneenika sandhi.
Highly vascularised muscular structure
Predominance of Agni and Pruthvi mahabhuta.
Sthanika doshas → Pitta and Kapha.

Function:
Vata:
Vyana:
Opening and closing of the eyelids
Main seat of vyana vayu → Hridaya therefore in hridaya function of vartma will be impaired e.g., Sarvanga vata

Prana:
Controls the functions of the indriyas.
Diseases confined to the head region manifest signs and symptoms in vartma also Eg: Ardita.

Pitta:
Rakta dhatu:
nutritional factor in vartma. Thereby pitta being directly linked to rakta dhatu also helps in nourishing vartma.

Sara & Drava guna:
Moistens the eyeball through lacrimal secretion
Gives lustre.
Protect the eyes.

Kapha:
Maintain structural stability of vartma.
protects the eyeball from trauma and foreign particles.
Kapha ↓ → Vata ↑ → Disturbance in normal function.

3. **Shukla mandala:**

Visible white portion of the eye
Comprising of conjunctiva and sclera.
Visible area about 25mm × 15mm.
Boundaries of shukla mandala consists of 4 netra sandhis.

1. Vartma shukla
2. Shukla krishna
3. Kaneenika
4. Apanga sandhi.

Pancha bhautikatwa:
Jala mahabhuta [kapha (shtanika dosha)] + Agni mahabhuta [Pitta (Anubandha dosha)]
↓
Due to presence of blood vessels signifying agni mahabhuta.

Nutrition:
Rasa and Rakta dhatu → Vartma mandala

Function:
Shape and stability of the eyeball is maintained by the sthira, snigdha and guru properties of kapha.

4. **Krushna mandala:**

Central 1/3rd part of the visible portion of the eyeball.
Appears black in colour but is purely transparent.
Krishna mandala gets its colour because of the underlying pigmented structure Iris.

Pancha bhautikatwa:
Vayu mahabhuta is predominant because of its contact with atmospheric air property of transparency and function of attracting light rays into eyeball.

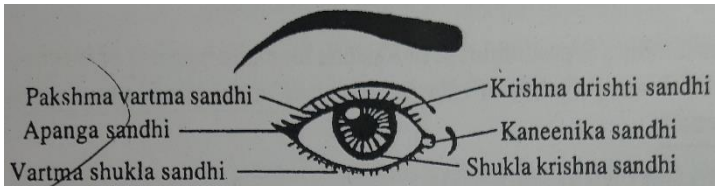
Nutrition:
Transparent due to avascularity.
gets nutrition directly from the atmospheric air through tear film and aqueous humor. (Derivative of rasa dhatu)

Function:
Transparency maintained by the vata dosha and vayu mahabhuta.
helps in the conduction and convergence of the rays on the photosensitive portion of the eye (retina).

5. **Drishti mandala:**

Functional unit: Actually, does perception of vision.
Drishti can be understood in 4 different ways.
Drishti mandala → Pupil
Drishti mani → Lens
Drishti → Retina
Drishti → Vision
$1/7^{th}$ or $1/9^{th}$ of Krushna mandala
Situated in centre of Krushna mandala
Circular in shape
2-4mm diameter
Constrict in presence of bright light.
Dilates in absence of light.
Pancha bhautikatwa:
Predominance of tejo mahabhuta. All three doshas

**Netra sandhi:**
Junctional areas.
6 in number
Four are placed in between the mandalas
Two at the periphery.



1. **Pakshma vartmagata sandhi:**

Junction between pakshma mandala and vartma mandala.
Considered as lid margin.

2. **Vartma Shuklagata sandhi:**

Junction between vartma mandala and shukla mandala.
Considered as the site where the palpebral & bulbar conjunctiva meet fornix

3. **Shukla krushnagata sandhi:**

Junction between Shukla mandala and Krishna mandala.
Considered as limbus

4. **Krushna Drishtigata sandhi:**

Junction between Krishna mandala and Drishti mandala.
Considered as free margins of iris (pupil).

5. **Kaneenika sandhi:**

Junction between upper and lower lid medially
Considered as medial or inner canthus.
Directly connected to nasal cavity through naso lacrimal canal.

6. **Apanga sandhi:**

Junction between upper and lower lid laterally
Considered as lateral or outer canthus.
Slightly higher than kaneenika sandhi.

**Netra patala:**

Patalas are the tunics/layers/coats of the eye.
Exact co-relation of patala is not possible with the anatomical structure of the eye in modern.
6 patalas: 2 in the eye lids → Bahya patala
4 inside the eyes
Prathama patala: Tejo jalashrita: Cornea and Aqueous humor
Dwitiya patala: Pishitashrita: Iris, Ciliary body, and Choroid
Tritiya patala: Medo ashrita: Lens. Some consider Vitreous as tritiya patala
Chaturtha patala: Asthi ashrita: Retina or Lens → Solid appearance & seat for timir roga.
↓
Held in body orbit
According to other authors 4 patalas → layers of lens as it is the seat for the manifestation of timira.
According to Dalhana, patalas are counted from inside out.
First patala → Asthi ashrita,
Second patala→ Medo ashrita,
Third patala → Mamsa ashrita,
Fourth patala → Tejojalashrita.

**Netra bandhana:**
Binding of the structures of the eye is called netra bandhana.
Structures help in netra bandhana are-

- Sira (blood vessels),
- Kandara (tendons),
- Meda (fat),
- Kalakasthi → Fascia attached to bony cavity.
- Kapha

**Netra marma:**
3 marma related to eyes.

1. Apanga marma:

Vaikalyakara, Shira marma
½ angula in size
Situated lateral to eye just below the eyebrows.
Injury leads to andhyatva.

2. Aavarta:

Vaikalyakara, Sandhi marma
½ angula in size
Situated just above the eyebrows
Injury leads to andhyatva.

3. Srungataka:

Junction area of siras nourishing ghrana, shrota, akshi, & jihwa
4 angula in size
Sadhyo pranahara, Shira marma
Trauma is fatal.

**Shira, Dhamani, Snayu, Peshi of netra:**

| | |
|---|---|
| Shira | (38) 8 vataja, 10 pittaja, 10 kaphaja, 10 raktaja |
| Dhamani | 4 rupavahini, 2 ashruvahini (1 in each eye) |
| Snayu | 2 (1 in each eye) |
| Peshi | 2 (1 in each eye) |

**Anatomy of eye (Modern):**
Eye is responsible organ for the vision.
Eye & its appendages are situated in the orbits.

**Anatomy of orbit (Netra guha):**
Orbits are a pair of pyramidal cavities / sockets of skull in which eyes & its appendages are situated.

Orbits are situated 1 on each side of nose between anterior cranial fossa (above) & maxillary sinuses (below).

Measurement of orbit: Antero posteriorly 5-8cm
Vertically & Horizontally 4cm

Orbits formed by combination of following bones:

1. Frontal
2. Sphenoid
3. Ethmoid
4. Maxilla
5. Palatal
6. Lacrimal
7. Zygomatic

Parts of orbit:

1. Base
2. Apex
3. Roof
4. Floor
5. Medial wall
6. Lateral wall

Contents of the orbit:

1. Eyeball & intra orbital part of optic nerve.
2. Tenon's capsule → Form a socket for moving of eye ball, extends form limbus to optic nerve.
3. Extra ocular muscle for movement of eyeball in different directions (4 rectus & 2 oblique)
4. Lacrimal gland & Lacrimal sac
5. Ophthalmic artery with its branches
6. $3^{rd}$, $4^{th}$, $5^{th}$ & $6^{th}$ cranial nerves and branches of $1^{st}$ and $2^{nd}$
7. Branches from carotid and cavernous plexus of sympathetic
8. Ciliary ganglion
9. Orbital fat & Fascia

Arterial supply: Ophthalmic artery (Branch of internal carotid)

Venous drainage: Ophthalmic veins

Nerve supply:

Motor: Superior rectus → $4^{th}$ cranial (Trochlear nerve)
Lateral rectus → $6^{th}$ cranial (Abducent nerve)
Rest 4 muscles → $3^{rd}$ cranial (Oculomotor nerve)

Sensory: $1^{st}$ & $2^{nd}$ division of trigeminal nerve. (Ophthalmic nerve & maxillary nerve)

**Anatomy of eyeball:**

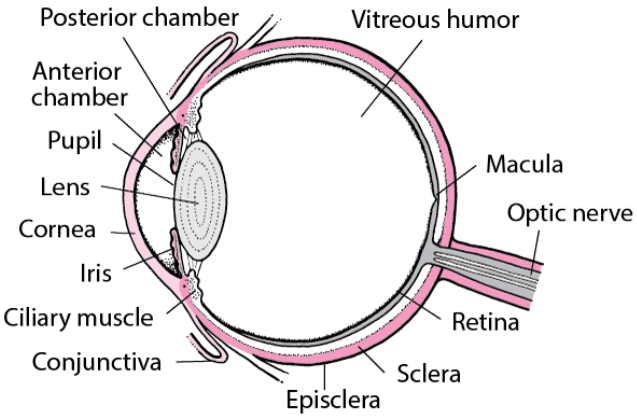
A cystic structure, referred as a globe.
Shape → Not spherical but oblate spheroidal
Situated in anterior part of orbital cavity. Central point on maximal convexities.
Suspended by extra ocular muscle & facial sheaths in quadrilateral pyramid shaped bony cavity → orbit

Dimensions of adult eyeball:

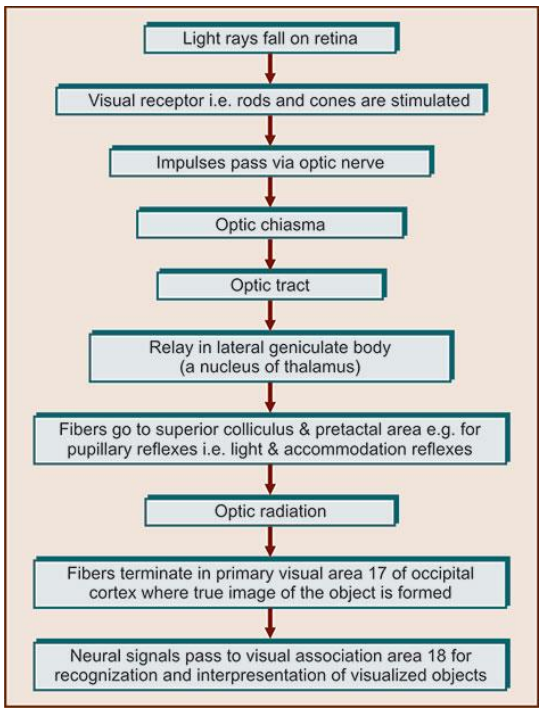
| | |
|---|---|
| Anteroposterior | → 24mm |
| Horizontal | → 23.5mm |
| Vertical | → 23mm |
| Circumference | → 75mm |
| Volume | → 6.5ml |
| Weight | → 7gm |

**Structure of the eye**

| Layers of the eyeball | Interior of the eye ball | Assessory structure of the eye |
|---|---|---|
| 3 layers<br>1. Outer fibrous (Sclera & Cornea)<br>2. Middle vascular layer Uveal tract (Iris, Ciliary body, Choroid)<br>3. Inner nervous tissue layer (Retina, Optic disc, Optic nerve) | Aqueous humor<br>Lens<br>Vitrous humor | Eyebrows<br>Eye lids & Eye lashes<br>lacrimal apparatus<br>Extraocular muscle |




Mechanism of vision




**Layers of the eyeball:**

1. **Outer fibrous layers:**

a. Sclera:

It is composed of a dense, slightly elastic layer consisting of collagen fibres. It is mainly protective in function and maintains the shape of the globe.

The anterior 1/6$^{th}$ part is transparent called cornea and the posterior 5/6$^{th}$ part is opaque called sclera. All extra-ocular muscles are attached here.
It is about I mm thick in the posterior side it is become thin (sieve like membrane ) called Lamina cribrosa at where the optic nerve pierces.

b. Cornea:

It is a clean transparent and elliptical structure with smooth shining surface. It forms anterior 1/6$^{th}$ of the eye. It is the main refracting media of the eye. It consists of five layers namely- Epithelium, Bowman's membrane, stroma, Descemet's membrane & Endothelium.

c. Limbus:

The junction of cornea & sclera is known as limbus.

**2. Middle vascular layer:**

a. Iris:

It is a coloured, free, highly vascular, circular diaphragm with an aperture in the centre called pupil.
It divides the anterior segment of the eye in to anterior and posterior chambers which contain aqueous humor, secreted by the ciliary body.
It consists of endothelium, stroma, pigmented cells and two groups of muscle fibres i.e circular (sphincter pupillae) and radiating (dilator pupillae)

b. Ciliary body:

It is like an isosceles triangle with base forward, about 6 mm length.
The iris is attached to the middle of the base.
It consists of non- striated muscle fibres (Ciliary muscles), Stroma & secretory epithelial cells.
The two main parts of ciliary body are pars plicata about 2 mm & pars plana about 4 mm length.

c. Choroid:

Choroid is a dark brown, highly vascular layer situated between the retina & sclera.
It extends from the ora serrata to the aperture of the optic nerve in the sclera.

**3. Inner nervous tissue layer:**

a. Retina:

Retina is the inner most layer of the eye and is derived from neuroectoderm.
It is a thin membrane extending from the optic disc to the ora serrata in front, which is the anterior termination of retina and where it is continuous with the epithelium of ciliary body.
Macula lutea (yellow spot) is an important spot on the retina about 1.5 mm in diameter situated at the posterior pole, about 3 mm to the temporal side of the optic disc.
There is small depression in the centre of the macula, is a cones predominant area and it is the most sensitive part of the retina. Mainly it is composed of two layer & further ten layers.

- Outer retinal pigment epithelium
- Inner neural layer

b. Optic disc:

It is a circular, pink coloured disc of 1.5 mm diameter. It consists of only nerve fibre layer so it does not give any response to light. It is known as the "blind spot".

c. Optic nerve:

It extends from lamina cribrosa up to the optic chiasma. The total length of optic nerve is 5 cm with having 4 parts namely- Intraocular, intraorbital, intraosseous & intracranial.

**Interior of the eyeball:**

a. Aqueous humor: It is clear transparent, watery fluid filling the anterior chamber (0.25ml) and posterior (0.06ml) secreted by ciliary process & passes in front of the lens, through the pupil in to the anterior chamber, then perform its normal function & returns to the venous circulation through the “canal of Schlemm” situated in the angle of anterior chamber.
b. Lens: It is a transparent, biconvex, circular structure lying immediately behind the pupil. It is suspended from the ciliary body by the suspensory ligament or zonule of Zinn. It is enclosed within a transparent capsule.
c. Vitreous: It is colourless, transparent, inert gel which fills the posterior $4/5^{th}$ of the eye ball.

**Accessory structure of the eye:**

a. Eyebrows:

Eyebrows are two arched ridges of the supraorbital margins of the frontal bones. Numerous hairs (eyebrows) project obliquely from the surface of the skin.
It protects eye from sweat, dust & other foreign bodies.

b. Eyelids & Eyelashes:

Eyelids are two movable folds of tissue situated above and below the front of each eye.
There are short curved hairs. The eyelashes situated on the free edges. The eyelid consist of –

- Thin covering of skin
- Thin sheet of areolar tissue
- 3 muscle - orbicularis oculi
  Levator palpebrae superioris
  Muller’s muscle
- A thin sheet of dense connective tissue, the tarsal plate, larger in the upper than in the lower eyelid. It supports the other structures.
- A lining of palpebral conjunctiva.

c. Lacrimal apparatus:

Lacrimal apparatus of each eye consist of 2 parts viz.

1. Secretory part:
a. Lacrimal glands & its ducts
b. Accessory lacrimal glands
2. Excretory part:
a. Lacrimal puncta
b. Lacrimal canaliculi
c. Lacrimal sac
d. Nasolacrimal duct

The tears are secreted by the lacrimal gland and accessory lacrimal glands.
They drain into conjunctival sac by small ducts.
The tears passes into lacrimal sac through two canaliculi, nasolacrimal duct and finally in the nasal cavity (inferior meatus).

d. Extraocular muscle:

The movement of eyeball is connected by 6 extrinsic muscles, attached at one end to the eyeball and other end to the walls of the orbital cavity.
There are 4 straight & 2 oblique muscles.

Movement of the eyes to look in a particular direction in under voluntary control but co-ordination of movement need for convergence & accommodation to near or distant vision, is under autonomic control.

Name, action & nerve supplies:

| Muscle | Nerve | Function |
|---|---|---|
| Superior rectus | Oculomotor | Rotate the eyeball inwards |
| Inferior rectus | Oculomotor ($3^{rd}$ C.N) | Rotates the eyeball outwards |
| Medial rectus | Oculomotor ($3^{rd}$ C.N) | Rotates the eyeball upwards |
| Inferior oblique | Oculomotor ($3^{rd}$ C.N) | Rotates the eyeball downwards |
| Lateral rectus | Abducens ($6^{th}$ C.N.) | Rotates the eyeball so that cornea turns upwards and outwards. |
| Superior oblique | Trochlear ($4^{th}$ C.N.) | Rotates the eyeball so that cornea turns downwards & outwards |

Blood supply:
Arterial supply: Ciliary artery
Central retinal artery
Ophthalmic artery
Internal carotid artery

Venous drainage: Short ciliary vein
Anterior ciliary vein
Vortex vein
Central retinal vein

Nerve supply:
Motor nerves: Oculomotor (3rd)
Trochlear (4th)
Abducens (6th)
Facial (7th)
Sensory: Trigeminal (5th)
Optic (2nd)

**Netra kriya sharira:**
Eye is the most important indriya among 5 jyanendriya. The function of the eye is to get the clear vision of the external world.

The samyoga of indriya, atma, manas and indriyartha leads to jnana.
The perception of vision takes place in three stages.

1. Indriyartha sannikarsha:

(contact of eye with the objects)
The perception of objects by indriya takes place in stages, by a number of complex mechanisms.
Stage 1 → Conduction of light rays reflected by the objects to the eye.
Stage 2 → Refraction of light rays inside the eye on Drishti patala.
Stage 3 → Convergence (union) of light rays inside the eye on Drishti patala.
Vata is functioning dosha in this stage in the presence of normal pitta & kapha.

2. Roopalochana (analysis of images):

It is a very complex stage. Once the light rays converge on drishti patala, a series of reaction takes place. They are viz.

a. Photo chemical changes: concerned with the photosensitive pigment in the rods and cones of Drishti patala.
b. Electrical changes: when Drishti patal is stimulated, the electrical variations (electrical changes) occur in the nerve endings.
c. Nervous stimulations: the nervous stimulations is developed by the electrical potential.
   Alochaka pitta (chakshur vaisheshika) is the main functioning dosha in this stage.

3. Jnanotpatti:

It occurs in following stages

a. Conduction of the impulse from the Drishti patala to buddhi.
b. Transformation of visual impulse to the indriya jnana (visual sense).
   In this stage, conduction is carried out by prana vayu &transformation of the visual impulse is carried out by alochaka pitta (buddhir vaisheshika).
   Functionally alochaka pitta has two fractions:
   1. Chakshur vaisheshika: acts at the level of eye.
   2. Buddhir vaisheshika: acts at the level of buddhi.

The overall functions of the visual organ can be summarized as follows.

Indriyartha
↓ Vata
Netra sannikarsha
↓ Chakshurvaisheshika
↓ alochaka pitta
Roopa alochanam
↓ Prana vata &
↓ buddhirvaisheshika
↓ alochaka pitta
Jnanotpati

Pancha panchatmaka of netra:
Indriya → chakshur indriya
Indriya dravya → tejas
Indriya adhisthana → akshi
Indriyartha → rupa
Indriya buddhi → chakshur buddhi

**Physiology of vision:**

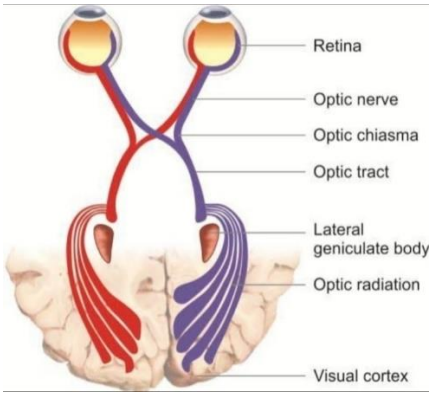
Physiology of vision is a complex phenomenon. The main mechanisms involved in physiology of vision are:

1. Initiation of vision (phototransduction): A function of photoreceptor.

The rods and cones serves as sensory nerve ending for visual sensation.
Light falling upon the retina causes photochemical changes which in turn triggers a cascade of biochemical reactions that results in generation of electrical changes.
The whole phenomenon of conversion of light energy into nerve impulse is known as phototransduction.

2. Processing & transmission of visual sensation: A function of image processing cells of retina and visual pathway.

The light falling upon the retina is absorbed by the photosensitive pigments present in the rods & cones, and initiates photochemical changes which trigger a sequence of events (electrical changes) that initiate the visual sensations.




The long fibres originating from all ganglion cells of retina meet together and forms as optic nerve & comes out of the eye ball through lamina cribrosa.
Both the optic nerves (left & right) form optic chiasma.
Here the fibres from the nasal half of each retina crosses to join the optic tract.
The fibers from temporal half of retina proceeds to the same side.
The two optic tracts from chiasma moves outwards backwards, to end in the lateral geniculate bodies, from which new fibres for the optic radiation originates.
The optic radiation on either sides passes through the posterior portion of the internal capsule and end in the visual cortex surrounding the calarine fissure in the occipital lobe, which is also known as visual cortex.

3. Visual perception: a function of visual cortex and related area of cerebral cortex.

Visual perceptions are the functional elements of the vision – the sensations which results from stimulations of the retina with light.
These are of four kinds, viz.

a. The light sense: It refers to the appreciation of light.
b. The form sense: It refers to the ability to discriminate between the shape of objects.
c. Sense of contrast: It is the ability of eye to perceive slight changes in the luminance between regions which are not separated by definite border.
d. The colour sense: It is the ability of eye to discriminate between different colours excited by light of different wavelength.

## 3. Eye examination and knowledge of basic instruments/equipments required for examination of Eye.

**Examination of eye: (ocular examination)**
Closer examination of the eyelids and different parts of eyeball should be done with a loupe (small magnifying glass) and torch.

1. **Examination of the lids:**

a. Position of the lid margin in relation to cornea
b. Thickness of lids
c. Redness, oedema, localized swelling, any pigmentation, or depigmentation.

d. Condition of the lashes:

- Any misdirection of the lashes as trichiasis
- Any scantiness of lashes (madarosis)
- Any white discolouration of lashes (vitiligo)
- Any nits or parasites adhered to lashes.
- Any matting of the lashes with conjunctival discharge.

e. Lid margin proper

- Any in-rolling (entropion) or out-rolling (ectropion).
- Any crust or ulcers
- Any thickness of margins (tylosis)
- Any redness of margins
- Any defect of lacrimal puncta i.e., eversion, stenosis or absence, any discharge.

Normal opening of the ducts of meibomian glands are visible as a series of white dots in front of the posterior sharp edge of the lid margin.

**2. Examination of lacrimal sac:**

The following points are to be noted.

a. Any redness or swelling over the sac area.
b. Any fistula on the skin over the sac.
c. Any regurgitation of watery, mucoid, or purulent matter through the puncta on pressure over the sac area.

**Test for nasal patency:**

Patency of nasolacrimal passage is tested by introducing a lacrimal canula through the lower punctum and by pushing a coloured fluid like mercurochrome solution or normal saline.
If the passage is blocked, the fluid regurgitates through the upper punctum and if the passage is patent (open) then the patient will feel it in the throat via the nose.

3. Examination of conjunctiva:

A. Bulber conjunctiva:

a. Whether normal or oedema
b. Any chemosis or oedema
c. Any subconjunctival haemorrhage – petechial / patches
d. Any pigmentation, nodule, or any tumour.

B. Upper tarsal conjunctiva:

The lid is everted by a gentle pull on the lashes and a simultaneous pressure over the skin with a glass rod.

a. Any alteration in the arrangement of normal vesicular pattern or any congestion.
b. Any follicle or papilla
c. Any scarring
d. Any membrane formation
e. Any granuloma, tumour, mass, or foreign body.

C. Lower tarsal conjunctiva:

Pulling the lower lid downwards exposes the conjunctiva and fornix.
All the points as in the upper conjunctiva should be noted including any evidence of symblepharon (symblepharon is a pathologic condition where the bulbar and palpebral conjunctiva form an abnormal adhesion to one another).

D. The conjunctiva of the limbus:

a. Presence of circumciliary congestion
b. Presence of any nodule
c. Presence of any newly formed tissue

4. **Examination of plica semilunaris and caruncle**: look for any follicle or tumour.

5. **Examination of sclera:** look for any change in colour, pigmentation, protrusion of uveal tissue (staphyloma) or any congestion or nodule formation

**6. Examination of the cornea:**

a. Diameter: less in microcornea, more in buphthalmos or megalocornea.
b. Curvature: conical in keratoconus, globular or flat.
c. Smoothness, opacity, vascularization, abrasion, or oedema of the corneal surface.
d. Any changes in corneal sensation: elicited by touching the cornea with a wisp of cotton wool.

7. **Examination of angle of anterior chamber:** (Iridocorneal junction)

The anterior chamber angle is a part of eye located between the cornea and iris which contains the trabecular meshwork.
The size of angle is an important determinant of the rate aqueous humour flows out of the eye, and thus, the intraocular pressure.
Its examination is only possible with a gonioscopy.

**Gonioscopy:**

Owing to lack of transparency of corneoscleral junction it is not possible to visualize the angle of anterior chamber directly.
Therefore, a device (gonioscope) is used to divert the beam of light and this technique of biomicroscope examination of the angle of anterior chamber is called gonioscope.

**8. Examination of the pupil:**

a. Size: normally 3 – 4 mm
b. Shape: normally circular any irregularity is better noted if the pupil is dilated.
c. Position: whether central or eccentric and drown to one side.
d. Pupillary margin: any adhesion with the lens capsule known as posterior synechia.
e. Pupillary aperture: clear or occluded
f. Pupil reaction:

Reaction to light – direct or consensual

i. Direct reaction: when the ipsilateral pupil contracts as soon as light enters the eye.
ii. Consensual reaction: pupil of the contralateral eye contracts when the light enters in the ipsilateral eye.

Reaction to accommodation & convergence: Pupil constricts on looking at a near object.

**9. Examination of Iris:**

Following points are to be noted.

- Iris pattern: normal or altered
- Colour: normal or any alteration in the colour.
- New vessels on the iris: normally iris vessels are not visible
- Atrophic patch: usually this area looks worn out and depigmented
- Any gap or hole in the iris
- Any tremulousness of iris known as iridodonesis – best elicited by movement of the eyeball particularly in an aphakic eye.
- Any adhesion of the iris to the posterior surface of the cornea known as anterior synechia

**10. Examination of lens:**

Thorough examination of lens needs a fully dilated pupil. Following points are to be noted:

a. Colour of the lens: grey, brown, white, or transparent
b. Any opacity: central, peripheral, or total
c. Any displacement: if partial it is called as subluxation. If complete it is called luxation (dislocation)
d. Presence or absence of the $3^{rd}$ & $4^{th}$ purkinje image.

**11. Examination of intraocular pressure:**

Measurement of intraocular pressure should be made in all suspected case of glaucoma and in routine after the age of forty years.

Tonometry is test for estimation of IOP.

There are three methods of tonometry:

1. Digital tonometry
2. Schiotz tonometry
3. Applanation tonometry

**1. Digital tonometry:**

Means of “estimating” intra ocular pressure by palpating gently pressing the index finger against the cornea of a closed eye) the globe.

Using index finger to feel the stiffness of the eye.

Also called as digital palpation tonometry.

A rough estimation of IOP can made by digital tonometry

The patient must look down so that the sclera is palpated through the upper lid beyond the tarsal plate.

Tension is judged by the amount of fluctuation obtained.
Interpretation:

1. Indecent early → low IOP
2. Firm to touch → normal IOP
3. Hard to touch → high IOP

**2. Schiotz tonometry:**

By this instrument the resistance offered to the different weights used to indent the surface of the cornea is recorded by the movement of the pointer on the scale.
After a local anesthesia the lids are separated with the fingers and the foot plate of the tonometer carrying a weight 5.5 gm is gently placed on the cornea.
The deflection can be interpreted in terms of intraocular tension from the chart accompanying the tonometer. Normal intraocular tension varies from 11 -21 mmHg.

Advantages: easy to use, simplicity, low price.
Disadvantages: gives false result when used in eye with abnormal scleral rigidity.
False low levels of IOP with low scleral rigidity seen in high myopes and following ocular surgery.

**3. Applanation tonometry:**

The concept of applanation tonometry was introduced by Goldman in1954.
It is based on Imbert-Fick law which states that the pressure inside a sphere (P) is equal to the force (W) required to flatten its surface divided by the area of flattening (A) i.e., P=W/A.
The commonly used Applanation tonometers are:
Goldman tonometer, Perkin's applanation tonometer, Pneumatic tonometer, Pulse air tonometer, Tono-pen.

**12. Fundus examination:**

Examination of fundus is essential to diagnose the diseases of vitreous, optic nerve head, retina, and choroid. For thorough examination of the fundus, pupils should be dilated. The fundus examination can be accomplished by ophthalmoscopy (indirect/direct) and slit lamp biomicroscope examination.

**a. Indirect ophthalmoscopy:**

Indirect ophthalmoscopy is performed with a condensing lens and a concave mirror. The fundus details are magnified 5 times and the image formed IS real, inverted image of the fundus.

**b. Direct ophthalmoscopy:**

Direct ophthalmoscopy is with the help of an electric ophthalmoscope. Here, the fundus details arc 10 times magnified and the image formed is virtual and erect.

**Slit lamp examination:**
Slit lamp is an instrument consisting of a high intensity light source that can be focused to shine a thin sheet of light into the eye.
It is used in conjunction with a biomicroscope.
The lamp facilitates an examination of the anterior segment or frontal structures and posterior segment of the human eye, which includes the eyelid, sclera, conjunctiva, iris, natural crystalline lens, and cornea.
The binocular slit lamp examination provides a stereoscopic magnified view of the eye structures in detail enabling anatomical diagnosis to be made for a variety of eye conditions.

**During fundus examination following points are to be noted.**
**Media:**
Normally the ocular media is transparent. Opacities in the media are best diagnosed by distant direct ophthalmoscopy, where the opacities look black against the glow.

**Optic disc:**
Optic disc- It a round or oval structure, pale pink in colour situated at the posterior pan of the fundus.
It is also known as optic nerve head as the optic nerve start from this point.
There is an excavation at the central part known as the physiological cup whose depth and extent varies in different subjects.
The margins of the disc are normally sharp and distinct.
So, during examination of the fundus the colour, shape of the disc, its margins, the physiological cup, presence of any abnormal vessels or any other abnormality on the disc must be noted.

**Macular area:**
Macular area- It is a small circular area with a red colour which is deeper than that of surrounding fundus and is situated at about 2-disc diameters on the temporal side of the optic disc.
The glistening central point of macular area is known as fovea centralis.
It is slightly depressed and this depression is known as the foveal pit.
During ophthalmoscopic examination, due to reflection of light, this put appears as a bright-reflex which is known as foveal reflex. Any abnormality in this macular area must be noted.

**Retinal blood vessels:**
These consists of arteries which are branches of the central retinal artery of the retina and the veins which are branches of the central vein of retina.
These vessels radiate from the optic disc and they spread over the fundus.
The arteries which are in fact arterioles at a short distance from the disc, are narrower than the veins.
The end arteries are bright red in colour whereas the veins are purplish red.

During examination of the fundus, any narrowing, tortuosity, or dilatation or sheathing of the vessel, any alteration in the light reflex from the vessel wall and any venous compression at the arterio - venous crossings are to be noted.

**General appearance of the fundus:**
Normally the fundus has a uniform red appearance.
But colour depends on the degree of pigment in the retinal pigment epithelium.
The fundus should be examined all around for any abnormalities like superficial and deep retinal hemorrhages, cotton wool spots, hard exudates, drusen, microaneurysms, retinal holes, retinal detachment etc.

**Subjective examination:**
This includes:

1. Central or direct vision
a. Distance vision with Snellen’s test types.
b. Near vision with Snellen’s type or Jaeger's chart.
c. Colour vision with Ishihara chart.

2. Field of vision
a. Peripheral field by confrontation method.
b. Perimeter.

**1. Central or direct vision:**
Distant or near vision is tested by using different kinds of charts like Snellen's or Jaeger's and colour vision is usually tested using Ishihara chart.

**How to record visual acuity or central vision for distance:**
A chart containing Snellen's test types is essential. These lest types are square shaped letters in a Snellen's chart.
In the chart they are gradually diminished in size from above downwards, a numerical number written underneath each line of the test types.

**Principle of Snellen’s test types:**
Each individual letter subtends an angle of 5 minutes and each component part of the letter subtends an angle of 1 minute at the nodal point of the eye from the distance in meters shown by the numerical number written under each line of type.
This principle is in conformity with the standard of normal visual acuity.

1. Distance at which the Snellen's test types must be kept- It should be at distance of 6 meters or 20 feet. The rays of light from that distance are practically parallel. Half this distance may also be utilized, but in that case the test types should be seen reflected through a plain mirror, kept at 3 meters or 10 feet from the patient.
2. Illumination of the Snellen's test types- it should not be below 20-foot candles.

3. The test types should be at the eye level of the patient. The test types should be clearly printed in black on white back ground with uniform illumination.
4. Individual eye must be examined separately while keeping the other eye closed.
5. For illiterate patients a chart containing various sizes of 'E' or 'C can be used. The patient is required to find out the direction of the hands of E or the gap of C.

**Method of recording distant vision:**

The visual acuity is expressed by a fraction, the numerator of which is the distance of the chart from the patient, i.e 6 meters and the denominator is the numerical number written below the line up to which the patient can read.

For example, if the patient can read upto the line under which is written 24, the vision is 6/24 which means that he reads the letters from 6 meters which a normal person would have read from 24 meters.

If the patient fails to read even the biggest letter from 6 meters, he is brought towards the chart at 5 meters, 4 meters, 3 meters and so on until he can read the biggest top letter and the vision is recorded as 5/60, 4/60 or 3/60 and so on.

**Method of recording near vision:**

Near vision is tested by asking the patient to read the near vision chart, kept at 35 cm in good illumination with each eye separately.

In near vision charts a series of different sizes of printer type arc arranged in increasing order and marked accordingly.

If he cannot read the smallest types, the types which he can read should be noted by noting the number against the types.

**Examination of colour vision:**

This is conducted to elicit quantitative analysis of colour-blindness. Commonly employed colour vision tests are as follows:

Lantern test:

The usual appliance used is the Edridge - Green's lantern.

Holmgren's wools of various colours:

The examiner selects a particular colour and asks the patient to pick up the wool whose colour matches with the colour of the selected wool.

Pseudo isochromatic charts:

The most used is the Ishihara char - this consists of coloured plates in which bold numbers are shown in dots of various tints, set amid dots of the same size but of different tints. A normal person can easily read the numbers.

**Field of vision:**

1. **Confrontation method:**

Here the patient's field of vision is compared with that of the observer having a normal field of vision.
The examiner (whose vision is normal) stands facing the patient at one meter.
The patient covers his left eye and fixes his vision on the examiner's left eye.
The examiner closes his right eye, and moves his hand from the periphery towards their common line of vision keeping the hand in the plane halfway between him and the patient.
When he sees it himself, the patient ought to say that he also sees it.
The movements of the hand are repeated in various parts of the field above, below, to the right, to the left and so on.

2. **Perimetry:**

It is done using Perimeter- a metallic semicircle, whose radius is 1/3rd of a meter which can be rotated in all meridians.
The patient's chin lies on a chinrest placed at the centre of the semicircle.
The eye, not to be examined is closed a pad and the eye for examination fixes an object placed at the centre of the metallic arc.
A white test object of size 3mm is then moved along the inner surface of the arc from the extreme periphery towards the centre.
The point where the object is seen first is recorded automatically on a chart in degrees. This recording is done in all meridians.

**Extent of normal field of vision:**
Superiorly = 50°
Inferiorly = 70°
On nasal side (medially) = 60°
On the temporal side (laterally) = 90°

## 4. Netrarognanam – Samanya Hetu (Nija and agantuja), Purvarupa, Samprapti, Rupa and Chikitsa.

**Netra roga samanya nidana:**

उष्णाभितप्तस्य जलप्रवेशाद्दूरेक्षणात् स्वप्नविपर्ययाच्च |

प्रसक्तसंरोदनकोपशोकक्लेशाभिघातादतिमैथुनाच्च ||

शुक्तारनालाम्लकुलत्थमाषनिषेवणाद्वेगविनिग्रहाच्च |

स्वेदादथो धूमनिषेवणाच्च छर्देर्विघाताद्वमनातियोगात् |

बाष्पग्रहात् सूक्ष्मनिरीक्षणाच्च नेत्रे विकारान् जनयन्ति दोषाः ||

1. उष्णाभितप्तस्य जलप्रवेशात् : Exposure to cold immediately after exposure to heat.

Immediate and altered exposure to heat and cold, affects the temperature maintained in eye leading to various eye diseases.

2. दूरेक्षणात् : Constant staring at distant objects.

Atiyoga and mithyayoga are the primary causes leading to any disease. Here, constant staring at distant objects strains the eye muscles causing netra roga.

3. स्वप्नाविपर्यय : Abnormal sleeping habits.

Day sleep vitiates kapha and awakening at night vitiates vata and pitta, leading to eye diseases.

4. प्रसक्त संरोदन: Continuous weeping.

Excessive lacrimal secretion due to continuous weeping washes the nutrients and, in the conjunctiva, paving way for manifestation of diseases.

5. कोप शोक : Anger and grief.

Excessive Anger and grief lead to aggravation of pitta and vata respectively.

6. क्लेश : Stress / strain

Vata vitiation

7. अभिघातात : trauma

Causes severe damage

8. अतिमैथुनात : excessive intercourse

Leads to dhatu kshaya

9. शुक्त अरनाल आम्ल कुलत्थ माष निषेवणात् :

Shukta and Aranala are alcoholic preparations having and are ruksha, teekshna in nature. These when taken in excess vitiates pitta leading to eye disorders.
Kulattha (horse gram) has vidahi guna, ushna veerya and katu vipaka, which when taken in excess causes vitiation of rakta and pitta leading to eye diseases.
Masha(black gram) has madhura, guru and snigdha guna. It aggravates kapha when taken excessively leading to kaphaja netra rogas.

10. वेगविनिग्रहात् : suppression of urges like jrumbha, asru, hikka & Kshudha

Vitiation of vata

11. स्वेदात् : fomentation of eye

Aggravates pitta & rakta

12. धूमनिषेवणा : exposure to smoke

13. छर्देर्विघाताद : suppression of vomiting

Vitiation of kapha leads to netra kandu.

14. वमनातियोगात् : excessive vamana

Protrusion of eye ball due to the pressure created by it.
Cause retinal & subconjunctival

15. बाष्पग्रहात : suppression of tears

When tears are suppressed, it leads to akshi rogas related to ashru vaha srotas.

16. सुक्ष्मनिरीक्षणाच्चा : observing minute things

Causes strain to ciliary muscles.

According to bhavaprakasha:
Rajo dhuma nishevanata
Ati shighra yanata
Rutunama viparyaya
Shiro abhitapa

According to yogaratnakara:
Ati drava anna pana: leads to kapha vriddhi
Ati madhya pana: leads to toxicity

**Samanya purvarupa of netra rogas:**
Purva rupa is the stage in which the prodromal symptoms appear even before the actual manifestation of the disease.

तत्राविलं ससंरम्भमश्रुकण्डूपदेहवत् ||
गुरूषातोदरागाद्यैर्जुष्टं चाव्यक्तलक्षणैः |
Aavilam: eye discharge
Sa samrambha: mild swelling
Ashru: lacrimation
Kandu: itching
Upadeha: coating due to sticky discharge
Guru: heaviness

Oosha: burning sensation
Toda: pricking pain
Raga: redness / hyperaemia
Jushta: found
Avyakta lakshana: non manifested symptoms

सशूलं वर्त्मकोषेषु शूकपूर्णाभमेव च ||
विहन्यमानं रूपे वा क्रियास्वक्षि यथा पुरा |
Sa shoola: associated with pain
Vartmakosha: eye lid
Shooka poorna: foreign body sensation
Vihanya maanam roopa: visual disturbance with respect to colour & form.
Kriyasu akshi: functions of eye.

Depending on the dosha involved:
Kapha: heaviness of eye
Pitta: burning sensation
Vata: pricking pain
Rakta: redness

**Samanya netra roga chikitsa:**
सङ्क्षेपतः क्रियायोगो निदानपरिवर्जनम् |
वातादीनां प्रतीघातः प्रोक्तो विस्तरतः पुनः ||
In brief, the general line of treatment for all the eye diseases is to avoid the etiological factors and to subside the vitiated doshas by specific treatments which are explained later in detail.

## 5. Classification of Netraroga and its importance.

| Netra roga | Sushruta | Vagbhata | Madhava nidana |
|---|---|---|---|
| Vartma gata | 21 | 24 | 21 |
| Sandhi gata | 9 | 9 | 9 |
| Sukla gata | 11 | 13 | 11 |
| Krushna gata | 4 | 5 | 4 |
| Drishti gata | 12 | 27 | 12 |
| Sarva gata | 17 | 16 | 17 |
| Bahya nimitaja | 2 | - | 2 |
| Total | 76 | 94 | 76 |

There are many opinions regarding the number of netra rogas, which are summarized here.

- Charaka – 4
- Videha / yogaratnakara – 76
- Karala – 96
- Satyaki – 80
- Bhavamishra – 78
- Sharangadhara – 94

Sushruta has classified netra rogas as follows:

1. Doshanushara:

- Vataja – 10
- Pittaja – 10
- Kaphaja – 13
- Raktaja – 16
- Sannipataja – 25
- Bahya – 2

2. Adhisthana anushara:

Mnemonic: बाल कृष्ण संग शुक्लाजी दिल्ली सरोवर गये |

- Bahya: 2
- Krushna gata: 4
- Sandhigata: 9
- Shukla gata: 11
- Drashti gata: 12
- Sarva gata: 17
- Vartma gata: 21

3. Sadhyasadhyata anusara:

- Sadhya: 52
- Yapya: 7
- Asadhya: 17

4. Chikitsa anusara:

Mnemonic: छे भैस लेकर व्यापारी आया |

- Chhedya: 11
- Bhedya: 5
- Lekhya: 9
- Vedhya: 15
- Astrakruta: 12
- Yapya: 7
- Asadhya: 17

# NETRA SAMANYA AND VISHISHTA CHIKITSA – KRIYA KALPA

## 1. Netra and Chakshu swasthya hitkara Dinacharya, Ritucharya, Aahara evam Vihara.

**Netra swasthya rakshanopaya:**
The word Chakshu means "eyes" and anything which is good for the eyes and vision is called Chakshushya.

**Importance of vision:**
Day and night are similar for a blind9-erson and all the wealth in the world seems to be of no use. Hence to lead a desired life, one should always try to protect the eyes.

**Regimen to be followed for better vision:**
Consume kapha pitta hara ahara like purana yava, godhuma, shali, shastika shali, kodrava, mudga etc. along with ghee, shaka (vegetables), jangalamamsa, dadima, sita, saindhava, triphala, draksha, and jala (nabhasa).
Use umbrella and footwear regularly.
Adopt regular shodhana (purificatory measures in rutus).

**Acharya nimi has advised the following measures for chakshu samrakshana:**
Triphala, raktamokshana, 'controlling the mind, anjana, nasya, intake of flesh of birds and Ghrita, taking care of the feet, avoid viewing of unpleasant, bright, moving and minute objects.

**Role of din charya and rutucharya in promoting vision:**

1. **Dina charya:**

Regular Mukha-prakshalana
Regular Shiro-abhyanga
Use of cold-water for head-bath as hot water is harmful to eyes
Daily application of Anjana (sauviranjana) not only enhances the visual acuity but also helps to withstand sun light, heat, and wind.
Regular Padaprakshalana, Pada abhyanga and padatradharana
Regular practice of jalaneti
Chatradharanam- To protect eyes from excessive sunlight.
Tarpana Should be done with an interval of 2 days in swastha.

**Importance of pada samrakshana:**
Dirt, heat, injury, strenuous movements of feet etc vitiates eye and its functions. So regular pada abhyanga, udvartana and lepana is advised. The siras present in the pada are connected to the which helps in its nourishment.

2. **Rutucharya:**

Pathya, apathya ahara and vihara and rutushodhana as advised in particular rutu should be followed. This not only helps to protect and prevent ocular disorders but also promotes vision.

**Chakshushya dravyas:**

Milk and milk products like Go ghrita, Stanya, Navaneeta, Ajaghrita
Kharpara, Raktachandana, Kasturi, Lavanga, Prapaundarika
Triphala, Ghrita, Madhu, Yava, Shatavari, Mudga
Swarna, Abhraka, Tāmra, Vanga, Loha, Swarnamakshika, Tuttha, Kāsisa.
Shakapanchakas like Jeevanti, Vaastuka, Matsyaakshi, Meghanada and Punarnava

**Apathya:**

Vega dharana, ajeerna, adhyashana (consuming food before the digestion of previous meal), krodha, shoka, divaswapna, ratri jagarana, vidahi and vishtambhakara ahara and aushadha should be avoided to maintain good vision.

**Eye exercises:**

Eye exercises are aimed at toning up the eye muscles and also for relaxation of eyes. Dr. W.H. Bates method of eye exercises are practiced and even today and is found to be effective specially in refractive errors and neurological eye disorders.

1. **Sunning:** exposing to early morning sunrays by closing the eyes after instilling two drops of honey into the eyes.
2. **Eye wash:** with triphala
3. **Palming:** rub the palms and place it over the closed eyes. It gives immense relaxation to the eyes and mind.
4. **Swinging:** swinging body from left to right and back by relaxing the eyes without focusing on any object. The objects in front of you will start moving in the opposite direction. Swinging helps to relax the eyes and corrects the accommodative error.
5. **Eye ball movement exercises**: This can be done by moving the eyeball from extreme right to extreme left, or top to bottom without moving the head. The eyeball should be rotated clockwise and anticlockwise. This helps in strengthening the extra ocular muscles of the eye.
6. **Candle reading:** Reading the fine-print in a darkroom with the illumination of a candle. This stimulates the retinal cells to improve vision.

**Trataka:**

‘Trataka’ is the term used in yoga for exercising the eye. In this, eyes should be focused on any object or light of flame till there is watering from the eyes. Trataka helps in improving the neurological condition of eye, improves concentration and also relieves the burning sensation of the eyes.

## 2. Kriya-kalpa-Seka, Aschyotana, Pindi, Vidalaka, Tarpana, Putapaka, Anjana and importance of Panchakarma in Netra Chikitsa.

**Netra kriya kalpa:**

Netra kriyakalpas are special bahir-parimarjana chikitsa procedures adopted for treating ocular disorders.

Panchakarma is the foundation for kayachikitsa, similarly netra kriyakalpas are the foundation for netrachikitsa. They are modulated to suit the structural peculiarities and different disease conditions of the eye.

These local therapies are unique and each does their function in a different way.

Here, the word kriya means the special therapeutic procedure and kalpa means formulations like swarasa, ghrita kashaya etc.

**Benefits of topical administration (kriyakalpa) over oral administration of drugs in ocular disorders:**

| Topical administration (kriya kalpa) | Oral administration |
|---|---|
| The medicine will have direct action on the tissues | There will be no direct action on the tissues. |
| The medicine will not undergo systemic digestion. | The medicines undergo systemic digestion |
| The contact time between the tissue and medicine can be monitored. | The tissue contact time of the drugs cannot be monitored. |
| The medicines can reach the target tissue more easily because of the direct contact. | Difficult to cross blood-aqueous, blood-vitreous, and blood-retinal barrier to reach target tissues. |
| The bioavailability of the drug is more. | The bioavailability of the drug is comparatively less. |

**Classification of kriyakalpas:**

Charaka:

1. Bidalaka
2. Aschotana
3. Anjana

Sushruta & vagbhata:

1. Seka
2. Aschotana
3. Anjana
4. Tarpana
5. Putapaka

Sharangadhara:

1. Seka
2. Aschotana
3. Anjana
4. Tarpana
5. Putapaka
6. Pindi
7. Bidalaka

**Akshi tarpana:**
It is a procedure in which medicated e is kept-over--eyes for a specific period of time. It is also named as 'Netra basti.'

Indications:
Sushruta:
Tamyati- Darkness in front of eyes
Ativishushkam- Reduced lacrimation
Atiruksha- Dryness of eyes
Atidaruna- Roughness of the lids
Sheerna pakshma- Falling of eyelashes
Avila- Blurriness of vision
Jihma- Squint

Vagbhata:
Stabdha (stiffness of eyes), Nimna (depressed eyes), Krichronmilana, sirotpata Siraharsha, Arjuna, Shukra, Timira, Abhishyanda, Adhimantha, Anyatovata, Vataparyaya and Shushkakshipaka.

Contraindication:
Durdina- Cloudy day
Atiushnasheeta- Too hot or too cold climate
Chinta- Grief
Aayasa- Tiredness
Giddiness
Ashanto upadrava - If complications will not subside

Person who is not suitable for Nasya and Snehapana are contraindicated for tarpana and putapaka also.

**Tarpana vidhi:**
Purva karma:
Patient is prepared by subjecting him to samshodhana karmas such as vamana, virechana, nasya etc and is made to lie in supine position comfortably on a table.
The room selected for the procedure should be devoid of sunlight, dust, and heat.
A uniform, smooth dough is prepared out of masha flour.
Mild massage and warm fomentation is given to the part.
Medicated ghee, towels, cotton swabs, vessels etc should be kept ready.
The agni of the patient is assessed before subjecting him to pradhana karma.

Pradhana karma:
A firm circular frame of two angula height is constructed around the eyes with the dough of masha flour.

Then lukewarm ghrita or ghritamanda (supernatant part of ghee) is slowly poured on to the eyes till the eyelashes get immersed.
Then the patient is asked to slowly blink the eyes.

**Duration to retain medicine:**
According to sushruta:

| On the basis of dosha | | On the basis of sthana | |
|---|---|---|---|
| Swastha | 500 matra | Sandhi | 300 matra |
| Kapha roga | 600 matra | Vartma | 100 matra |
| Pitta roga | 800 matra | Krishna | 500 matra |
| Vata roga | 1000 matra | Krishna | 700 matra |
| | | Sarva gata | 1000 matra |
| | | Drishti | 800 matra |

Paschat karma:
After tarpana procedure the ghee is drained by making hole at the apanga sandhi in the paali and it is cleaned.
Followed by mild fomentation with warm water or Yava pishti.
Then dhoomapana is given to expel the kapha caused by the ghee.
Vagbhata mentions the use of luke warm water for mukha prakshalana after dhooma pana.
Exposure to heat, open air and bright light should be avoided.

**Duration of treatment:**

| Dosha | Sushruta | Vagbhata | Videha |
|---|---|---|---|
| Vata | Daily | Daily | Daily |
| Pitta | Once in 3 days | Interval of 1 day | Interval of 1 day |
| Kapha | Once in 5 days | Interval of 2 days | Interval of 3 days |
| Rakta | - | - | Interval of 1 day |
| Sannipataja | - | - | Interval of 2 days |
| Swastha | - | Interval of 2 days | Interval of 2 days |

Additional point as per vagbhata:
Tarpana should be performed only when redness (raga), lacrimation (ashru), pain (shoola), swelling and discharge have subsided.
Along with masha, flour of yava (barley) can also be used to construct the paali.
The height of paali should be two angulas.
Lukewarm ghee should be poured on closed eyes.
In case of naktandhya, vataja timira, and krichronmilana vasa should be used instead of ghrita.

**Samyaka tarpita lakshana:**
When tarpana is properly done following features are seen:
Sukha swapna - Sound sleep
Avabhodhatva - Pleasant awakening
Vaishadyam - Clarity of vision
Varnapatavam - Clear sense of colour or imparts natural colour to shukla and krishna mandala
Nivritir vyadhi vidhvamsa- Relief from the disease
Kriya- Normal functioning of the eye (unmesha, nimesha)
Laghavameva- Lightness of the eyes
Prakasha kshamatva – tolerance to bright light

**Ati tarpita lakshana:**
When tarpana is done excessively the following lakshanas are seen:
Guru- Heaviness of eyes
Avila- Blurriness of Vision
Atisnigdha- Sliminess in the eyes
Ashru kandu upadehavat- Excessive lacrimation, itching and discharge.
Dosha utklista- Aggravation of doshas
kapha janya vyadhis (vagbhata)

**Heena tarpita lakshana:**
The heena tarpita lakshanas seen are as follows:
Ruksha- Dryness of eyes
Avila- Blurriness of vision
Excessive lacrimation
Intolerance to light
Aggravation of the disease

**Chikitsa for ati and heena tarpita:**
Dhuma, nasya, anjana and seka with ruksha dravyas are advised when there is excessive vitiation of kapha.
The same procedures are performed with snigdha dravyas in case of excessive vitiation of vata.

Commonly used ghritas for tarpana:
Triphaladi ghrita
Patoladi ghrita
Shatavaryadi ghrita
Maha triphaladi ghrita
Jivantyadi ghrita
Tarpana is not done using taila, as taila is achakshushya.

**Putapaka:**
Putapaka is one among the kriyakalpas which is usually done after-tarpana. The procedure of putapaka is same as that of tarpana but method of preparation of medicine, ingredients, and duration of treatment are different.
Indications and contra indications of putapaka are same as that of tarpana.

Why putapaka after tarpana:
The body becomes heavy and lazy/weak due to the consumption of unctuous food. Similarly, eye also becomes heavy and weak after tarpana kriya (because of clogging of the srotas by ghrita). Hence to promote strength to the eyes putapaka is advised to be done after tarpana.

Preparation of putapaka rasa:
Materials required:
2 pala Mamsa (Approx 100gms)
1 pala Dravya (Approx 50gms)
8 pala Drava (Approx 400ml)

Method of preparation:
Initially the drugs are selected based on the type of putapaka to be prepared.
Then a homogenous paste is made out of the drugs which is made into a bolus.
The bolus is then wrapped with leaves of eranda, kashmari, kumuda, kamala or kadali based on the doshas.
This bolus is again packed with mud and placed over fire till it becomes red hot. (wood used as fuel are khadira, kanaka, ashmantaka etc.)
The cooked bolus is squeezed to extract the juice.
The juice thus obtained is used for putapaka as ‘Putapaka rasa.’

**Procedure:**
The procedure of putapaka is similar to that of tarpana.

Types of putapaka: (According to Su. U. 18 / 21)

1. Snehana:

Duration: 2 days
Mutra kala: 200 matra
Indication: atiruksha netra
Dravyas: sneha, anupa mamsa, vasa, majja & madhura aushadha.

2. Lekhana:

Duration: 1 day
Matra kala: 100 matra kala
Indications: ati snigdha netra
Dravyas: jangala mamsa, sunthi, maricha, pippali, krishna loha churna, tamra, shankha, pravala, saindhava, samudraphena, kasisa, shrotonjana, Dadhimastu, mukta & haratala.

3. Ropana:

Duration: 3 days
Matra kala: 300 matra kala
Indication: in pitta, rakta, vata and vranayukta netra also to improve vision.

According to vagbhata:

1. Snehana: vata
2. Lekhana: kapha
3. Prasadana / ropana: pitta & rakta

Dravya: madhura dravya, mriga pakshi yakruta, majja, vasa, ghrita triturated with stanya.

**Samyaka putapaka lakshana:**
If putapaka is carried out properly the following lakshanas will be noticed in the individual.
Prasanna varna: clarity of vision
Vata atapasaha: tolerance to air and heat
Sukhaswapna avabodhya: awakens after sound sleep
Vishada: clear appearance of eye
Laghu: lightness of eyes

**Putapaka atiyoga lakshana:**
Ruja (pain)
Pidaka (nodular swelling)
Shopha (oedema)
Timira (blurriness of vision)

**Putapaka ayoga lakshana:**
Paka (Inflammation)
Ashru (Excessive lacrimation)
Doshodgama (Recurrence of symptoms)

Chikitsa:
In hina and atiyoga of putapaka- Anjana, Aschotana and Swedana are indicated based on the vitiation of the doshas.

Merits tarpana & putapaka:
Tarpana and putapaka if done properly will reduce daha, shopha, ruja, Srava, kandu, Upadeha (coating), dushika (netramala) and rakta raji (congestion of blood vessels).

**Complications of tarpana & putapaka:**

| Procedure | Complications |
|---|---|
| Use of ati ushna and tikshna dravyas | Daha and paka |
| Apluta (slow pouring of medicine) and use of sheetala dravya | Ashrustambha, ruka |
| Atimatra of dravya | Kashayatvam (muddy eyes), Sankocha (constriction), sphurana (throbbing sensation). |
| Heena matra of dravya | Dosha utklesha (aggravation of doshas). |

**Aschotana:**

Aschotana is a procedure in which medicine is instilled drop by drop into open eyes from a height of 2 angulas. This procedure can be compared to installation of eyedrops.

Indication of Aschotana:

First line of treatment for all types of netra roga is aschotana. It relieves symptoms such as ruk, toda, kandu, gharsha (घर्ष) (foreign body sensation), ashru (lacrimation), daha (burning), raga (redness), bheda, paka and shopha.

**Aschotana vidhi:**

The patient is made to lie down comfortably.

The physician should open the eyelids of the patient and instill the medicine with his right hand.

The medicine should be instilled in the kaninika sandhi from a height of 2 angulas.

After the completion of the procedure the eyes should be wiped with soft cotton or cloth.

Mild-fomentation with lukewarm water should be given to the eyes in vataja and kaphaja conditions.

According to Sharangadhara eyes should be kept closed for 100 matra kala after instilling the drops.

Types and dosage:

1. Snehana: 10 drops
2. Lekhana: 8 drops
3. Ropana: 12 drops

Temperature of the medicine depending on the predominance of dosha:

Vata: ushna

Kapha: koshna

Pitta and rakta: sheeta

**Indication and time of administration of aschotana:**

| Dosha | Kala | Aschotana |
|---|---|---|
| Kaphaja | Purvahana | Lekhana |
| Vataja | Aparahana | Snehana |
| Raktaja and pittaja | Madhyahana | ropana |

Aschotana is contraindicated at night. But is indicated in ruja kala (i.e. whenever there is manifestation of symptoms).

Action of aschotana:
The medicines instilled into the eyes enters into the srotas of netra sandhi, shiras, ghrana, mukha and expels out the malas.

Complication of aschotana:

| | |
|---|---|
| Ati ushna and tikshana | Ruka, raga and drishti nasha |
| Ati sheeta | Nistoda, stambha, vedana |
| Ati matra | Gharsha, difficulty in opening of eyes |
| Hina matra | Symptoms increases |
| Aparisrushta (without filtering) | Lacrimation, pain, and irritation due to foreign particles. |

Common drugs for aschotana:
Vataja: Eranda mula, jivanti, brihati, madhu, shigru and panchamula boiled in water.
Pittaja: Pruthvika, darvi, manjishta, laksha and madhuka boiled in water along with sugar.
Kaphaja: Shunthi, triphala, musta, nimba and vasa boiled in water.
Other yogas like Triphala kashaya, Draksha kashaya, Daru haridra kwatha, Dashamula kashaya etc. can be used based on the predominance of dosha.

**Seka:**
Seka is the procedure of pouring thin stream of medicines very-slowly on the closed eyes from a height of four angulas. It is also referred as Pariseka.

| Seka types | Indication | Matra kala | Preferred time |
|---|---|---|---|
| Snehana | Vataja | 400 matra | Evening |
| Lekhana | Kaphaja | 200 matra | Morning |
| Ropana | Pittaja & raktaja | 600 matra | Afternoon |

Seka can also be done during manifestation of symptoms or till the disease subsides.

Samyaka and mithyayoga lakshana of seka are similar to tarpana.

Commonly used seka yogas:
Vataja: Kashaya prepared from tvak, patra and moola of eranda with aja ksheera.
Pittaja: Kashaya prepared from shweta lodhra, yashtimadhu, chandana, prapoundarika and sariva.
Kaphaja: Nimba, patola, jatipatra, lodhra dvaya, shunthi.
Tridosha: Triphala kashaya.

**Anjana:**
Anjana is a procedure of applying medicine into the inner aspect of lower eyelid. It is usually applied from kaninika sandhi to apanga sandhi using a shalaka or fingertip. It is the most commonly practised procedure which not only helps in treating eye diseases but also in preventing them.

Pre requisites for anjana procedure:
Patient should have undergone shodhana.
The disease should be in the vyakta avastha and localized only in the eye.

Indications for anjana:
Alpa shopha
Picchilata (unctuousness)
Ashru srava
Kandu
Manda gharsha (mild foreign body sensation)
Raga
Ghana dushika (thick discharge).

Contraindication for anjana:
Shrama: exertion
Udavarta: upward movement of vata
Rudita: weeping
Madya: alcoholic
Krodha: anger
Bhaya: fearful
Jwara: fever
Suppression of natural urges
Shirodosha: diseases of head
Note: If Anjana is applied in the above said conditions it leads to complications such as raga (redness of eyes), ruka (pain), timira (blurred vision), srava (discharge), and samrambha (swelling).

Classification of anjana:

| Sushruta | A.H. | A.S. | Sharangadhara |
|---|---|---|---|
| Lekhana | Lekhana | Lekhana | Lekhana |
| Ropana | Ropana | Ropana | Ropana |
| Prasadana | Prasadana | Prasadana | Snehana |
| | | Snehana | |

Based on kalpana of anjana:

| Anjana kalpana | Indications |
|---|---|
| Gutikanjana | Mahabala of dosha (severe) |
| Rasakriyanjana | Madhyamabala of dosha (moderate) |
| Churnanjana | Hina bala of dosha (less) |

Dosage of anjana:

| | Gutikanjana / rasakriyanjana | Churnanjana |
|---|---|---|
| Lekhana | 1 harenu matra varti | 2 shalaka |
| Prasadana | 1 ½ harenu matra varti | 3 shalaka |
| Ropana | 2 harenu matra varti | 4 shalaka |

Harenu = size of a peanut
Shalaka = powder available on the tip of shalaka.

Anjana patra and shalaka:
Anjana patra (container) and the shalaka should possess similar qualities as that of anjana. It is usually prepared out of swarna, roupya, tamra, mesha shringi, vaidurya and kamsya.

**Features of shalaka:**
Anjana shalaka is a rod like instrument of 8 angulas in length made of swarna, roupya etc.
It is thin in the middle and rounded at both the edges similar to flower bud of jasmine (mukula akara)
It should be smooth and easy for handling.
It should not be rough, thin, hard, or breakable.

Shalaka based on action:

| | |
|---|---|
| Ropana | Lauha shalaka or anguli |
| Lekhana | Tamra shalaka |
| Prasadana | Svarna or rajata shalaka |

**Method of administration of anjana:**
The patient is made to sit comfortably and the lids are retracted.
Anjana shalaka filled with anjana is held in the right hand of the physician and applied uniformly from kaninika sandhi to apanga sandhi in the left eye of the patient and vice versa.
The patient is then asked to close the eyes and rotate the eye ball, so that uniform distribution of the medicine takes place.
The excess anjana should be wiped out with a soft and clean cloth.
Care should be taken not to apply anjana excessively either in kaninika or apanga sandhi as it may cause injury.
Eyes should be washed only when discharges and doshas drain out completely from the eyes. Immediate washing of eyes causes recurrence of the disease or damage to vision.

**Anjana nishedha kala:**
Nishi: night
Swapna: during sleep
Madhyahana: noon
Mlana: fatigued eyes
Extreme heat
If anjana is applied during above conditions the doshas liquify and aggravate to produce severe eye diseases.
Application of Anjana is to be done during morning or evening to manage the above said complications.

Types:

1. **Lekhana anjana:**

Lekhananjana is used to expel out the doshas from netra. It is prepared from tikshna, kshara and all rasa dravyas except madhura.

Indications:
Savrana shukra
Avarana shukra
Arma

Samyaka yoga of lekhana anjana:
If lekhana anjana is applied properly the following features are seen:
Vishada: clarity
Laghu: lightness
Anasravi: free from discharge
Kriyapatu: normal functioning of eyes
Sunirmala: clear eyes
Shanta upadrava: pacification of all the complication.

Atiyoga lakshana of lekhana anjana:
Squint
Hardness of lids
Discoloration
Drooping of eyelids
Severe dryness
Severe discharge
According to Vagbhata atiyoga of lekhana anjana causes santapa, nistoda, shoola i.e. pricking pain, stambha, gharsha, ashru, difficulty in opening eyes and headache.

Chikitsa for atiyoga of lekhana anjana:
Vatahara and santarpana chikitsa
Aschotana and pratyanjana with sheetala dravyas.

Hinayoga lakshana of lekhana anjana:
Insufficient use of lekhana anjana will lead to aggravation of the doshas and produce severe disease.

Chikitsa for hinayoga of lekhana anjana:
This condition can be treated by dhooma, nasya and teekshna anjana. These procedures expel out the aggravated dosha.

2. **Prasadana anjana:**

This anjana is Prepared using madhura and sneha dravyas. Hence it brings about snehana (unctuousness) and prasadana (soothening) of eyes. According to Ashtanga Hridaya it is subdivided into:

a. Snehana anjana
b. Prasadana anjana

Snehana anjana is prepared from sarpi and vasa.
Prasadana anjana is prepared from madhura, sheeta and snigdha dravyas.
Prasadana anjana is to be applied after the administration of tikshna or lekhana anjana. It soothens the eye and relieves irritation caused by ruksha and tikshna properties of lekhana anjana.

Samyaka yoga lakshana of prasadana anjana:
Proper application of prasadana anjana imparts unctuousness, normal colour, and strength to the eyes. The eyes will be pleasant, devoid of doshas and regains its normal functions.

Atiyoga of prasadana anjana:
Atiyoga of prasadana anjana is similar to that of atiyoga of tarpana. It is managed using ruksha and mrudu aushadhi.

Ayoga of prasadana anjana:
Ayoga does not produce any discomfort to the eyes. But it has no action in relieving the symptoms. Hence, anjana should be applied in proper matra.

3. **Ropana anjana:**

Ropana anjana is prepared using kashaya, tikta and dravyas. It restores normal colour to the eye, improves vision and strengthens the eye.

Samyaka, ati and hina yoga lakshana of ropana anjana:
Samyak, ati and heena yoga lakshanas of ropana anjana arc similar to prasadana anjana and can be managed accordingly.

Pratyanjana:
The anjana indicated to counter the complications caused due to the improper administration of anjana is called pratyanjana.

**Bidalaka:**
Application of medicinal paste over the eyelids excluding the eyelashes is called Bidalaka. Thickness of bidalaka is same as that of mukhalepa.

| Lepa | Thickness of the lepa |
|---|---|
| Doshaghna | 4 angulas |
| Vishaghna | 2 angulas |
| Varnya | ½ angula |

Time of application:
It can be applied during day or whenever the symptoms manifest.

Indications:
Daha: burning sensation
Upadeha: discharge
Ashru: lacrimation
Shopha: oedema
Raga: congestion

Contraindication: it should not be applied at night.
Contraindications after applying the paste are speaking, laughing, or crying excessively, being in grief or anger, exposing to sunlight and sleeping during day.

Commonly used bidalaka yogas:
Paste of yashtimadhu, gairika, saindhava, Daruharidra, and rasanjana with water.
Paste of rasanjana
Paste of kumari and haridra
Paste of haritaki and shunthi
Paste of lodhra and saindhava

**Pindi:**
Mentioned only by sharangadhara.
Pindi is modification of bidalaka. In this paste of medicines are covered in a cloth and placed over the closed eyes. It is also called as kavalika.

Indications:
Abhishyanda
Early stage of netra roga

Commonly used yogas in pindi:
Paste prepared with patra, moola and tvak of eranda in vataja conditions.
Paste of yashti, amalaki or mahanimba phala in pittaja conditions.
Paste of Shigru leaves in kaphaja conditions,

Paste of triphala in kapha pitta conditions.
Pindi can also be done with shigru-patra, amra pallava, bringaraja, bhumyamalaki, nimba, lajjalu, bilwa, kumari etc in combination or alone, depending on the condition.

**Avaguntana:**
This procedure is mentioned only in A.S. & sangraha.
Avaguntana is a procedure in which powders of the drugs are tied in a cloth and used in netra roga.

Panchakarma in netra chikitsa:
Since eye is a part of the body, most of the systemic disorders have their manifestation in the eyes.
The Kriyakalpas are just local therapeutic measures to alleviate doshas present in the eye, whereas Panchakarma does the shodhana of the complete body.
Hence Panchakarma plays a very important role in the management of eye disorders.

1. Vamana:

Vamana has limited scope in the management of netra rogas. The few indications are:
Pakshma shaata
Lagana
Kukkunaka
Pilla roga
It is contraindicated in drishtigata rogas.

2. Virechana:

It is the most preferred shodhana karma in eye diseases and it imparts strength to all indriyas,
It is indicated in akshipaka, kaacha, timira and abhishyanda.
It is also indicated in diseases like netra daha, netrasrava and timira.
While describing samanya chikitsa for timira, the drugs for virechana are selected based on predominance of dosha.

a. Eranda taila with milk: vataja
b. Triphala ghrita: pittaja and raktaja
c. Trivrit ghrita: kaphaja
d. Taila prepared with tridoshahara drugs: sannipataja

Virechana is indicated as purva karma in kriyakalpas (like tarpana and anjana) and shastra karmas (arma cheda and pakshma kopa chikitsa).
Virechana is indicated after siramokshana in pilla roga.

3. Basti:

It is indicated in all conditions where vitiated vayu gets lodged in head and causes eye disease. Basti is helpful in improving vision (chakshushya basti) and in the treatment of Krichronmilana.

4. Nasya karma:

Snehana nasya helps in improving vision.
Nasya is indicated in timira, shukra (savrana and avrana), vartma roga and other akshi rogas.
Snaihika nasya is indicated in vataja abhishyanda.
Anutaila nasya is indicated in shushkakshi paka and in vataja timira.
Nasya is also indicated in shushkakshi paka, kaphotklishta vartma, adhimantha, hatadhimantha, anyatovata, amladyushita, dhumadarshi, timira, kaacha, linganasha.

5. Raktamokshana:

It is an important para surgical procedure. Siravyadha and jalaukavacharana are commonly indicated procedures in eye disorders.
Some of the references of raktamokshana are as follows:
Puyalasa, complications of arma and savrana shukra.
Pittaja, raktaja and kaphaja timira
Vataja, pittaja, kaphaja and raktaja abhishyanda
Pilla
In pothaki, jalaukavacharana is recommended

## 3. Basic fundamentals of Netra Shastra Chikitsa e.g., Purva – Pradhana - Paschat karma, Ama-Pachyaman-Pakva Vrana shotha, Vranitopasana, Pranashtashalya, & Vranabandhana. Methods and concepts of sterilization, asepsis, and antisepsis as per ancient and modern point of view.

**Trividha karma:**

1. Purva karma:

Select an ideal auspicious day, time, and place for shastra karma.
Instruments and equipment needed for the surgery like yantra, shastra, kshara, agni, shalaka, shrunga, jalauka, alabu, jambvoshta, pichu, sutra, madhu, ghrita etc. should be kept ready.
Attendant should be compassionate, strong, and steady.
Vaidya should be enriched with knowledge, bold and confident.
Diet is advised based on diseased condition.

2. Pradhana karma:

Patient is made to face east direction and Vaidya should face the patient.
Surgery should be conducted by taking care not to injure the vital-points such as marma, asthi, sandhi etc.
Incision should be made along the direction of the hair in one stroke.
In the eyebrows and eyelid, incision should be oblique
An ideal incision is that which creates a uniform wound without damaging the surrounding structures.

3. Paschat karma:

Prakshalana of the wound is done using specified kashayas.
Fumigation is done with guggulu, agaru, sarjarasa, vacha, sarshapa, nimbapatra and ghrita.
Then the wound is bandaged.

**Vrana shopha / vrana shotha:**

Vrana shopha is a thick-swelling localized in twak and mamsa caused due to the vitiation of dosha. It may be even or uneven, having different features and shapes and looks similar to granthi, vidradhi or alaji.

**Features of vranashopha:** it can be understood in 3 stages:

1. Amavastha:

In Amavastha the shopha will have mild temperature, pain, and inflammation. It is firm, cold and has color similar to the surrounding tissue.

2. Pachyamana avastha:

In this stage the features of pain are similar to as though pricked by needles, bitten by ants, excised by instruments, hit by stick, pressed by palm, squeezed by finger, burnt by agni / kshara, or as bitten by scorpion.
Patient does not find comfort in any position (sitting / standing / sleeping).
Swelling is associated with oedema, discoloration and burning sensation. Fever, thirst, and anorexia may also be present.

3. Pakva avastha:

Pain and swelling reduce
The skin looks pale, wrinkled, and cracked.
Pitting type of oedema which fluctuates on applying pressure due to accumulation of pus
Recurrent pricking pain and itching
Appetite improves and complications subside.

**Vranitopasana:**

Vranitopasana (Care of the wounded):- Acharya sushruta described the concept of Vranitopasana in the vranitopasniya adhyaya of sutra sthana in his legendary dissertation Sushrut Samhita. Vranitopasniya adhyaya is especially devoted to the care of wounded patients with all pondered spiritual and psychological aspects of wound healing. In this chapter Acharya sushruta differentiate the two types of vrana first is nija vrana and the second is agantuja vrana. As per the context, patients with non-infectious wounds and normal injury are not require a special care but deep, large infected wound and dushta vrana is to be require a special care of the vranita (wounded person). Some conventional considerations may be adopted as per chapter in the wound healing management are described in point wise as under:

**Vranitagaar (Ward for the wounded):**
First of all, a well maintained and proper vranitagaar (ward) should be selected and allocated to the vranita (wounded person). Vranitagaar is a specially designed isolation room for a wounded patient. Ward should be well architected as per vastu shastra (science of Indian architecture) and well equipped with all necessary utilities. Some psychological and physical disorders are caused and augmented by external agents in the wounded. Those agents are not developed by itself if wounded are isolated in such ward that should be situated at a clean place, free from fast sun light, dust, and heavy breeze.

**Shayya (bed):**
In a proper ward patient's bed should be well laid with comfortable mattresses. Bed's head should be situated towards east direction. On such a well-equipped bed, the wounded can comfortably lay down. As the Gods reside towards the east direction, so the patient's head is also kept in the east direction for worship. This situation flows a magical and pious wave of enliven in the wounded person.

**Paricharaka (Attender):**
The patient should sit in their bed for as long as he likes. Patient should be attended by his family members and close relatives. Some affectionate friends having a quality of good conversationalists also attend to him. The affectionate friends should be able to detract the pain of the wound by their friendly stories, chat, jokes, and other various ways to console him.

**Avoid day sleeping:**
The patient should not sleep in the day time because it tends to inflame the swelling and pain. Sleeping in the day time gives also increases the itching in the wound, heaviness in the body, pain, redness, swelling and exudation from the wound.

**Complete Sexual Abstinence:**
Sexual intercourse should be prohibited to the wounded during the treatment otherwise soft tissue and ligaments of the skin may be rupture or broken.

**Care During Natural Activities:**
The patient should himself safeguard the wound while normal activities such as lay down, turning sides on bed, getting up and speaking loudly, moving to one place to another in the ward etc. Excessive sleeping, sitting, and standing position, upsurges the severe pain in the whole body. That is why, such activities must be avoided by the wounded.

**The Contraindicated Wines:**
If the wounded patient is habitual to drink of wine, he should be avoiding the wine and by product of wine such as asava, arista and various intoxicating preparations. The wine and it is by products being acidic nature, hot, vitriolic, and sharp in absorption so that immediately affects the wound if taken by wounded.

**Apathya Ahara (The contraindicated Articles of Diet):**
The wounded patients should not use of fresh paddy, kulattha (horse gram), pulses, tila (sesame), green leafy vegetables, cakes, pungent foods, very cold water, dry meat, yoghurt, dry vegetables, meat of goat and aquatic animals, rice pudding, milk, and butter milk etc.

**Pathya Ahara (Proper diet):**
Proper diet and nutrition are performing a significant role in fast wound maturation and collagen synthesis. As per modern science, some nutrients like vitamin A, vitamin B and protein containing foods are essentially required for fast wound healing and collagen synthesis process. As per ayurveda, Jangala Mansa (Meat of wild animals) is a rich source of protein and other prominent nutrients that rapidly rise the wound healing process. Apart from this, vitamin C is the proved and significant co-factor of collagen synthesis process. Therefore, ancient texts provide a major source of vitamin C like karondaa (gooseberries) and Dadima (Pomegranate) fried in cow ghee. Ayurveda also provides that some Vasthuka (green leafy vegetable), Patola (snake guard), Tanduleeyaka (red leafy vegetable), Karavellaka (bitter guard), Balamoolaka (tender radish) are rich sources of vitamins (A, C and E), proteins and minerals, these are rapidly improving the wound healing.

**Don’ts for the wounded:**
Wounded person should also avoid some unwholesome things such as excessive and heavy meals, dust, direct hot sun rays, dew touch on wound, smoke, unpleasant loud noises and scenes, physical exercise, feeling of jealousy, rage, fear, awake at nights, irregular food habits and harmful diet, sleeping on rugged bed, wandering, excessive conversation, standing and walking for a long time, cold draughts, indigestion etc.

**Do’s for the wounded:**
Wounded person should wear soft and white cloths. They should keep short, clean hair and nails. Wounded patients should be pure hearted, devoted to God and auspicious rites. Wounded should be feeling pleased and calm in all time so that his confidence level maintain.

**Pranashta shalya:**
When the shalya is present in the body, following features are seen:
Shyava pidika
Vedana
Shopha
Shonita srava
Unnatam mrudu mamsa (elevated and soft tissue)

**Vishesha lakshana based on location of shalya in different vrana vastu:**

1. Twakgata: Appearance of discoloured, hard, and diffused swelling.
2. Mamsagata: Enlarged suppurative tender swelling, associated with burning sensation.
3. Siragata: Dilated and engorged-veins associated with pain.
4. Snayugata: Painful swelling at the site of snayu.
5. Srotogata: Impairment in the normal functions of the srotas.

6. Dhamanigata: Frothy blood oozes out from the dhamani. Associated symptoms are bodyache, thirst and nausea.
7. Asthigata: Different types of pain with swelling.
8. Asthi vivaragata: Fullness of bone, pricking pain and horripilation.
9. Sandhigata: Symptoms similar to asthigata shalya.
10. Marmagata: Similar to marma viddha lakshana.

**Management of pranashta shalya:**
Natural-expulsion of shalya takes place on lacrimation, sneezing, belching coughing etc. (e.g. foreign particles in eye are removed on lacrimation).
Small sized Shalya present in the eyes can be removed by parisechana (washing), aadhmapana (blowing), pramarjana (wiping with cloth or fingers).

**Vrana bandhana:**
Bandages which can be applied in netra and jatrurdhva are:
1. Swastika bandha advocated in bhru, karna
2. Cheena bandha is done in apanga sandhi.
3. Vitana bandha is done in murdha.
4. Panchangi bandha is done in jatrurdhwa.

**Sterilization:**
The introduction of 'antisepsis' changed the science of surgery from infection and death to one of relieved suffering and prolonged life. Maintenance of asepsis is important to ensure safe surgery and to minimize post operative infections.

Sterilization: It is the process that eliminates or kills all forms of life including transmissible agents such as fungi, bacteria, virus, spore forms etc. Sterilization can be achieved by applying heat chemicals, irradiation, high pressure, and filtration.

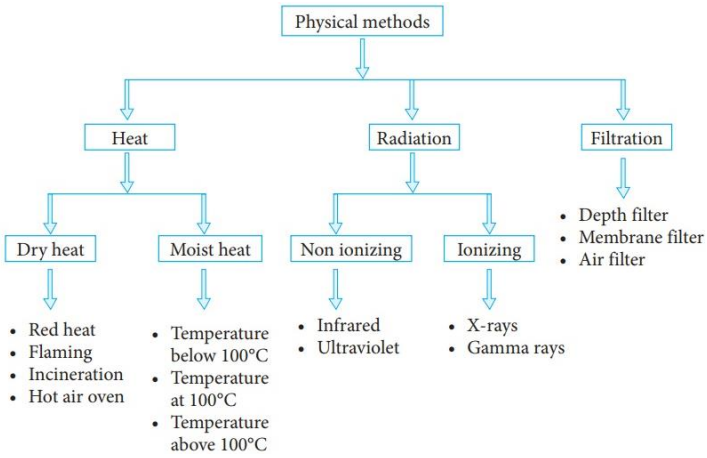
Disinfection: It is destruction of infectious agents outside the body by direct exposure to physical or chemical agent to prevent the spread of infectious diseases. Disinfectants are generally used in surfaces or to clean instruments.

Antiseptic: This implies a substance that prevents growth or action of microorganisms either by inhibiting their activity or in destroying them. Its role is generally seen on living tissue.

Asepsis: The concept of asepsis includes prevention of wound-contamination by using sterile-material and minimizing airborne transmission.

Aseptic practices include:
Proper preparation of the patient.
Hand washing
Surgical hand scrub
Using materials such as gloves and surgical attire.

Maintaining safe environment during surgery.




Fumigation of operation theatre:
Disinfection of the operatingroom by exposure to fumes of a disinfectant is referred to as fumigation. Formaldehyde is an effective agent commonly used to sterilize the operating room.

## 4. Basic applied knowledge of Ashtavidha shastra karma, agni, kshara, raktamokshana in Netra rogas.

The eight types of shastra karma are Chedana, Bhedana, Lekhana, Vyadhana, Eshana, Visravana, Aharana and Seevana.
Among these the first four are included in netra chikitsa by our Acharyas.

### 1. Chedhya roga:

Chedhya rogas are: five types of Arma, Arsho varthma, Shushkarsha, Arbuda, Sirajala and Sirapidaka.
Chedana karma is the surgical procedure indicated in the above diseases. In this any affected extra growth is excised.

Purvakarma for chedana karma:
Samshodhana karma and samsarjana karma should be followed before Chedana.
Snigdha anna is given to the patient.

Pradhana karma:

a. Arma:

The arma is softened by rubbing it with saindhava lavana.
Then swedana is done to bring about wrinkle and free movement of the arma.
The wrinkle is held with the badisha and muchundi yantra while the patient looks laterally (to the apanga side).

Using mandalagra shastra, lekhana (scraping) of the arma is done to separate it from krishna and shuklanandala till kaneenika sandhi. Then the arma is excised using the shastra by leaving behind medial 1/4$^{th}$ part of arma. Over excision (very close to kaninika sandhi) leads to nadi vrana (sinus) and if excision is not done sufficiently the arma regrows.

b. Shushkarsha, arshovartma, and arbuda:

Initially eyelid is fomented and the lid everted with help of a suchi.
With a sharp mandalagra shastra, the extra growth should bc cxcised.
Then pratisarana is done with saindhava, kasisa, pippali etc.
When the bleeding stops, the remnant part of lesion should be treated by agni and kshara karma.
Patient should also undergo ubhaya shodhana (vamana and vircchana).

c. Sirajala:

The kathina siras present in sirajala should be held firmly with badisha yantras They are then scrapped and excised with the help of mandalagra shastra.

d. Sira pidika:

Excision of the pidikas should be done using mandalagra shastra as mentioned in arma chedana.

Paschat karma:
Pratisarana should be carried out with yavakshara, trikatu, saindhava lavana followed by karasweda and bandhana.
Then snehana with chakshushya dravya siddha ghrita is advised.
After three days, bandhana is removed and vrana shodana and ropana measures are followed till it heals completely.
Aschotana using kshirapaka of karanja bija, amalaka, madhuka along with madhu is indicated twice daily to reduce thc pain.
Lekhana anjana prepared using loha churna, saindhava lavana etc. should be applied to remove the left over 1/4$^{th}$ part of arma.

Samyaka chedana lakshana:
Proper chedana karma brings normal colour and function (all eye movements) of the eye. It also gives relief from pain and is devoid of complications.

**2. Bhedhya roga:**

Bhedhya rogas are lagana, bisa vartma, krimi granthi, anjana namika and upanaha.
Bhedana karma is the surgical procedure indicated for the above said diseases. Here, incision is done and the contents are extracted or drained.

Purvakarma for bhedhya rogas:
Initially snehana, swedana, raktamokshana, virechana, nasya are done for shareera shodhana.
Sthanika snehana and swedana over the eyes using tender leaves to induce paka. Bhedana should only when paka lakshana are observed.

Pradhana karma:

a. Lagana:

Pratisarana is done with gorochana, yavakshara, tuttha or pippali along with kshaudra followed by bhedana.
If lagana is large in size, bhedana is followed by kshara & agnikarma.

b. Bisavartma:

Initially swedana is done to produce paka of the lesion.
Then the pus points (chidra) in the lesion are incised with the help of shastra.
This is followed by pratisarana using saindhava, kaseesa, pippali, pushpanjana and manahshila.
Finally kshaudra and ghrita are applied and proper bandaging is done.

c. Krimi granthi:

The part is incised after proper fomentation.
Bhedana is followed by pratisarana using rasakriya prepared from triphala, tuttha, kasisa and saindhava.

d. Anjanamika:

Initially swedana is given to the part.
If it burst open spontaneously, the contents are squeezed out and pratisarana is done using manahshila, ela, tagara, saindhava and madhu.
If it doesn’t burst open, bhedana with shastra is done followed by pratisarana using rasanjana and madhu.

e. Upanaha:

Bhedana is done using shastra.
This is followed by lekhana with mandalagra shastra followed by pracchana and pratisarana using pippali, madhu and saindhava.

Paschat karma:
Vranavat chikitsa should be done.

**3. Lekhya roga:**

Lekhya rogas are - kumbhika
Sharkara
Utsangini
Kardama vartma
Vartma avabandha
Klishta vartma
Bahala vartma
Pothaki

Lekhana karma is the surgical procedure indicated for the above said disease. Here affected part is scrapped using shastra

Purvakarma:
Patient should be subjected to snehana, svedana, vamana and virechana for shareera shodhana
He is made to lie in supine postion in a room devoid of wind and sunlight.
Eyelid is fomented and is firmly held with left thumb and forefinger to restrict the lid movements.

Pradhana karma:

1. In kumbhika, sharkara, utsangini, shyava vartma & kardama vertma scraping is performed with help of shastra or patra.
2. In vartma avabandha, klishta vartma, bahala vartma and pothaki, pracchana is fone followed by lekhana with shastra.
   If the patient are small, hard and coppery they are followed to undergo paka before bhedana and lekhana procedure.

Paschata karma:
Once the bleeding stops, swedana is advised.
Pratisarana with fine powders of manahshila, kasisa, vyosa, rasanjana, saidhava and madhu.
Prakshalana with warm water & ghee.
Finally vranavat chikitsa.

Samyaka lekhita lakshana:
Absence of bleeding, discharge, itching & swelling.
The scrapped surface appears even.

Durlekhita (improper) lakshana:
Redness of eyes, discharge from the site of scraping, swelling & bluring of vision.
Bluish discolouration, heaviness, stiffness, itching and stickiness of eyelids along with increased inflammation.

Chikitsa:
Snehana followed by lekhana.

Atilikhita lakshana:
Excessive scraping leads to evertion of eyelid, loss of eyelashes, pain excessive discharge and bleeding.

Chikitsa:
Snehana, swedana & vatahara chikitsa.
Followed by vranavata chikitsa.

4. **Vedhya roga:**

Vedhya rogas are - sirotpata
Siroharsa
Sashopha akshi paka
Ashopha akshi paka
Anyotvata
Puyalasa
4 types of adhimantha
4 types of abhishyanda.

Purvakarma:
Dravonnu pana / yavagupana / sarpipana
Followed by snehana (abhyanga) & swedana.

Pradhana karma:
An auspicious day, which is neither too hot, cold, not cloudy is selected.
The patient is made to sit in a room ddevoid of wind, facting the sun.
He is made to sit with hip and knee flexed resting the elbow over the knee joints and placing the closed fist over the lateral aspect of the neck.
A bandage is tied around the fist & neck. A knot is put behind the neck which is neither too tight nor too loose.
The patient is asked to close the mouth and blow.
The sira which has to be punctured should be made prominent by tapping with middle finger.
Kutarika shastra is placed over the sira and tapped with middle finger to puncture.
The blood starts ooxzing out as soon as it is punctured.

Paschat karma:
When the bleeding stops, the site of puncture is pressed with thumb and the bandage is removed slowly.
Then cotton dipped in taila is placed at the site of puncured and bandaged.
Patient is sdvised to take light and easily digestable food is neither too not nor too cold.

Site of siravyadha in netra rogas:

1. Aupanasika sira
2. Lalata sira
3. Apana

Indication of siravyadha:
Puyalasa, complication of arma, savarna shukra.
Pittaja, raktaja & kaphaja timira.
Pilla roga

**Rakta mokshana:**
Raktamokshana is a method of blood letting. It is considered to be one of the shodhana karma by sushruta.

Types of raktamokshana:
Shastra kruta: pracchana & siravyadhana
Ashastra kruta: jalauka (in pittaja vikara)
Shringa (in vataja vikara)
Alabu (in kaphaja vikara)
Ghati yantra

Indication of raktamokshana in netra roga:
Pothaki → jalaukavacharana is recommended
Vranasukla → siravyadha and jalaukavacharana
Puyalasa → siravyadha
Pittaja & kaphaja timira → siravyadha
Vataja, pittaja & kaphaja abhishyanda – sirabyadha
Raktabhishyanda → siravyadha & jalaukavacharana
Pila roga → siravyadha

**Agni karma:**
Agnikarma is a therapeutic procedure performed using fire or hot instruments.

Importance of agnikarma:
Agnikarma is considered as most superioe because the disease which cannot be managed by medicines surgery or kshara karma can be effectively managed by agnikarma

Types of agni karma → samyaka dagdha lakshana:
Twak dagdha → sabda pradurbhava ( production of sounds), daurgandha (foul smell), twaka sankocha (constriction of skin)
Mamsa dagdha → kapota varnata (colour of pigeon), alpa shvayathu (mild swelling), alpa vedhana (mild pain), suska (dry), sankuchita (constriction).
Sira snayu dagdha → krishna unnata varnata (black & raised), sravasannorodhascha (cessation of discharge).
Sandhi & asthi dagdha → ruksha, arunata (reddish brown), karkasha (rough), sthira (firm)

Commonly used materials or equipments for agnikarma.
Shalaka, pippali, jambaushtha, madhu, madhuchista, guda, mudga, taila, ghrita, ajashakrita, godanta.

Purvakarma:
Patient fit for agnikarma is selected and is made to consume cold and unctuous food.
Necessary equipment or materials needed for agnikarma should be kept ready.

Pradhana karma:
Depending upon the site where agnikarma has to be performed, materials that is selected is heated to red hot and placed over the site till samyaka dagdha lakshanas are seen.

Paschat karma:
To promote healing of the wound, paste of madhu and ghrita is applied on the cauterised site.
Complications if any should be attended accordingly.

Indication of agnikarma in netra rogas:
Netra roga → indications
Vartmagata rogas → krichornmila, lagana, arbuda, bisa varma, shlista vartam, paksma kopa & pakshmoparodha
Sandhigata rogas → puyalasa & alaji
Sarvagata rogas → vataja and=himantha & abhishyanda

**Kshara karma:**
Definition of kshara:
तत्र क्षरणात क्षणनाद्वा क्षारा: |
Kshara is defined as that which destroys & removes the vitiated & unhealthy tissue.

Importance of kshara:
Kshara is considered as more important than shastra or anushastra. It can bring about surgical effect like incision, excision and scrapping.
It also helps in pacifying the vitiated tridoshas and can also be used in special theraputic procedures.

Kshara karma:
Any parasurgical procedure performed by using kshara karma.

Indication of kshara karma in netra vartma rogas:

- Lagana
- Arso vartma
- Shuska vartma
- Vartma arbuda
- Pakshmakopa
- Upapakshma maala

Kshara used in netrs rogas: yavakshara
Tuttha
Vibhitaki kshara
Gunja kshara

## 5. Essential diagnostic and therapeutic modern pharmacological agents required in Netra Chikitsa

**Ophthalmic dyes:**

1. Fluorescein sodium:

Fluorescein reveals epithelial defects of cornea, conjunctiva and aqueous humor leakage that may occur after trauma or ocular surgery.
Used to determine the patency of nasolacrimal system.
Used in the procedure of applanation tonometry.
Used for posterior segment diagnosis (retinal angiography).

2. Rose Bengal & lissamine green:

It is used as 1% solution and saturated paper strips.
It stains devitalized tissue on the cornea & conjunctiva.

3. Ocular anesthetics:

Proparacaine: used in conjunctival scraping etc. for diagnostic procedure.

4. Mydriatic drugs & cycloplegics:

Mydriatics are used to dilate the pupil by temporarily paralyzing the iris sphincter muscle.
e.g.: atropine ophthalmic
cyclopentolate
isopto atropine

**Cycloplegics:**

Cycloplegics temporarily paralyze accommodation to focus the lens for distant vision.
e.g.: atropine sulfate
homatropine hydrobromide
cyclopentolate hydrochloride
tropicamide

**Essential therapeutic modern pharmacological agents:**

ocular drug delivery is often challenging because of its anatomical location and presence of external guarding system.
Drug may enter the ocular tissue via anterior or posterior routes.
The entry through anterior route is important for the treatment of disease of anterior segment.
The delivery of drugs to the posterior segment is often difficult because of the presence of blood retinal barrier which restricts the entry of drugs from the systemic circulation into the posterior tissue such as retina and vitreous.

Drugs used for ocular infections:

- Antibacterial agents
- Antiviral agents
- Antifungal agents
- Anti acanthamoeba formulations

**Antibacterial agents:**
Several antibacterial agents are formulations for topical use in various ocular infections.
Aminoglycosides e.g., gentamycin & tobramycin
Fluroquinolones e.g., ciprofloxacin, ofloxacin, levofloxacin
Macrolides e.g., erythromycin
Sulfonamides e.g., sulfacetamide
Others e.g., chloramphenicol

**Antifungal agent:**
Fungal infection is serious, sight threatening conditions which warrants prompt diagnosis for effective treatment.
The management of fungal of infections poses a great challenges to the physician.
Ophthalmic infections for antifungal medications include fungal keratitis, scleritis, endophthalmitis, canaliculitis etc.

They are classified into –
Polyene antifungals: amphotericin, natamycin
Azole antifungals: fluconazole, atraconazole, voriconazole

**Antiviral:**
Viruses are obligatory intracellular organisms and their replication is dependent on the host's mechanism.
Viral infections are a significant cause of ocular morbidity. Therefore, there is an obvious need for efficient prevention and treatment of ocular viral disease.
The available antiviral drugs are: acyclovir
Famciclovir
Valacyclovir
Trifluridine

**Anti acanthamoeba formulation:**
Acanthamoeba represents microorganisms which occur worldwide and a genus of amoeba.
They provoke keratitis, which is very often severely progressive disease occurring in contact lens wearers.
Commercially available anti acanthamoeba formulations are: hydrogen peroxide
Benzalkonium chloride

**Drugs for ocular inflammation:**
The pharmacological approach for the management of ocular inflammation involves administration of anti-inflammatory agents after the recognition of anti-inflammatory activity of adreno cortico extracts.
Early use of various systemic and topical cortico steroids started, followed by the advent of non-steroidal anti-inflammatory drugs (NSAIDs) for controlling various inflammatory conditions of eye.

Corticosteroids are used as main stay in treatment of ocular inflammations. However, their use is limited due to serious side effects.

Steroidal anti-inflammatory drugs are: prednisolone
Dexamethasone
Fluorometholone

**Non-steroidal drugs:**
NSAIDs have proven to be safe & effective alternate to corticosteroids in the management of ocular inflammations.
e.g.: aspirin
diclofenac
indomethacin
naproxen

**Drugs used for allergic conditions:**
Ocular allergy refers to a variety of hypersensitive disorders that affects lids, conjunctiva and / or cornea.
They are commonly associated with immune mediated inflammatory reactions.
Currently available topical drugs for allergic conjunctivitis are classified as follow.

| Classification | Drugs |
|---|---|
| Vasoconstrictors | Naphazoline |
| Anti histamines | Pheniramine, antazoline |
| Mast cell stabilizers | Cromolyn sodium, nedocromil |
| Dual action anti allergic drugs | Olopatadine, epinastine etc. |
| NSAIDs | Ketorolac |
| Corticosteroids | Fluorometholone, dexamethasone, prednisolone |

**Anti cataract drugs:**
The anti-cataract agents claim to be effective and is broadly classified into following categories:
Aldose reductase inhibitors
Non-steroidal anti-inflammatory drugs
Vitamins, minerals, and antioxidants
Agents acting on glutathione and miscellaneous agents

**Anti glaucoma drugs:**
Glaucoma is one of the leading cause of blindness in the world. Current therapy for chronic treatment of glaucoma includes:
Beta blockers
Prostaglandin analogues

Adrenergic receptor agonists etc.

**Dry eye medications:**

The goals of dry eye treatment are to improve tear film quantity, stability, and reverse ocular surface damage. The agents which are available for the treatment of dry eye are classified as:
Tear substitutes and autologous serum.
Anti-inflammatory agents: Topical corticosteroid, topical cyclosporin, oral tetracyclines and topical NSAIDs.
Secretagogues: Cholinergic agents and mucin inducers.
Nutritional supplements, essential fatty acids omega-3 fatty acids, omega-6-fatty acids, topical retinol.
Hormonal therapy-topical estrogen and androgen.

# SANDHIGATA ROGA (DISEASES OF JUNCTIONAL AREAS OF EYE)

## 1. Number of sandhigata rogas, detailed etiology, pathology, clinical features, and management of Pooyalasa and Srava Rogas.

**Netra sandhi:**

The conjoining area of any two mandalas make a sandhi. They are 6 in number viz.

1. Pakshma vartmagata sandhi
2. Vartma shuklagata sandhi
3. Shukla krishnagata sandhi
4. Krishna drishtigata sandhi
5. Kaneenika sandhi
6. Apanga sandhi

### 1. Pakshma Vartmagata sandhi:

It is the junction between the eye-lids and eye lashes and can be considered as the lid margin. Openings of mebomian glands of zeis and glands of moll are present in this one of the disease occurring here.

### 2. Vartma shuklagata sandhi:

It is the junction between the vartma mandala and Shukla mandala and can be considered as the site where the palpebral and meet i.e., Fornix (Superior, inferior, medial & lateral).

### 3. Shukla Krishnagata sandhi:

It is the junction between the shukla mandala and krishna mandala and can be considered as limbus. This sandhi is functionally very important for the drainage of aqueous humour. Shukla mandala is opaque and krishna mandala is transparent in nature Parvani and Alaji re the diseases manifesting in this sandhi.

### 4. Krishna drishtigata sandhi:

It is the junction between the krishna mandala and drishti mandala. It can be considered as free margins of iris (pupil). The disease upanaha manifests here.

### 5. Kaneenika sandhi (nasa sameepa sthita sandhi):

It is the junction between the upper and lower lid medially and is considered as medial or inner canthus. It is directly connected with nasal cavity through naso lacrimal duct. Kaninika sandhi has key role in the drainage of tears. The disease puyalasa and four types of srava are said to manifest in this sandhi.

### 6. Apanga sandhi:

It is the junction between the upper and lower lid laterally and is considered as lateral or outer canthus. Position of the apanga sandhi is little higher than kaneenika sandhi. It is considered s a marma point.

**Classification of sandhigata roga:**

Based on involved sandhi:

| Sandhi | Roga |
|---|---|
| Suklakrishnagata | Parvani, alaji |
| Pakshmavartmagata | Krimigranthi |
| Krishnadrishtigata | Upanaha |
| Kaninika | Puyalasa and 4 types of srava |

Based on dosha prakopa:

| Dosha prakopa | Roga |
|---|---|
| Sannipataja | Alaji, puyalasa, puyasrava |
| Kaphaja | Krimigranthi, upanaha, Kaphasrava |
| Pittaja | Pittasrava |
| Raktaja | Raktasrava, parvani |

Based on shastra karma:

| Surgical procedure | Disease |
|---|---|
| Bhedana | Krimigranthi, upanaha |
| Vyadhana | Puyalasa |
| Chedana | Parvani |

Based on Sadhyasadhyata:

| Prognosis | Diseases |
|---|---|
| Sadhya | Puyalasa, upanaha, parvani, Krimigranthi |
| Asadhya | 4 types of srava, alaji |

**Puyalasa (dacryocystitis):**

Puya → pus; alasa → collection

Puyalasa is a sannipataja vyadhana sadhya vyadhi with predominance of pitta. The involved dhatus are rakta and mamsa.

Puyalasa is characterized by a swelling in the kaneenika sandhi. On suppuration, a thick, purulent, foul-smelling discharge is produced.

According to vagbhata:

Puyalasa is a condition where in a swelling characterized with redness, pain, ulcers, and continuous discharge of pus is seen in the kaneenika sandhi.

Chikitsa:

The treatment according to clinical stage is-

Shareera shodhana

Upanaha sweda

Raktamokshana

Anjana:
a) Kaseesa, saindhava, ardraka with madhu.
b) Above combination with lauha bhasma and tamra bhasma.

In the stage of paka, Vyadhana (incision & drainage) and nadivrana chikitsa must be done. If not treated properly, Puyalasa will lead to a stage called pilla roga. Agnikarma is indicated if this condition continues.

Upanaha: (cyst of iris / mucocele)
Upanaha is a Kaphaja, Bhedana sadhya Vyadhi.
Upanaha is characterized by a painless, large, non-suppurative nodular swelling at the drishti sandhi associated with itching.

According to vagbhata:
Upanaha is a big, painless, non-suppurative, deep-rooted, soft, sticky, skin coloured swelling associated with itching. It is caused by the vitiation of kapha. Its size and shape resemble the bubbles produced on boiling alkalis.

Chikitsa:
Bhedana is the line of treatment for upanaha. Since it is a non-suppurative swelling, effort should be made to bring it to suppurative stage before doing incision and drainage.

Stepwise treatment to be followed by upanaha:

1. Swedana is done initially to bring the non-suppurative swelling to suppurative stage.
2. Bhedana is done using vrihimukha shastra.
3. Scraping the contents of the swelling by Mandalagra shastra.
4. Pratisarana with the drugs like pippali, saindhava and madhu.
5. Clean the part with warm water.
6. Sprinkle the area with ghee.
7. Massage lightly with ghee and honey.
8. Lastly bandage the part.

Later aschotana should be done with patola patra and amalaki kwatha.

**Netra srava: (chronic dacryocystitis, epiphora)**
Sandheen- In the junction
Sravan- Secretions
Lingam- Symptoms
Ashru maargena- Through lacrimal duct
Ruk viheenaan- Pain less
Keertavishye- Told

According to videha:
The vitiated doshas goes through the siras (ashruvaha) and gets localized in the netrasandhis producing painless secretions (srava) through kaneenika sandhi. The srava manifests according to the involved dosha. This is also called as 'Netranadi'.

The four types of srava are –

1. Pooya srava
2. Shleshma srava
3. Rakta srava
4. Pitta srava

Vagbhata also describes 4 types of srava, instead of pitta srava, he mentions jala srava.

1. Puyasrava:

The vitiation of tridoshas in ashruvaha srotas gives rise to inflammatory changes leading to various types of purulent discharge from the kaneenika sandhi. It is said to be an vyadhi.

According to vagbhata:
Rakta along with tridoshas suppurates twak and mamsa. Due to this, frequent discharge of blood mixed pus is seen in the kaneenika part of vartma sandhi.

2. Shleshma srava:

The vitiation of kapha in ashruvaha srotas leads to painless, white, thick, sticky discharge from the kaneenika sandhi. It is said to be an asadhya vyadhi.

According to vagbhata:
The vitiation of kapha dosha produces white, profuse, sticky discharge from the Kaneenika sandhi.

3. Rakta srava:

The vitiation of rakta dosha produces coppery brown coloured, very hot discharge from the Kaneenika sandhi.

According to vagbhata:
The vitiation of rakta dosha produces coppery brown coloured, very hot discharge from the kaneenika sandhi.

4. Pitta srava

The vitiation of pitta in the ashruvaha srotas leads to yellowish blue coloured, hot watery discharge from the kaneenika sandhi.
It is also considered as an asadhya vyadhi.

5. Jala srava

Vata gets vitiated and reaches the siras producing watery discharge from Vartma Shukla and Kaneenika sandhi. It is associated with pain, redness and swelling in the eyes.

Chikitsa:
All the Sravas are said to be Asadhya
As Srava is said to be Asadhya by both Sushruta and Vagbhata, no treatment is explained in their texts. But some authors of Medieval period (Yogaratnakara, Chakradatta etc.) have mentioned the following treatment.
In all kind of Srava, Triphala kwatha is indicated.
Triphala kwatha+ honey in Kaphaja netra srava
Triphala kwatha+ ghee in Pittaja netra srava
Triphala kwatha + pippali in Vataja netra srava
Siravyadha is also indicated in the management of srava.

Anjanas mentioned for srava:
Pathyadi varti- Pulp (majja) and fruits (phala) of Triphala is used as varti in rakta srava.
Karpasadyadi varti- Karpasi phala, jambu, amra, rasanjana along with madhu in chronic srava.

## 2. Brief Study of krimi granthi, Parvani and Alaji Rogas.

**Parvani (phlyctenular conjunctivitis):**
Parvani is Raktaja Chedana Sadhya Vyadhi.

Lakshanas of parvani:
Vitiation of rakta leads to the formation of a thin, circular swelling at the krishnashukla sandhi. It is coppery in colour & is associated with burning sensation and pain. This condition is called parvani and is considered as the prodromal symptom of Alaji.

According to vagbhata:
Parvani is a copper coloured, green gram (mudga) shaped nodule localized in the vartma shukla sandhi. It is associated with burning sensation, pain, and bleeding on puncturing.

Shastra chikitsa of parvani:
Firstly, swedana is done to the part to soften the tissue.
Then hold & lift one third part of the lesion by Badisha yantra.
Carefully excise half part of the parvani pidika by Vridhipatra.
Over excision may lead to complications like ashru nadi (Lacrimal sinus).
Later pratisarana with Saindhava & Madhu is done.
To remove the remnants of the lesion, lekhana karma is also indicated.

Lekhana anjana for the above procedure:
Powders of shankha, samudraphena, manduki, shukti, sphatika, kuruvinda (padmaraga), pravala, ashmantaka, vaidurya, pulaka, mukta, lauha, tamra and srotonjana is taken in equal quantity and mixed. It should then be stuffed in meshashringi (Ram’s horn) to prepare anjana.

**Alaji (advanced stage of phlyctenular conjunctivitis):**
It is a Sannipataja Asadhya Vyadhi.
Alaji is the progressive stage of Parvani. Here, the swelling will be thick along with other symptoms of parvani.

According to vagbhata:
Alaji is a swelling manifesting in the inner aspect of kaneenika sandhi. It is associated with pain, pricking, and burning sensation.

**Difference between parvani and alaji:**

| Features | Parvani | Alaji |
|---|---|---|
| Dosha | Raktaja | Tridoshaja |
| Size of pitika | Thin | Thick (large) |
| Netra sandhi | Shukla krishna (Su.)<br>Shukla vartma (Vag.) | Shukla krishna (Su.)<br>Inner aspect of kaneenika (Vag.) |
| Symptoms like pain and burning sensation | Mild | Severe |
| Location of lesion | Superficial | Deep |
| Prognosis | Sadhya | Asadhya |

**Krimigranthi (Blepharitis):**
Yogaratnakara names Krimigranthi as jantugranthi.

It is a Kaphaja Bhedana Sadhya Vyadhi.
Krimigranthi is a disease in which small cystic swelling associated with itching is found in the junction between eyelids and eyelashes. These are caused by various types of krimis which moves further and vitiates the inner structures of the eye including vartmashukla sandhi.

According to vagbhata:
In krimigranthi, cysts are formed by micro-organisms either at the outer or inner canthus of the eyes. It is associated with pain, itching, burning sensation, pus discharge and cracks on the eyelids.

Chikitsa:
First Proper swedana is done on the lid margins.
Krimigranthi present on the lid margin are incised.
Then Pratisarana is done with paste made of triphala, tuttha kaseesa and saindhava.

## 3. Study of Acute and Chronic Dacryocystitis, Epiphora, Blepharitis including their aetiology, pathology, signs & symptoms, differential diagnosis, and medical & surgical management.

**Drainage of tears:**
Tears are secreted from the lacrimal gland. On blinking, lids push tears evenly across the eyes to keep it moist and healthy. Blinking also pumps tears into the puncta and by capillary action, they are drawn into the lacrimal sac and travels through the naso lacrimal duct and finally tears gets drained into the nose from where it is evaporated.

**Epiphora:**
Epiphora refers to excessive watering of the eye or an overflow of tears due to excessive secretion of the lacrimal glands or obstruction of the lacrimal ducts.

Etiology:
Epiphora can be due to over production of tears.
e.g. ocular irritation and inflammation.
Dacryocystitis
Trichiasis
Entropion
Obstruction to ducts
e.g., punctal, canalicular or nasolacrimal duct obstruction, ectropion.

Two terms are used in connection with watering of the eye:
1. Epiphora: denotes watering due to obstruction to outflow of tears.
2. Lacrimation: denotes watering due to excessive secretion of tears.

Causes of epiphora:
Stenosis of the punctum: particularly the lower one - Congenital or acquired.
Eversion of the lower punctum due to laxity of the orbicularis muscle as in senility, facial paralysis, and ectropion.
Obstruction in the lower canaliculus due to calculus or infection.
Obstruction of the sac: due to tumour of the sac or following removal of the sac.
Obstruction in the naso-lacrimal duct as in chronic dacryocystitis, nasal polyp and maxillary antrum tumour pressing on the duct.

Clinical evaluation of epiphora:
Ocular examination to exclude causes in the punctum and any swelling in the sac.
Regurgitation test: Pressure is applied over lacrimal sac area above the medial palpebral ligament. Reflux mucopurulent discharge indicates obstruction at the lower end of sac or nasolacrimal duct.

Fluorescein dye disappearance test: Two drops of fluorescein dye are instilled in both conjunctival sac and observations made after two minutes. A prolonged retention of dye in conjunctival sac indicates mechanical obstruction.
Lacrimal syringing test: Normal saline is pushed into the lacrimal sac from lower punctum with the help of syringe and lacrimal canula. In the presence of obstruction, no fluid passes into the nose and it may reflect through the same punctum indicating obstruction in the same or common canaliculi. The fluid passes out through the opposite punctum indicating obstruction in the lower sac or naso lacrimal duct.

Treatment:
The causes of the obstruction must be evaluated and treated accordingly.
In stenosis of the punctum- Laser punctoplasty or ampullotomy may be used to enlarge the outflow orifice.
In eversion of the lower punctum as in ectropion, the only cure is to surgically realign the punctum with the globe.
In obstructive conditions, punctal or canalicular dilation and irrigation is done.
Dacryocystorhinostomy (DCR) is indicated if blockage exists distally in the nasolacrimal system. This creates a surgical bypass of the common canaliculus directly into the nasal mucosa.

**Dacryocystitis:**
It is the inflammation of the lacrimal sac.

Classification:
1. Congenital dacryocystitis
2. Adult dacryocystitis
a. Chronic
b. Acute

Congenital dacryocystitis or dacryocystitis in new born:
This condition arises due to failure in canalization of the naso-lacrimal duct, the lumen being blocked by epithelial debris. The condition may be bilateral.

Treatment:
Sharp pressure over the sac area may force the content down. Thus, the patency of the naso lacrimal duct is achieved. Probing of the nasolacrimal duct is helpful in this condition. Delay in treatment causes complete cicatrical obliteration or blocking of the duct.

**Chronic dacryocystitis:**
Etiology:
Age: Usually affects adults between 40 and 60 years of age.
Sex: Predominantly seen in females (80%) due to narrow lumen of the bony canal.
Bi-laterality: May be unilateral or bilateral.
Social incidence: Common in low socio-economic group

Causative organisms:
Staphylococci. pneumococci. streptococci and pseudomonas pyocyanea.

Pathology:
Stricture of the nasolacrimal duct causes stagnation of the contents of the sac. This becomes infected and the sac wall becomes chronically inflamed. The epithelium of the sac wall multiplies to form several layers and the vascularity of wall increases and becomes atonic. The contents of the sac which are at first watery, later becomes mucoid due to excessive secretion of mucus by goblet cells and afterwards muco purulent due to exudation of pus cells.

Symptoms:
The commonest symptom is watering eye.

Clinical signs:

1. Catarrhal stage:

Persistent watering of the eye.
Mild conjunctival hyperaemia at inner canthus of the affected eye.
On applying pressure on the sac, very little or no regurgitation of fluid through punctum.
On syringing the sac, fluid regurgitates through the upper punctum mixed with flakes of mucus.
No local swelling over the sac area or tenderness.

2. Mucocele stage:

In addition to watering, there is swelling over the sac area below the medial palpebral ligament which is not tender.
On pressure over the sac, mucoid material regurgitates through the punctum.
Encysted mucocele- Sometimes both the canaliculi may be blocked and there is no regurgitation on pressure.
Conjunctival hyperaemia at the inner canthus.

3. Pyocele stage:

Conjunctival hyperaemia at the inner canthus becomes more pronounced.
Similar swelling over the sac arca below the medial palpebral ligament, which is not tender.
Also, there is no redness of the skin over the swelling.
On pressure over the sac, there is regurgitation of mucopurulent matter through the punctum.
Watering of the eyes remains as before.

Complications:
Acute on chronic dacryocystitis. i.e., recurrent acute attacks on chronic dacryocystitis.
Development of the corneal ulcer, which is known as hypopyon ulcer or ulcus serpens of the cornea as the causative agent is pneumococcus derived from the sac.
Chronic conjunctivitis.

Treatment:
Conservative treatment: By repeated lacrimal syringing.
Balloon catheter dilation in partial nasolacrimal duct obstruction.
Dacryocystorhinostomy (DCR): The medial wall of the sac is anastomosed with the mucus membrane of the middle meatus of the nose.
Dacryocystectomy (DCT): Removal of the lacrimal sac.

**Acute dacryocystitis:**
It is acute suppurative inflammation of the lacrimal sac characterized by the presence of painful swelling in the lacrimal sac.

Etiology:
It may develop in two ways.

1. As an acute exacerbation of chronic dacryocystitis.
2. As an acute peridacryocystitis due to direct involvement from the neighboring infected structures like paranasal sinuses, surrounding bones and dental abscess.

Causative organisms: Commonly involved are streptococcus haemolyticus, pneumococcus and staphylococcus.

Pathology:
The sac becomes filled with frank pus with abundant poly morphonuclear leucocytes. Inflammation spreads to the tissues surrounding the sac causing pericystitis. Lacrimal abscess is finally formed which usually bursts on the skin surface forming a lacrimal fistula. As soon as the pus drains out, the inflammation subsides.

Symptoms:
Severe pain and sensation of heat over the sac area.
Fever
Watering of eyes

Clinical signs:
Marked swelling and redness of the skin over the sac area.
Oedema of the skin of the lids and on the side of the nose.
Skin over the sac is tender and hot.
No regurgitation through the punctum.
Slight congestion of the conjunctiva.
Enlargement of the sub maxillary lymph nodes.
When abscess bursts, fistula is formed and signs and symptoms of acute inflammation subsides.
If this condition is not properly treated, there may be acute attacks of dacryocystitis in future.

Complications:
Osteomyelitis of the lacrimal bone
Orbital cellulitis
Facial cellulitis
Cavernous sinus thrombosis
Acute conjunctivitis

Treatment:

1. Before abscess formation:

Hot compresses over the affected sac
Systemic and topical antibiotics to control infection
Systemic anti-inflammatory and analgesic drugs

2. When inflammation has localized:

Incision over the sac to drain the pus.
Removal of the sac when inflammation completely subsides.
When lacrimal fistula has formed, surgical techniques such as excision of the fistulous passage and removal of the sac is indicated.

**Dacryocystorhinostomy:**
Dacryocystorhinostomy (DCR) is a surgical procedure to restore the flow of tears into the nose from the lacrimal sac when the nasolacrimal duct does not function.
Dacryocystorhinostomy (DCR) operation can be performed by two techniques:

1. Conventional external approach DCR, and
2. Endonasal DCR

Conventional external approach DCR:

1. **Anaesthesia:** General anaesthesia is preferred. However, it may be performed with local infiltration anaesthesia in adults.
2. **Skin incision:** Either a curved incision along the anterior lacrimal crest or a straight incision 8 mm medial to the medial canthus is made.
3. **Exposure of medial palpebral ligament (MPL) and Anterior lacrimal crest:** MPL is exposed by blunt dissection and cut with scissors to expose the anterior lacrimal crest.
4. **Dissection of lacrimal sac:** Periosteum is separated from the anterior lacrimal crest and along with this, the lacrimal sac is reflected exposing the lacrimal fossa.
5. **Exposure of nasal mucosa:** A bony ostium is made by removing the anterior lacrimal crest exposing the thick, pinkish white nasal mucosa.
6. **Preparation of flaps of sac:** A probe is introduced into the sac through lower canaliculus and the sac is incised vertically. To prepare anterior and posterior flaps, this incision is converted into ‘H’ shape.
7. **Suturing of flaps:** Posterior flap of the nasal mucosa is sutured with posterior flap of the sac. It is followed by suturing of the anterior flaps.
8. **Closure:** MPL is sutured to periosteum, orbicularis muscle is sutured and skin closed with silk sutures.

**Dacryocystectomy (DCT):**
Dacryocystectomy is a well-established oculoplastic procedure that refers to a complete surgical removal of lacrimal sac.
Anaesthesia: General anaesthesia is preferred.
Skin incision: Either a curved incision along the anterior lacrimal crest or a straight incision 8 mm medial to the medial canthus is made.
Exposure of medial palpebral ligament (MPL) and Anterior lacrimal crest: MPL is exposed by blunt dissection and cut with scissors to expose the anterior lacrimal crest.
Dissection of lacrimal sac: Periosteum is separated the anterior lacrimal crest and along with this, the lacrimal sac is reflected laterally with blunt dissection exposing the lacrimal fossa.
Removal of lacrimal sac: After exposing the sac, it is separated from the surrounding structures by blunt dissection followed by cutting its connections with the lacrimal canaliculi. It is then held with artery forceps and twisted 3-4 times to tear it away from the nasolacrimal duct (NID).
Curettage of bony NLD: It is done with the help of a lacrimal curette to remove the infected parts of membranous NLD.
Closure: MPL is sutured to periosteum, orbicularis muscle is sutured and skin is closed with silk sutures.

The upper end of the duct is curetted & the incision in closed by sutures.

**Blepharitis:**
Definition:
Blepharitis is the most common disease caused due to subacute or chronic inflammations of lid margins.
It can be divided into following clinical types:

1. Bacterial Blepharitis (ulcerative).
2. Seborrheic or squamous Blepharitis,
3. Mixed staphylococcal with Blepharitis.
4. Posterior blepharitis or meibomitis
5. Parasitic blepharitis

**1. Bacterial or ulcerative blepharitis:**
It is chronic infection of the anterior part of the lid margin. There is suppurative inflammation of the ciliary follicles along with the glands of Zeis and Moll.

Etiology:
Causative organisms: staphylococci, rarely streptococci, moraxella.
Clinical features:
Symptoms:
Chronic irritation, itching, mild lacrimation, gluing of cilia and mild photophobia.

Signs:
Yellow crusts are deposited at the root of the eye lash by which the lashes are glued together.
On removing the crusts, small ulcers appear around the base of the lashes which bleed freely.
Rosette's- red thickened lid margins seen with dilated blood vessels.
Falling of the eye lashes, which are either not replaced or when replaced become misdirected.

Treatment:
1. Lid hygiene:

Warm compresses for 5 to 10 minutes to soften the crusts.
Crust removal and lid margin cleaning with the help of cotton buds dipped in solution of 3% sodium bicarbonate.
Antibiotic eye ointment should be applied immediately after removal of crusts.

2. Antibiotic eye drops and oral antibiotics:
3. Topical steroids like Fluorometholone
4. Ocular lubricants

**2. Seborrheic or squamous blepharitis:**

Etiology:
It is not essentially an infective condition. Metabolic causes, hygienic factors, eye strain and dandruff of the scalp usually lead to the development of this condition.

Symptoms:
Deposition of whitish material (soft scales) at lid margin.
Mild discomfort.
irritation.
Occasional watering of eyes.
History of falling of lashes.

Signs:
White dandruff like scales on lid margin. On removing the scales, underlying surface is found to be hyperemic and greasy (no ulcer).
Lashes fall out easily but are usually replaced without distortion.
Lid margins are thickened and sharp posterior border tends to be rounded.

Treatment:
General measures include improvement of health and balanced diet.
Treatment of seborrhea of scalp.
Removal of scales from lid margins with the help of luke warm solution of 3% sodium bicarbonate or baby shampoo.
Frequent application of antibiotic and steroid ointment.

### 3. Posterior blepharitis or meibomitis:

It is an inflammation of meibomian glands. It can occur in chronic and acute forms.
Acute meibomitis is caused due to staphylococcal infection and is characterized by painful swelling around the involved gland. Pressure on it results in expulsion of pus.
Chronic meibomitis is a commonly occurring meibomian gland dysfunction in those with acne, rosacea and/or seborrheic dermatitis.

Symptoms:
Chronic irritation, burning, itching, grittiness, mild lacrimation with remissions and exacerbations intermittently.

Signs:
White frothy secretions present on lid margins.
Opening of meibomian gland becomes prominent with thick secretion on applying pressure on lids.
On eversion of lids, vertical, yellowish streaks
shining through conjunctiva are seen.
Hyperaemia of posterior lid margin.

Treatment:
Lid hygiene.
Topical antibiotics in the form of eye ointment and drops.
Systemic tetracyclines.
Topical steroids.
Ocular lubricants

### 4. Parasitic blepharitis (lash infestation):

Etiology:
Blepharitis associated with infestation of lashes by crab louse.

Clinical features:
Chronic irritation, itching, burning and mild lacrimation.

Signs:
Lid margins inflammed.
Nits (eggs) may be seen adherent to the root of eye lashes.

Treatment:
Mechanical removal of nits & louse.
Application of antibiotic ointment and yellow mercuric oxide.
Delousing the patient.

# VARTMAGATA ROGA (DISEASES OF LIDS)

1. **Number of vartmagata rogas, and detailed knowledge of etiology, pathology, clinical features, and management of Anjananamika, Utsangini, Lagana, Vatahata vartma, Pakshma kopa, Sikta vartma, Pothaki, Klinna vartma, Krichhronmeelana and Kukunaka diseases of Vartma.**

**Vartmagata roga:**
Vartmas are eyelids which cover the eyes externally. They are two in number-Urdhwa and Adha. It is also called as netra puta (covering of eye) or pakshma mula (root of eyelashes).

Patala and sandhis of vartma mandala:
There are in Vartma -l. Bahya and 2. Abhyantara.

Vartma mandala is associated with four sandhis
Pakshma vartmagata sandhi
Vartma shuklagata sandhi
Kaneenika sandhi
Apanga sandhi

Pancha mahabhuta and doshas present in vartma:
Muscular and vascular nature of vartma indicates the presence of Prithvi and Agni mahabhuta. Predominant doshas present are Kapha and Pitta. Movement of lid is by the action of vata (vyana) and since it is situated in the murdha, presence of pranavayu also can be presumed.

**Samprapti of Vartmagata rogas:**
Nidana sevana → Vitiates doshas (individual or all together) → Goes through the siras → Localizes in vartma → Vitiates mamsa and rakta → Produces 21 vartmagata rogas.

Vartma gata rogas are 21 in number:

| S.N. | Sushruta 21 | Vagbhata 24 |
|---|---|---|
| 1. | Utsangini | Utsanga |
| 2. | Kumbhika | Kumbhee pidika |
| 3. | Pothaki | Pothaki |
| 4. | Vartma sharkara | Sikta vartma |
| 5. | Arsho vartma | Arsho vartma |
| 6. | Sushkarsha | - |
| 7. | Anjana namika | Anjana namika |
| 8. | Bahala vartma | Bahala vartma |
| 9. | Vartma avabandha | - |
| 10. | Klishta vartma | - |
| 11. | Kardama vartma | Kardama vartma |
| 12. | Shyava vartma | Shyava vartma |
| 13. | Praklinna vartma | - |
| 14. | Apariklinna vartma | - |
| 15. | Vatahata vartma | Vatahata vartma |
| 16. | Arbuda | Arbuda |
| 17. | Nimesha | Nimesha |
| 18. | Shonita arsha | - |
| 19. | Lagana | Lagana |
| 20. | Bisa vartma | Bisa vartma |
| 21. | Pakshma kopa | - |
| 22. | | Kruchronmeelana |
| 23. | | Pittotklishta vartma |
| 24. | | Pakshma shata |
| 25. | | Kaphotklishta vartma |
| 26. | | Doshotklishta vartma |
| 27. | | Utklishta vartma |
| 28. | | Slishta vartma |
| 29. | | Kukunaka |
| 30. | | Pakshmoparodha |
| 31. | | Alaji |

Classification based on doshas:

| Vata | Kapha | Rakta | Sannipata |
|---|---|---|---|
| Nimesha | Klinna vartma | Klishta | Utsangini |
| Vatahata vartma | Lagana | Anjana namika | Kumbheeka |
| | Pothaki | Shonitarsha | Vartma sharkara |
| | | | Arsho vartma |
| | | | Shushkarsha |
| | | | Arbuda |
| | | | Aklinna vartma |
| | | | Vartma avabandha |
| | | | Bahala vartma |
| | | | Shyava vartma |
| | | | Bisa vartma |
| | | | Vartma Kardama |
| | | | Pakshma kopa |

Classification based on Sadhyasadhyata:

Asadhya: vatahata vartma
Nimesha
Shonitarsha

Yapya: pakshma kopa

**Classification based on shastra chikitsa:**

| Lekhana | Bhedana | Chedana | Ashastrakruta |
|---|---|---|---|
| Utsangini | Lagana | Arsho vartma | Praklinna vartma |
| Kumbhika | Anjana namika | Shushkarsha | Aklinna vartma |
| Pothaki | Bisa vartma | Arbuda | |
| Vartma sharkara | | | |
| Avartma avabandha | | | |
| Bahala vartma | | | |
| Shyava vartma | | | |
| Vartma Kardama | | | |
| Klishta vartma | | | |

**Utsangini (chalazion or Meibomian cyst):**

It is a tridoshaja sadhya vyadhi.

Utsangini is a condition in which one or more pidakas or nodular swelling erupts in the lower lids. Special feature of these pidakas is that even though they look prominent outwards, their openings are directed inwards.

As per Dahana's commentary:
Utsangini is a pidaka formed in the lower lid, opening inwards but prominent outwards, hard to touch, slightly painful & surrounded by similar pidaka. When the Utsanga pidakas are incised or cut, a secretion like contents of an egg (Kukkutanda rasa) is seen.

According to vagbhata:
A raktaja condition in which red coloured pidika is surrounded by similar pitikas is called Utsanga.

Utsangini is formed only in lower lid
Utsanga is formed in either of eyelids

Chikitsa:
Surgical:
Chedana- If pidika is large
Bhedana- If pidikas are small.
Lekhana- After chedana or bhedana karma.

Vagbhata has mentioned following steps for the management of utsanga:
Bhedana- Incision of the pidika using appropriate instrument
Nishpeedana- the contents of the pidika
Lekhana- Scraping of the remnant tissue
Pratisarana- Rubbing with the drugs like tagara, ela, saindhava, manahshila with honey.
Pariseka with Kashaya prepared out of haridra, madhuka and patola.

**Kumbheeka:**
Kumbheeka is a Sannipataja Lekhana Sadhya Vyadhi.
Kumbheeka is a disease in which the pidakas resembling pomegranate seed occurs frequently in the vartma. On puncturing the pus gets drained but it swells up again due to the accumulation of pus.

According to vagbhata:
According to Vagbhata, in this the pitikas are black in colour, swollen resembling pomegranate seeds, usually seen in the inner aspect of the eyelid. On puncturing, the pus gets drained out but it gets swollen up again.

Chikitsa:
Acharya Vagbhata has advised-
Lekhana
Pratisarana
Pariseka
The area of the kumbheeka pidika should be scrapped. (If the pidakas are small and they should be allowed to suppurate after which it can be incised and scraped).
Pratisarana with saindhava.

Pariseka with kashaya prepared out of patola, amalaka, yashtimadhu followed by ghrita prepared out of the above drugs.

**Pothaki (trachoma):**
Pothaki is a Kaphaja Lekhana Sadhya Vyadhi. It is one of the Pilla roga.
It is a vartmagata roga in which the pidakas resemble red mustard seed. The pidakas are hard (heavy), painful, associated with itching and discharge. The condition having the above features is called as Pothaki.

According to vagbhata:
Pothaki is a condition in which hard follicles with coating, resembling the seeds of white mustard originates in vartma due to vitiation of kapha dosha. The associated symptoms are oedema, sticky discharge, pain, and itching.

Chikitsa:
Two methods of treatments are indicated in pothaki:

1. Blood letting
2. Scraping

Initially bloodletting is indicated. This is to be followed by Scraping the part

According to acharya vagbhata:
The management of Pothaki is as follows
Lekhana.
Pratisarana with shunthi, saindhava and pippali
Prakshalana with ushnambu.
Sechana with kashaya prepared out of khadira, aadhaki and shigru
Aschotana with kashaya prepared out of haridra, daruharidra and yashtimadhu mixed with honey.
Aschotana with decoction of tender leaves of amra and jambu.
Anjana prepared from vidanga, laksha, daruharidra, twak, haratala, manahshila and honey.

**Vartma sharkara (sikata vartma) (lithiasis conjunctivae – a form of trachoma):**
Vartma sharkara is a Vyadhi.
The word Sharkara or Sikata literally means Sugar or Sand particles. It denotes the size and shape of the pidakas in the lids.
A disease in which large rough nodule surrounded by very small nodules seen in the lids is called Vartma sharkara.

According to vagbhata:
Vagbhata has described the disease as Sikatavartma in which multiple small nodules resembling sand particles are seen within lids.

Chikitsa:
The treatment for Kumbheeka, Vartmasharkara and Utsangini are same
Initially excision of the pidakas is done by sharp instruments.
This should be followed by Lekhana karma.

**Shushkarsha (polyp of palpebral conjunctiva):**
It is Tridoshaja Chedana Sadhya Vyadhi.
The disease in which a long sprout like, rough, immobile troublesome projection occurs in the lids is called Shuskarshas.

Chikitsa:
Chedana with mandalagra shastra. The base of the shushkarsha should be excised using sharp instruments like mandalagra shastra.

Anjana namika (Stye):
It is a raktaja bhedana sadhya vyadhi.
A small, soft, copper0 coloured pidaka occurring in the vartma, associated with symptoms like burning sensation and is known as Anjana namika.

According to vagbhata: (Raktaja)
A firm green gram sized red coloured pitika formed in the middle or end of the eyelids is called as anjana namika. It is caused by the vitiation of rakta and is associated with symptoms like itching, burning sensation and pain.

Chikitsa:
Steps to be followed.
Swedana- Hot fomentation.
Bhedana- Incision to let out pus.
Nishpeedana Extraction of pus completely.
Pratisarana with manahshila, ela, tagara, saindhava and honey.

Description of Anjana namika:
According to Sushruta: External hordeolum
Vagbhata: Internal and External hordeolum

**Bahala vartma (multiple chalazion):**
It is a tridoshaja lekhana sadhya vyadhi.
A condition in which pidakas of same Shape and colour arises from all the sides of vartma forming a uniform swelling is called as Bahala Vartma.

According to vagbhata:
Bahala vartma is characterized by muscular growths which are similar in colour and shape giving bulky appearance to the eyelid.

Chikitsa:
Lekhana - Same as Pothaki

**Vartma avabandha (imperfect closure of eyelids following inflammatory swelling or angioneurotic oedema):**
It is Sannipataja Lekhana Sadhya Vyadhi.
A disease characterized by oedema of the eyelids, associated with itching and mild pricking pain resulting in improper closure of eyelids in human beings is called as Vartma avabandha,

Chikitsa:
Same as Pothaki (Refer pothaki chikitsa)
Shothahara chikitsa

**Klishta vartma (allergic conjunctivitis):**
It is a Raktaja Lekhana Sadhya Vyadhi.
Klishta Vartma is a condition in which the eyelids which are soft & copper in colour with mild pain, suddenly becomes red in colour.

Chikitsa - Lekhana
The treatment for Vartma avabandha, Vartma klishta, Vartma bahala and Pothaki are same.

**Vartma Kardama (inflammed lid with conjunctivitis):**
It is a Sannipataja (kapha, pitta and rakta) Lekhana Sadhya Vyadhi.
Vartma kardama is the progressive stage of klishta vartma wherein vitiated kaphayukta rakta again undergoes vidahana due to pitta leading to excessive moistness in eyelids.

According to vagbhata:
Vartma kardama is a condition in which eyelids appear black and moist like muddy clay.
Chikitsa:
Lekhana
Vrana shothahara
Treatment as in Abhishyanda is to be done.

**Shyava vartma (inflammed lids with conjunctivitis):**
It is a Sannipataja Lekhana Sadhya Vyadhi.
A condition in which the eyelids become grey or black in colour with painful swelling on both sides (internally and externally) associated with sticky discharge, itching, and burning sensation is called as shyava vartma.

According to vagbhata:
Shyava vartma is a disease which occurs due to the vitiation of tridoshas along with rakta. It leads to painful swelling and greyish discolouration of the lids. Moistness is due to the discharge.
Pain: vata; burning sensation: pitta; moistness: kapha

Chikitsa:
Lekhana and pratisarana.
Internal medicine to reduce the inflammation.

**Shlishta vartma:**
The disease in which eyelids adhere together and is associated with itching, swelling, and redness is called shlishta vartma.

Chikitsa:
Lekhana

**Klinna vartma / Praklinna vartma (Conjunctivitis):**
It is a Kaphaja Bheshaja Sadhya Vyadhi.
Klinna vartma is a disease of the lids characterized by painless swelling externally and sticky discharge internally. It is associated with symptoms like severe itching and pricking pain.
Few authors considered klinna and aklinna vartma as Pilla roga.

Chikitsa:
As kapha is the dominant dosha, Kapha hara chikitsa should be adopted.

**Aklinna vartma (Ankyloblepharon):**
It is tridoshaja bheshaja sadhya Vyadhi.
Aklinna vartma is a non-suppurative condition where in eyelids stick together again and again even after repeated washing.

Chikitsa:
Tridoshahara chikitsa.
Sweda or grahi aushadha

**Vatahata vartma:**
It is a vataja asadhya vyadhi.
Vatahata vartma is a condition in which the patient is unable to close the eyelids. Here the loose/weak sandhi (vartma shukla sandhi, apanga/kaneenika sandhi) becomes non-functional. This disease may or may not be associated with pain.

According to vagbhata's description, it can be correlated to drooping of eyelids (ptosis).
The condition in which the eyelids are unable to do its function of opening due to the weakness of sandhi (kaneenika and apanga) is called as Vatahata vartma.

Chikitsa: asadhya

**Lagana (chalazion):**
It is a kaphaja bhedana sadhya vyadhi.
Lagana is a large, non-suppurative, painless, hard, cystic swelling formed in the eyelid. Associated symptoms are itching and stickiness. The size of lagana is said to be like that of badara or kola.

According to vagbhata:
Lagana is a pale, hard, cystic swelling caused due to vitiation of kapha dosha. It is non suppurative, painless and is associated with itching. The size of Lagana is like badara (kola) or even less.
Bhavaprakasha names it as Nagana and Sharangadhara as Alagana

Chikitsa:
Bhedana- An incision on the lagana with vrihimukha Shastra.
Pratisarana with gorochana, yavakshara, tuttha, pippali and honey (in small cystic swelling).
Kshara and Agnikarma (in large cystic swelling).

**Bisa vartma (porous oedema of eyelids):**
It is tridoshaja Bhedana Sadhya Vyadhi as per Sushruta.
According to Vagbhata it is Yapya Vyadhi.
Bisa vartma is a condition in which eyelids are swollen with numerous minute pores on it like stalk of lotus in water.

According to vagbhata:
The vitiated doshas produce swelling in the external surface of the lids.
It also produces constant discharge from the minute pores present in the inner surface of the eyelids. Since the discharge from the pores looks like water oozing out from the Bisa it is called as Bisa vartma.

Chikitsa:
Line of treatment:

1. Swedana
2. Bhedana
3. Avachurnana with saindhava, kaseesa, pippali, pushpanjana, manahshila and ela.
4. Application of honey with ghee.
5. Bandhana (bandage).

If it does not respond to the above treatment pratisarana, kshara & agni karma can be tried.

**Pakshma kopa (trichiasis with entropion):**
Synonyms of pakshma kopa- Upapakshmamala, Parivaala (Acharya Dalhana)
It is Tridoshaja Yapya vyadhi.
The vitiated tridoshas invades the root of eyelashes making them sharp, rough, and inverted. The inverted lashes prick the inner part of eye causing discomfort, pain and intolerance to air, sunlight, and heat. The patient finds relief when cilia are epilated.

Vagbhata names it as pakshmoparodha.
The atrophy of eyelids causes inversion of eyelashes. There will be extra growth of eyelashes which are rough and sharp. The sharp edges of these eyelashes prick on to the inner surface of the eyes causing inflammation. Because of this, the patient is intolerant to air, heat and light and hence avoids it. On epilation the patient finds temporary relief.

Chikitsa:
All four methods of treatment are explained for Pakshmakopa

1. Shastra
2. Agni
3. Kshara
4. Aushadhi.

Shastra karma:

1. The patient who has undergone snehana (abhyantara & bahya) is made to sit comfortably.
2. Then a barley seed shaped (yavakriti) incision is made at a site 2/3$^{rd}$ part below the eyebrows and 1/3$^{rd}$ part above the eyelid margin using tiryak shastra.
3. The site of incision is sutured with tail hair of horse (ashwa bala). The lid is then lifted above with the suture thread and placed over lalata and bandhana is done with a cloth. (By this procedure, the lids are elevated and does not prick on to the inner surface of the eyes).
4. Wound-management is done by applying ghee & honey over it.
5. When healing of wound is attained, suture is removed.

Agni kshara karma:
If the disease does not subside with Shastra karma, then Agni and Kshara karma can be done at the same site.

- If all treatment measures fail, then extra line of lashes should be excised using badisha yantra.
- A heated fine needle can be used to burn the roots of the eye lashes.
- Pratisarana should be done with haritaki or tuvaraka.
- As it is a Yapya vyadhi, virechana, aschotana, dhumapana, nasya, lepana, anjana, snehana, rasakriya etc. can also be tried.

**Kruchronmeelana (blepharospasm):**
(Krichra = difficulty, Unmeelana = in opening)
The vitiated vata takes ashraya in the vartmagata siras producing symptoms such as pain, foreign body sensation (eyes filled with sand), difficulty in opening the eyes and discharge on arising from sleep. The person finds relief on rubbing the eyes.
This condition is called kruchronmeelana.

Chikitsa:
Vatahara chikitsa like snigdha nasya, snaihika dhuma, anjana etc.
Draksha ghrita prepared out of purana ghrita, draksha kalka, water and sugar.

**Kukunaka (ophthalmia neonatorum):**
Sushruta has mentioned Kukunaka in Nayana abhighata parisheda Adhyaya and not included in the 76 Netra rogas.
Kukunaka is an eye lid disorder occurring in children during eruption of teeth. The following signs and symptoms are seen:
Swelling of eyes
Inability to see properly
Sticky discharge
Coppery or redness of eye
Pain in the lids
Itching of ear, nose, and eye.

According to sushruta:
Sushruta has considered the disease kukunaka as vartma roga. Vitiated stanya causes aggravation of kapha, vata, pitta and rakta causing kukunaka in children.

Following symptoms are seen:
Continuous rubbing of eyes, nose, and forehead
Photophobia
Excessive lacrimation or discharge from the eyes.

Chikitsa:
Since the child is feed on breast milk, both the mother and the child should be treated in kukunaka.

For mother (Dhatri):
Snehapana with ghrita prepared using khadira, triphala, nimbapatra
Vamana using pippali, yashti, sarshapa and saindhava lavana.
Virechana with kashaya prepared out of abhaya, pippali and draksha.
Stana lepa- Application of paste of musta, haridra, daruharidra and pippali over the breast.
Dhupana- Sarshapa with ghee is used for fumigation of breast.
Kashaya of patola, musta, draksha, guduchi and triphala should be given internally after shodhana.

For infant:
Since kapha is the main vitiated dosha in children, it should be expelled out by vamana karma.

Other treatment:
lekhana of vartma or Raktamokshana with jalauka
Pariseka with kashaya prepared of dhatri, ashmantaka and jambupatra.
Vamana with apamargabeeja, krishna, saindhava lavana, madhu and stanya.
Aschotana with triphala ghrita, guduchi ghrita.
Anjana with ela, rasonadi varti.
Pratisarana with trikatu, madhu, saindhava lavana or rasanjana.

Special anjana yogas for kukunaka.
Madhurasadhyanjana (murva, yashtimadhu etc.)
Gutikanjana (trikatu, palandu, yashti, saindhava lavana, laksha, gairika).

**Kunchana (Blepharospasm):**
Bhavaprakasha and Yogaratnakara have mentioned this disease.
The disease in which there is difficulty in vision due to constriction (closure) of the eye lids because of the vitiation of vatadi doshas is called Kunchana.

Chikitsa:
No specific treatment is mentioned for kunchana. Therefore, based on dosha dushti treatment can be given.

**Alaji (internal hordeolum / stye):**
Sushruta mentions the term ‘Alaji’ in Sandhigata roga whereas Vagbhata has mentioned it in Vartmagataroga.
A hard, raised, copper coloured, cystic swelling present in the kaneenika sandhi on the external surface of the eyelid is called Alaji. On suppuration, there will be discharge of pus and blood which gets filled up again.

Chikitsa:
Bhedana, lekhana, kshara karma, agnikarma and vranopachara.

## 2. Brief Knowledge of Vartmarbuda, Utklishta vartma, Nimesh, Pakshmashata, Vartmarsha

**Vartma arbuda (Lid tumour):**
It is a tridoshaja chedana sadhya vyadhi.
An irregularly shaped, hyperaemic, painless cystic growth hanging from the inner of the lid is known as Arbuda.

According to vagbhata:
Arbuda is a painless, irregularly shaped, thickened muscular swelling resembling a bolus of flesh seen in the inner aspect of eyelid which is mobile externally (on palpitation). It is caused by the vitiation of rakta and tridoshas.

Chikitsa:
This condition is managed surgically by Chedana karma.

**Utklishta vartma (allergic conjunctivitis):**
This condition is mentioned only by Acharya Vagbhata. Here 'Utklishta' means excessive vitiation of doshas.
Utklishta vartma is an inflammatory condition of the eyelids which has sudden onset caused due to vitiation of rakta and tridoshas.

Other features of utklishta vartma are:
Rajimat – linear marks on lid (blood vessels)
Tenderness
Based on the involved dosha and its signs and symptoms, Klishta vartma is classified into four types:

1. Pittotklishta
2. Kaphotklishta
3. Raktotklishta
4. Sannipatotklishta

**1. Pittotklishta:**
Pittotklishta is a condition in which vitiation of pitta causes reddish discolouration of the vartma. It is associated with symptoms such as burning sensation, discharge, pricking pain and tenderness.

Chikitsa:

1. Snehapana- Madhura skanda dravya siddha ghrita.
2. Siramokshana
3. Virechana- Trivrit
4. Lekhana
5. Kshalana- Yashtimadhu kashaya.
6. Seka- Chandana ksheera paka.

**2. Kaphotklishta:**
In kaphotklishta, the eye lids become stiff and coated with unctuous substance. It is caused due to vitiation of Kapha.
It can be considered as a stage of kaphaja abhishyanda.

Chikitsa:

1. Lekhana
2. Pratisarana- saindhava, kaseesa, manahshila, pippali, rasanjana with madhu.
3. Vamana
4. Anjana
5. Nasya and all other kaphahara therapies should be done.

3. **Raktotklishta:**

In Raktotklishta, the blood vessels look prominent, there will be severe pain and photophobia.

4. **Sannipatotklishta:**

In this all the symptoms of tridoshas are seen.

**Sign and symptoms of utklishtas:**

| Clinical feature | Pittotklishta | Kaphotklishta | Raktotklishta | Sannipatotklishta |
|---|---|---|---|---|
| Shlaishmika kala | Red | Watery | Reddish & more prominent | Watery reddish |
| Discharge | Present | Mild | Nil | Present |
| Pain | Pricking | Mild | Severe | Moderate |
| Special features | Burning sensation | Lids becomes stiff and are coated with kleda | Photophobia | All the symptoms |

**Nimesha (excessive blinking of eye):**

It is a Vataja Asadhya Vyadhi.

The disease in which vitiated vayu enters nimeshani siras and get localized in the eyelids bringing about excessive movement of the lids is called as Nimesha.

According to vagbhata:

Excessive movement of the eyelids like closing and opening caused due to vitiation of vata is called as Nimesha. It is a painless condition.

Chikitsa:

It is an asadhya vyadhi.

**Pakshmashaata (Madarosis):**

It is a disease described by Acharya Vagbhata in which there will be falling of eyelashes.

The disease in which the vitiated pitta gets lodged in the root of the eyelashes resulting in itching, burning, and falling of eyelashes is called as pakshmashaata.

Chikitsa:

'Kuttanat'- A procedure of pricking at the root of eyelashes with the help of needle.

Jalaukavacharana is done at the root of eyelashes

Vamana with ikshu rasa or ksheera

Nasya with ghrita prepared out of madhura Sheeta dravyas

Pushpa kaseesa anjana - The powder of pushpa kaseesa is given bhavana with tulasi swarasa in copper vessel for ten days.

**Arsho vartma / vartma arsha (papillary form of trachoma):**
It is a Sannipataja (Sushruta), Raktaja (Vagbhata) Chedhana Sadhya Vyadhi.
Small or minute, rough and slightly painful pidakas resembling the seeds of cucumber occurring in the eyelids is known as Arshovartma.

According to vagbhata:
The polyp like immobile, unctuous, red coloured extra muscular growth occurring within the lids is called Arshovartma. It is associated with pain, burning sensation and bleeding. The peculiar characteristic feature of Arshovartma is that it will regrow even after excision.

Chikitsa:
Sushruta: Chedana with Mandalagra shastra
Vagbhata: Asadhya and hence should not be treated.

**Shonitarsha (cancer of lid / naevus / warts):**
It is a Raktaja Asadhya Vyadhi
Soft, painful growths associated with itching and burning sensation occurring in the vartma due to the vitiation of rakta is called Shonita arsha. This recurs even after repeated excision.

Chikitsa:
It is an Asadhya Vyadhi.

## 3. Knowledge of Hordeolum, Ptosis, Trachoma, Trichiasis, Entropion, Ectropion including their Etiology, signs and symptoms differential diagnosis and medical & surgical management.

**Hordeolum externum or stye:**
It is a condition where there is acute suppuration and inflammation of glands of zies or moll. Usually, a single stye occurs but occasionally there may be multiple.

Etiology:
Age: It can occur in any age, but is common in children and young adults.
Eye strain due to refractive errors, constant rubbing of eyes, chronic blepharitis.
metabolic factors: Diabetes, debility, and excessive intake of carbohydrate.

Causative organism:
Coagulase positive staphylococcus aureus

Symptoms:
Acute pain and swelling in the lid margin
Mild watering
Photophobia

The sign can be understood in two stages:

1. Stage of cellulitis: in which the swelling at the lid margin is localized, hard, red, and tender with marked oedema.
2. Stage of abscess formation: in which a visible pus point on the lid margin i.e., the base of the affected cilia.

Treatment:
In the stage of cellulitis - Hot compresses are useful.
In the stage of abscess formation – Epilation (removal) of the involved cilia to drain pus.
In large abscess - Surgical incision.
Topical antibiotics in the form of eyedrops and eye ointments.
Oral anti-inflammatory and antibiotics to relieve pain, oedema, and infection.

**Internal Hordeolum:**
It is the suppurative inflammation of a meibomian gland due to staphylococcus. It Is also often called a suppuration chalazion. Sometimes it may be caused due to secondary infection of a chalazion.

Etiology: Same as external hordeolum.
Symptoms: Same as external hordeolum but are more intense.
Signs:
Like external hordeolum, but the pus points arc seen on the tarsal conjunctiva and not on the root of eyelash.

Treatment:
Hot compresses and broad-spectrum antibiotic orally.
Vertical incision on the tarsal conjunctiva to drain pus.

**Ptosis:**
Normally upper one sixth i.e., about 2 mm of the cornea is covered by the upper lid.
Abnormal drooping of the upper eye lid below its normal position is called ‘Ptosis.’

Types and etiology of Ptosis:
l. Congenital ptosis: It is caused due to the congenital weakness or mal development of levator palpebrae superioris (LPS).
2. Acquired ptosis:
Based on the cause it is classified as:
a. Neurogenic or paralytic ptosis: caused due to complete or partial 3rd nerve palsy and Horner's syndrome.
b. Myogenic ptosis: caused due to
Trauma to the levator muscle
Muscular dystrophy of levator muscle
Myasthenia gravis

c. Aponeurotic ptosis: caused by a defect in the levator aponeurosis
d. Mechanical ptosis: caused due to weight of the upper lid as result of oedema, inflammation, hypertrophy, or tumour,

Signs:

- The upper lid covers the cornea more than normal.
- Palpebral fissure is narrower than normal.
- On an attempt to elevate the upper lid, there is elevation of the eyebrow and wrinkling of the skin of the forehead due to hyper action of the frontalis muscle.
- Head is tilted backwards to draw the lid upwards beyond the pupillary area.

Treatment:

- For acquired ptosis the cause must be treated.
- For congenital ptosis, surgical procedures are necessary.

Surgical procedures in Ptosis:

1. Tarso conjunctivo mullerectomy (Fasanella servat operation): It is indicated in cases having mild ptosis and good levator function. The upper lid is everted and the upper tarsal border along with its attached muller's muscle and conjunctiva are resected (the muscle is shortened).
2. Levator resection: It is indicated in moderate and severe cases of ptosis. It is contra indicated in patients with poor levator function. In this the required amount of levator muscle is resected.
3. Frontalis sling operation: It is performed in patients having severe ptosis with no levator function. In this operation the lid is anchored to frontalis muscle via sling.

**Trachoma:**

The word 'Trachoma' comes from the Greek word for 'rough' since the surface conjunctiva appears rough in cases of chronic trachoma.
Trachoma is a kind of keratoconjunctivitis i.e., the cornea and conjunctiva will be affected simultaneously. It is characterized by mixed follicular and papillary response of conjunctival tissue. It is one of the leading cause of preventable blindness in the world.

Etiology:
Causative agent: Chlamydia or Bedsonia group of organisms.
Age: Usually children in endemic areas.
Sex: Females are affected more, both in number and severity.
Socio economic status: Usually poorer classes are affected due to unhygienic conditions.
Climate: Common in countries with dry and dusty weather.

Mode of infection:
The infection spreads by contamination with the conjunctival discharge through fingers, towels, or flies.

Symptoms:
Mild foreign body sensation in the eyes.
Lacrimation.
Mucoid or mucopurulent discharge.
Signs:
Signs of trachoma can be categorized under two headings. i.e., l. Conjunctival and 2. Corneal signs.

**Mac Callan has divided trachoma into four stages.**
Stage I and II show the following changes:
**Changes in conjunctiva:**
Congestion in bulbar and palpebral conjunctiva.
Formation of papillae in the upper tarsal conjunctiva and fornix. The conjunctiva looks velvety in appearance.
Follicle formation is characteristic lesion. They commonly appear in the conjunctiva of the upper tarsus and fornix but may also be present in lower fornix and bulbar conjunctiva.

**Changes in the cornea:**
Epithelial keratitis i.e., keratitis affecting the epithelium only. This occurs in the upper part of cornea.
Trachomatous pannus: This vascularized infiltrate, known as pannus is limited first at the upper part of the cornea, but in course of time may appear all around the limbus.
Corneal ulcers: small ulcers may develop at the advancing edge of the pannus, causing much lacrimation and photophobia.

**Stage III - Stage of cicatrization:**
It is a stage of cicatrization when healing starts. Trachoma is healed by cicatrization. The first evidence of cicatrization is seen in the upper lids where white scar is formed. The follicles and conjunctiva undergo atrophic changes and blood vessels get constricted. In the cornea the pannus retrogresses, leaving behind a corneal haze. The corneal ulcers heal leaving facets, which cause great disturbance in vision.

**Stage IV-Stage of complications:**
Entropion of the upper lid, Trichiasis i.e., misdirection of the eyelashes.
Chalazion or Symblepharon formation.
Corneal opacities.
Pseudo ptosis due to the thickening of the upper lid.

**W.H.O. grading of Trachoma (FISTO):**

1. TF- Trachomatous inflammation (follicular): five or more follicles (>0.5mm) on the superior tarsus.
2. TI- Trachomatus inflammation (intense): diffuse involvement of the tarsal conjunctiva, obscuring 50% or more of the normal deep tarsal vessels, papillae are present.

3. TS- Trachomatous conjunctival scarring: easily visible fibrous white tarsal bands.
4. TT- Trachomatous trichiasis: at least one lash touching the globe.
5. CO- Corneal opacity: sufficient to blur details of at least part of the papillary margin.

Diagnosis:
Clinical diagnosis is made from its typical signs. Conjunctival cytology is one of the common test indicated.

Management:

- The SAFE strategy for Trachoma management supported by WHO.
- Surgery for treating entropion and trichiasis.
- Antibiotics should be administered to those affected and to all family members. A single dose of azithromycin (20 mg/kg) is the drug of choice. Erythromycin 500 mg and topical 1% tetracycline ointment.
- Facial cleanliness is a preventive measure.
- Environment improvement.

**Trichiasis:**
This is a condition wherein the eyelashes are misdirected inwards to rub against the eye ball with normal position of the lid margin.

Etiology:
Cicatrizing trachoma
Ulcerative blepharitis
Healed membranous conjunctivitis
Externum hordeolum
Mechanical injuries, burns and operative scar on the lid margin.

Symptoms:
Foreign body sensation
Lacrimation
Photophobia
Pain

Signs:
Ciliary congestion
Reflex blepharospasm
Superficial opacities and vascularization of the cornea
Corneal ulcer

Treatment:

1. Epilation- Mechanical removal of misdirected cilia with epilation forceps.
2. Electrolysis- Method of destroying the lash follicle by electric current.

3. Cryoepilation- A cryoprobe (-20 degree C) is applied for 20 - 25 seconds. It is very effective in eliminating profuse lashes.
4. Surgical correction is indicated when many cilia are misdirected.

**Entropion:**
It is a condition in which the lid margin turns inwards causing the lashes to rub against the eye.

Causes of entropion:
A. Congenital:
It is seen since birth and is usually associated with microphthalmos and anophthalmos conditions of eye.
B. Acquired:

- Spastic entropion- It develops typically in a case of blepharospasm due to any cause, particularly chronic irritative corneal condition. It also occurs after prolonged bandaging of the eye.
- Mechanical entropion- It occurs due to lack of support provided by the globe to the lids, as seen in conditions like phthisis bulbi, enophthalmos or after enucleation.
- Senile entropion- It is the commonest type usually affecting the lower lid. There is lack of support of the eyelid due to disappearance of orbital fat and due to atrophic and inelastic condition of the skin in senility.
- Cicatricial entropion- The entropion occurs due to contraction of the conjunctival scar as in trachoma and burns. Upper lid is usually affected.

Symptoms:
Occurs due to rubbing of the cilia against the cornea and conjunctiva. These include foreign body sensation, irritation, lacrimation, and photophobia.

Signs:
On examination the lid margins are found turned inwards.

Treatment:
It is treated surgically based on any of the following principles:

- Altering the direction of the lashes.
- Transplanting the lashes.
- Straightening the distorted tarsus.

(Simplest operation is the skin muscle operation in which an elliptical area of the loose skin and the underlying orbicularis oculi muscle are resected).

**Ectropion:**
It is a condition in which the lid margin rolls outwards. i.e., becomes everted.

Causes of ectropion:

- Spastic ectropion- It occurs due to powerful contraction of the orbicularis muscle, when the skin is elastic and the eyeball is prominent. Both lids may be affected.
- Senile ectropion- Usually only the lower lid is affected due to laxity of the tissues of the lid and due to loss of tone of the orbicularis muscle in old age.
- Paralytic ectropion- It mainly occurs in the lower lid as a result of weakness of the orbicularis muscle due to paralysis of the facial nerve.
- Mechanical ectropion- It is caused by the weight of a mass in the eyelid e.g., tumour or by the pressure on the eyelid from behind as in proptosis. The lower lid is usually affected.
- Cicatricial ectropion- It follows burns, ulcers, trauma, or skin diseases of the eyelid.

Symptoms:
Epiphora is the main symptom.

Signs:
Lid margin is rolled outwards. Depending on the degree of outrolling, ectropion can be divided into three grades:
Grade I- Only punctum is everted.
Grade II- Lid margin is everted and palpebral conjunctiva is visible.
Grade III- The fornix is also visible.

Treatment:
The method of treatment depends on the underlying etiology. Surgical management of the ectropion is as follows:

1. Senile ectropion is treated with horizontal lid shortening. This is achieved either by excision of a tarso-conjunctival wedge or with a lateral canthal sling procedure.
2. Mild localized cicatricial ectropion is treated surgically by excision of the offending scar tissue combined with a procedure that lengthens vertical skin deficiency, such as Z plasty.
   Another surgical procedure indicated in mild degree ectropion is V-Y operation. In this a V- shaped incision is given, skin is undermined and suturing is done in a Y-shaped pattern.
3. In Paralytic ectropion, temporary treatments include:

- Lubrication with tear substitutes
- Botulinum toxin injections into levator to induce temporary ptosis
- Temporary tarsorrhaphy- a procedure in which the upper and lower lids are sutured together.

Permanent treatment: include procedures like Medial canthoplasty, Lateral canthal sling, upper eyelid lowering etc. with an aim to reduce the vertical and horizontal dimensions of the palpebral aperture.

# SHUKLAGATA ROGA (DISEASES OF SCLERA AND CONJUNCTIVA)

## 1. Number of Shuklagata rogas, detailed knowledge of etiology, pathology, clinical features, and management of Arma, Arjuna and Shuktika

**Shukla mandala rogas:**
Shukla mandala is the visible white portion of the eye comprising of conjunctiva and sclera. The visible area is about 25mm long and 15mm wide. The boundaries of shukla mandala consists of 4 netra sandhis:
i) Vartma shukla
ii) Shukla Krishna
iii) Kaneenika
iv) Apanga sandhi.

Doshas and Dhatus in Shukla mandala:
The sthanika dosha of shukla mandala is kapha because of the predominance of the and pitta is the anubhandha dosha due to the presence of blood vessels signifying the agni mahabhuta. Rasa, rakta and are the dhatus involved.

Classification of shuklagata rogas:
As per Sushruta - Shuklagata rogas are 11 and Vagbhata has added two more diseases making it 13.

| S.N. | Sushruta, Bhavaprakasha, and Yogaratnakara | Vagbhata, sharangadhara |
|---|---|---|
| 1. | Prastara arma | Prastara arma |
| 2. | Shukla arma | Shukla arma |
| 3. | Kshataja arma | Shonita arma |
| 4. | Adhimamsa arma | Adhimamsa arma |
| 5. | Snayu arma | Snaavarma |
| 6. | Shuktika | Shuktika |
| 7. | Arjuna | Arjuna |
| 8. | Pishtaka | Pishtaka |
| 9. | Sirajala | Sirajala |
| 10. | Sirapidaka | Sirapitika: vag. (Chippita: sha.) |
| 11. | Balaasagrathita | Balasagrathita |
| 12. | | Sirotpata |
| 13. | | Siraharsha |

Classification based on dosha:

| S.N. | Dosha | Disease |
|---|---|---|
| 1. | Vata | - |
| 2. | Pitta | Shuktika |
| 3. | Kapha | Shuklarma, pishtaka, balaasagrathita |
| 4. | Rakta | Kshataja arma, arjuna, sirajala |
| 5. | Sannipata | Prasthaari arma, adhimamsarma, snayu arma, sira pidika |

Classification based on shastra karma:

| S.N. | Shastra karma | Disease |
|---|---|---|
| 1. | Chedana / lekhana | 5 types of arma, sirajala, sirapidika |
| 2. | Ashastrakruta | Shuktika, arjuna, balaasagrathita, pishtaka |

Sadhyasadhyata of shuklagata roga:
All the shuklagata rogas are said to be sadhya.

**Arma:**
Nirukti:
The term Arma originated from “Ru” dhatu along with “manain” pratyaya meaning “always growing.”

Definition:
A gradually spreading flesh growth occurring in the shleshma kala of shukla mandala is called as Arma.

Types of arma:
There are five types of Arma:

1. Prastari arma
2. Shukla arma
3. Kshataja (Lohita) arma
4. Adhimamsa arma
5. Snayu arma

1. Prastara arma (pterygium):

It is tridoshaja chedana sadhya Vyadhi
Prasthari arma is a bluish red coloured, thin, and widely spreading fleshy mass occurring in the shukla bhaga of netra.

According to vagbhata:
A soft and painless, rapidly spreading, black or red coloured growth occurring in the shukla mandala due to the vitiation of tridosha and rakta is called Prasthari arma.

2. Shukla arma (Pinguecula):

It is a Kaphaja Chedana Sadhya Vyadhi.
A soft, uniform, whitish coloured growth occurring in the Shukla bhaga of netra which progresses slowly and continuously is known as Shuklarma.

According to vagbhata:
Shuklarma is a slowly progressing, white coloured, uniform muscular growth caused due to vitiation of kapha dosha.

3. Kshataja arma / lohita arma (progressive pterygium or hemangioma):

It is a Raktaja Chedana Sadhya Vyadhi.
A fleshy growth resembling the colour of lotus flower occurring in the shukla bhaga of netra is called as Lohitarma.

Vagbhata has named it as shonitarma.

According to vagbhata:
Shonitarma is a uniform fleshy growth which is smooth and resembles colour of lotus.

4. Adhimamsa arma (pseudo pterygium):

It is a Sannipataja chedana sadhya Vyadhi
A grey coloured, bulky, soft, widely spreading muscular growth having resemblance to liver is known as Adhimamsaja arma.

According to vagbhata:
A large, thick, grey coloured muscular growth resembling the colour of dried blood clot is called as Adhimamsaja arma.

5. Snayu arma (snavarma):

It is a Sannipataja Chedana sadhya Vyadhi.
A pale and rough, fleshy mass which grows in the Shukla bhaga of eye is called as Snayu arma.

Vagbhata has named it as Snavarma.
A Tendon like growth in the Shukla bhaga of eye is called as Snavarma.

**Arma Chikitsa:**

Sushruta has categorized arma under chedana sadhya vyadhis. But in the following conditions when the disease is not very grave lekhana karma can be done. So, both lekhana and chedana are indicated in arma.

Indications for lekhana karma:
If the arma is thick like skin (charmabha).
Large and elevated (bahalam).
Fleshy and covered with fibrous tissue and blood vessels (snayu mamsa ghana avrutha).
If it is encroaching krishna mandala (Krishna mandalaga).

Contra indications for chedana karma:
If the growth has reached the asita bhaga (cornea) and Drishti bhaga (pupil).
If it is fleshy, tendinous, and covered with blood vessels.
If it is elevated like charmoddala (leather bag).

Shastra karma in arma:
Instruments required:

- Mandalagra shastra
- Badisha yantra
- Muchundi yantra
- Suchi and sutra

Purva karma:

- The patient is subjected to Samshodhana and Samsarjana karma.
- Snigdha anna is given to the patient.

Pradhana karma:
Patient is positioned comfortably either in sitting or sleeping posture.
Rub the arma with saindhava lavana to make it soft.
Swedana is done to the part.
Arma should be moved (parighattana) to loosen it.
The patient is asked to look laterally (apanga side).
The site where the wrinkle is formed is lifted with the badisha and muchundi yantra or the distal end of the arma is lifted using suture thread (suchi sutra). The arma should not be pulled up briskly as it may cause tearing.
Using mandalagra shastra separate the arma from Krishma and shukla mandala until kaneenika sandhi is reached.
Then the arma is cut leaving medial $1/4^{th}$ part.
Over excision (very close to kaninika sandhi) leads to nadi vrana (sinus), and insufficient excision will lead to regrowth of the arma.

Paschat karma:
Pratisarana should be carried out with yavakshara, trikatu and saindhava lavana followed by -
Swedana
Bandhana.
Snehana with ghrita.
Remove, the bandha after three days.
Vrana shodhana and ropana measures are followed till the complete healing takes place.

Aschotana with kshirapaka of Karanja bija, amalaka, madhuka along with madhu twice daily reduces pain.
Lekhana anjana prepared using 1oha churna, saindhava lavana etc. should be applied to remove the left over 1/4$^{th}$ part of arma.

Samyaka chedana lakshana:
If surgery is performed properly, then the following features are observed:

- Normal colour and functions of the eye
- Relief from pain
- Devoid of any complications.

**Table: showing classification and lakshanas of arma explained according to various authors:**

Prasthari arma:

| | Sushruta | Vagbhata |
|---|---|---|
| Colour | Rudhira prabha, saneela | Shyava lohita |
| Nature of the growth | Visteerna | Ashu vruddhi |
| Nature of mass | Tanu | Mridu |
| Dosha | Tridosha | Tridosha with rakta |

Shuklarma:

| | Sushruta | Vagbhata |
|---|---|---|
| Colour | Sukla sa sweta | Shukla |
| Nature of the growth | Vardhate chirena | Chira vruddhi |
| Nature of the mass | Mridu | Adhimamsakam |
| Dosha | Kapha | Kapha |

Kshataja / lohita arma:

| | Sushruta | Vagbhata |
|---|---|---|
| Colour | Padmabham | Padmabham |
| Nature of the growth | Prachyam upaiti | Adhimamsa |
| Nature of the mass | Shlakshnam | Mridu |
| Dosha | Rakta | Rakta |

Adhimamsa arma:

| | Sushruta | Vagbhata |
|---|---|---|
| Colour | Yakruta prakasha shyava | Ashruka pinda shyava |
| Nature of the growth | Visteerna | Pruthu |
| Nature of the mass | Mrudu bahulam | Shushka bahulam |
| Dosha | Sannipataja | Sannipataja |

Snayu arma:

| | Sushruta | Vagbhata |
|---|---|---|
| Colour | Prapandu | |
| Nature of the growth | Vrudhim etat | |
| Nature of the mass | Kharam | Snava sannibham |
| Dosha | Tridoshaja | |

**Shuktika:**
It is a Pittaja Bheshaja Sadhya Vyadhi.
A greyish coloured fleshy dot, resembling pearl shell, occurring in the shukla bhaga of netra is called Shuktika.

According to vagbhata:
It is a condition in which vitiation of pitta causes black, grey, or yellow coloured dots in the shukla mandala. The whole of sclera looks like mirror embedded with dust. The systemic symptoms present in shuktika are burning sensation, pain, diarrhoea, thirst, and fever.

Chikitsa:
Treatment is like those mentioned for pittaja abhishyanda.
After virechana, application of anjana prepared with cooling dravyas.
Ghritapana, seka, aschotana, lepa and nasya are also useful.

Anjana yogas in shuktika:
Anjanas prepared with bhasma or sukshma churna of vaidurya, sphatika, pravala, shankha, and suvarna mixed with sugar and honey.

- Mustadi anjana
- Lodhradi anjana
- Amalakyadi anjana

**Arjuna (Subconjunctival haemorrhage):**
It is a Raktaja Sadhya Vyadhi.
Condition in which a red coloured dot resembling the blood of rabbit is seen in shukla bhaga of netra is called Arjuna.

According to vagbhata:
A soft painless dot resembling the colour of blood of rabbit seen in shukla bhaga of netra is called as Arjuna.
Chikitsa:

- Pittahara line of treatment
- Rakta abhishyandavat chikitsa
- Dravyas for Seka and anjana
  Ikshurasa, Madhu, Sita, Darvi, Yashtimadhu, Saindhava.
- Dravyas for Aschotana (either alone or in combination).
  Sita, Madhuyashti, Mastu, Katvanga, Bijapura, kola, dadima.

Anjana yogas:
Shankha, Sita, Samudraphena
Sphatika, Pravala, Shankha, Madhuyashti, Madhu.
Saindhava, Kshaudra and Kataka.
Rasanjana with Kshaudra.
Kaseesa with Madhu.

## 2. Brief Knowledge of Sira pidika, Sira jala, Pishtaka, Balasgrathita.

**Pishtaka (Pinguecula / Lymphangioma):**
Pishtaka literally means paste made of rice flour.
It is a Kaphaja bheshaja Sadhya Vyadhi. Bhavaprakasha describes the involvement of Kapha and Vayu.

An elevated round spot in the shukla mandala which is either clear like water or white like grounded rice flour is known as Pishtaka.

According to vagbhata:
Multiple, elevated, white spots resembling rice flour paste seen in the shukla bhaga of netra is called pishtaka.

Chikitsa:

- Treatment is like Abhishyanda and Adhimantha
- Anjana yogas in pishtaka

1. Mahoushadhadi anjana: Trikatu, saindhava, shweta maricha- all are taken in equal quantity and bhavana is given with Matulunga swarasa to prepare this anjana.
2. Brihatyadi anjana: Seeds are removed from the ripened brihati fruit and filled with pippali and sauviranjana in equal quantity. After seven days it is removed and used as anjana.
3. Similarly, anjana can be prepared using other fruits like vartaka, shigru, indravaruni, patola, kiratatikta and amalaki instead of brihati.

**Sirajaala (Haemangioma of sclera / scleral staphyloma):**
It is a Raktaja Chedana Sadhya Vyadhi.
A layer of hard, large, red coloured capillary network occurring in shukla mandala is known as sirajala.

According to vagbhata:
Large, red coloured, thick, elevated network of blood vessels seen in the shukla mandala is called sirajala.

Chikitsa:
Lekhana is advised if the network of blood vessels is smooth and fragile. eg: Shankha samudraphenadi lekhaniya churna.
Chedana is advised if the network of blood vessels is thick and engorged. The Siras must be excised as in Arma.

Surgical procedure in sirajala:
Snehana and Swedana is given to the affected part.
Hold the hard siras with the help of badisha yantra and excise the part with mandalagra shastra.
After surgery, lekhana pratisarana as in Arma is advised.

**Sirapidaka (Episcleritis):**
Sira – blood vessels; pidika – nodular swelling
It is a Sannipataja Chedana Sadhya Vyadhi.
A white coloured, nodular swelling covered by blood vessels seen in shukla mandala lying close to cornea is called as Sirapidaka.

According to vagbhata: it is called sira.
Sharangadhara names it as sirachippita.
'Sira' is a condition in which mustard seed shaped granular swelling covered with blood vessels are seen near the krishna mandala. The symptoms such as foreign body sensation and burning sensation of the eyes are also seen.

Chikitsa:
Like Arma and Sirajala.
If the nodular swelling is soft and small- Lekhana is indicated.
In hard and large swelling- Chedana is indicated.

Lekhana Churnanjana:
Shankha, Samudraphena, Manduki, Samudraja, Sphatika, Kuruvinda, Pravala, Ashmantaka, Vaidurya, Pulaka, Mukta, Loha, Tamra, Rajata all the above ingredients are taken in equal quantity and mixed with half the quantity of Sroto anjana and stored in Mesha sringa.
The anjana thus prepared is indicated in Arma, Sira pidika and Sira jala.

**Balasagrathita (Pinguecula / any cyst or tumour of conjunctiva):**
Synonyms of Balasagrathita: Balasaakhya and Balasaahwaya
It is a Kaphaja Sadhya Vyadhi
A painless, hard nodule resembling water droplet and shining like bell metal (bronze) occurring in Shuklabhaga of netra is called balaasaka or balasagrathita.

According to vagbhata:
A hard, large, heavy, unctuous, painless swelling of similar colour, resembling water droplet occurring in shukla mandala is called Balasagrathita.

Chikitsa:
Since the disease balasagrathitha is caused by kapha, treatment indicated for kaphaja abhishyanda is to be adopted (except siravyadha)
Kshara anjana is a special treatment mentioned for Balasagrathita.

Preparation of kshara anjana:
Apakwa yava (Barley) is soaked in godugdha. Later it is dried and burnt with drugs like arjaka, aasphota, kapittha, bilva, nirgundi and jatikusuma and the ash produced by this is collected. The ash thus obtained is boiled with the saindhava, tuttha and gorochana to prepare ksharanjana.

Vagbhata includes Sirotpata and Siraharsha in Shuklagata Roga.
Sushruta includes Sirotpata and Siraharsha in Sarvagata Roga.

**Sirotpaata:**
Sirotpaata is a disease of shukla mandala caused due to vitiation of rakta. The clinical features are congestion of the sclera associated with burning sensation, pain, and discharge. There will be no swelling.

**Siraa harsha:**
It is a raktaja vyadhana sadhya vyadhi. If sirotpata is left untreated it leads to a condition called siraharsha. In this the signs and symptoms of sirotpata are seen in more aggressive form and the patient will be unable to visualize properly.

## 3. Study of Pterygium, Scleritis, Episcleritis, Sub-Conjunctival Hemorrhage including their Etiology, signs and symptoms, differential diagnosis, and medical & surgical management.

**Pterygium:**
The term Pterygium is derived from Latin word meaning ‘wing.’
Pterygium is a wing shaped triangular fold of conjunctiva encroaching upon the cornea either from the nasal or the temporal side within the inter palpebral fissure.

Pathology: It is a degenerative and hyperplastic condition of the conjunctiva.

Etiology:
Not definitely known. It usually occurs in elderly males working outside. The disease is commonly seen in people living in hot climates. Therefore, prolonged exposure to sun, dry heat, wind, and dust can be considered as the cause.

Symptoms:
Sometimes mild irritation and redness may occur.
Usually, no symptoms occur till it encroaches pupillary area.
When pupillary area is encroached, there will be visual disturbance.
Occasional diplopia is observed due to limitation of eyeball movement.

Signs:
Pterygium presents as a triangular fold of conjunctiva encroaching on the cornea in the area of palperbral aperture usually on the nasal side but may also occur on the temporal side.
Parts of Pterygium: It consists of a head, i.e., the part which rests on the cornea, a neck, and a body.

Types of pterygium:

1. Progressive pterygium is thick, fleshy, and vascular. There are opaque spots in the cornea, just in front of the apex i.e., the head of the pterygium (cap of pterygium).
2. Regressive pterygium is thin attenuated with very little vascularity. No opaque spots in the cornea in front of the head of pterygium.

Differential diagnosis:

| | Pterygium | Pseudo pterygium |
|---|---|---|
| Etiology | Degenerative | Inflammatory |
| Age | Elderly person | Any age |
| Site | Palpebral aperture | Any site |
| Stages | Progressive, regressive, or stationary | Always stationary |
| Probe test | Probe cannot be passed underneath | Probe can be passed under the neck |

Treatment:
If the pterygium is stationary, in the atrophic or regressive stage and is not much disfiguring, no treatment is necessary.
Surgical excision of the pterygium is the only satisfactory treatment.

Indication for surgical excision:
Progressive pterygium threatening to encroach the pupillary area.
Diplopia due to interference in ocular movements.
Cosmetic reasons.

Surgical technique of pterygium excision:
Eye is exposed using universal eye speculum after topical anaesthesia.
Head of the pterygium is lifted and dissected off the cornea.
The remaining mass of pterygium is then separated from sclera and conjunctiva.
Pterygium tissue is then excised, taking care not to damage the underlying medial canthus muscle.

Hemostasis is achieved by doing cautery to the exposed episcleral tissue.
Conjunctival limbal autograft (CLAU) transplantation is done to cover the part after pterygium excision.

**Scleritis:**
Inflammation of the sclera manifests in two distinct forms:

1. Deep- Scleritis
2. Superficial- Episcleritis

Scleritis is the chronic inflammation of the sclera proper. It usually occurs in elderly patients involving females more than males and is often associated with systemic diseases.

Etiology

1. Scleritis is caused by an immuno-mediated vasculitis that may lead to destruction of sclera.
2. It is associated with disorders like rheumatoid arthritis, systemic lupus erythematosus (SLE).
3. Metabolic disorders like gout and thyrotoxicosis have been reported to be associated with scleritis.
4. Toxic and allergic influences are the commonest causes.
5. Endogenous and exogenous infections.

Pathology:
The inflammation is much more severe than episcleritis. Scleritis is considered as a focal hypersensitivity reaction to endogenous toxins. The scleral stroma becomes necrotic and is replaced by a thin fibrous tissue. There is marked infiltration of scleral fibers, with ultimate thinning of sclera.

Classification:
Based on anatomical location and type of scleral inflammation, it can be classified as:

1. Anterior scleritis

a. Non necrotizing which is diffuse or nodular.
b. Necrotizing which is with or without inflammation.

2. Posterior scleritis: Inflammation of sclera behind the equator.

Symptoms
Marked pain in the eye, which may radiate to the jaw and temple.
Photophobia and lacrimation may be mild to moderate.
Occasional diminution of vision.

Signs
Usually, the anterior part of the sclera is affected in one sector.
Pinkish red area appears with hyperaemia of the surrounding conjunctiva.
The patch of scleritis is slightly elevated and markedly tender, when pressure is applied on it over the lid.

Treatment:
Non necrotizing scleritis: Mild cases respond to oral NSAIDs (Non-steroidal anti-inflammatory drugs). If NSAIDs are ineffective, systemic corticosteroids should be added. Topical steroid eye drops are also recommended.
Necrotizing scleritis is almost always treated by topical steroids and heavy doses of oral steroids.
In non-responsive cases immune-suppressive agents are used.

**Episcleritis:**
A transient inflammation of the superficial layers of the sclera is known as episcleritis. The disease may be unilateral or bilateral predominantly affecting young women.

Etiology:
Associated with systemic diseases such as gout, psoriasis, rheumatism etc.
As an allergic reaction to an endogenous toxin, tubercular or streptococcal, from a septic focus.
Infectious episcleritis may be caused by zoster or syphilis.

Symptoms:
Pain and redness in the eye.
Mild ocular discomfort such as gritty, burning, or foreign body sensation.
Rarely mild photophobia and lacrimation.

Signs:
Two clinical types of episcleritis are (i) simple (diffuse) and (ii) nodular

1. Simple episcleritis (diffuse) is characterised by engorged episcleral vessels which run in radial direction beneath the conjunctiva. The inflammation is confined to one or two quadrant of the eye. The involved area looks markedly oedematous and vascularised.
2. Nodular episcleritis is characterised by pink or purple nodule which is hard, tender, and Immobile and the overlying conjunctiva freely moves over it.

**Differentiating between Episcleral and Scleral Vessels:**
Episcleral vessels can be moved with a cotton bud. If you apply phenylephrine 10%, they blanch (remember that this will also dilate the pupil). Scleral vessels appear darker, follow a radial pattern, are and immobile and do not blanch.

Treatment
Topical artificial tears, or corticosteroid eye drops.
Cold compresses on closed eyelids.
Systemic Non-Steroidal Anti-Inflammatory Drugs. (NSAIDs)

**Sub conjunctival haemorrhage (Ecchymosis):**

Subconjunctival haemorrhage occurs very commonly. It may be seen as small petechial haemorrhages to one spreading under the whole of bulbar conjunctiva. The exposed part of bulbar conjunctiva is the usual site because this is easily liable to be injured and because blood can easily accumulate in the loose subconjunctival tissue in that area. In the early stage, the haemorrhage looks bright red in colour but later becomes blackish red.

Etiology:

Direct trauma to the eye, head, or orbit.
Blood diseases such as leukaemia, purpura, haemophilia.
Arteriosclerosis and hypertension or local vascular anomalies like varicosity or aneurysm.
Acute inflammation of the conjunctiva.
Acute febrile infection like meningococcal septicaemia.
Vicarious menstruation- bleeding may occur from ear, nose, and conjunctiva.

Clinical features:

Subconjunctival haemorrhage is usually symptomless.
On examination, subconjunctival haemorrhage looks as a flat sheet of homogenous bright red colour with well-defined limits. In traumatic subconjunctival haemorrhage, posterior limit is visible when it is due local trauma to the eye ball. Most of the time it is absorbed completely within 7 to 21 days. During absorption, the colour changes from blight red to orange and then yellow.

Treatment

Treat the cause.
Placebo therapy with astringent eye drops.
Cold compresses to check the bleeding in initial stage.
Hot compresses may help in absorption in later stages.

# KRISHNAGATA ROGA (DISEASES OF CORNEA AND UVEA)

## 1. Number of krishnagata rogas, detailed knowledge of Etiology, Pathology, Clinical features, differential diagnosis, complications, and Management of Savrana /kshata Shukla (Shukra), Avrana shukra (Shukla)

**Krishnagata rogas:**
(Krishna- Black, Mandala- Circular part).
Krishna mandala is the central 1/3rd part of the visible portion of the eye ball. This appears black in colour but is purely transparent. Krishna mandala gets its colour because of the underlying pigmented structure - Krishna patala
The predominant mahabhuta in Krishna mandala is vayu, may be because of its contact with atmospheric air, property of transparency and function of attracting light rays into eyeball

Pramana of krishna mandala:
It is 1/3rd of Netra ayama.
It is Dwi yava (barley) pramana. (Dalhana)
It is 1/3rd of Shukla mandala.

Layers of krishna mandala:
Acharya Vagbhata has mentioned three layers of Krishna mandala while describing sadhyasadhyata of kshata shukla. They are:

1. Twacham- Outer layer
2. Dwiteeya patala- Second layer
3. Triteeya patala- Third layer

**Classification of Krishnagata roga:**

| S.N. | Sushruta | Vagbhata | Sharangadhara |
|---|---|---|---|
| 1. | Savarna shukra | Kshata shukla | Kshata shukra |
| 2. | Avarana shukra | Shuddha shukla | Shuddha shukra |
| 3. | Ajakaajaata | Ajakaa | Ajakaa |
| 4. | Akshipakatyaya | Pakatyaya shukla | Sirasanga |
| 5. | | Sira shukla | Sira shukra |

**Classification based on dosha:**

| Dosha | Disease |
|---|---|
| Kaphaja | Ajakaa |
| Sannipataja | Paakaatyaya, sirashukla (vagbhata) |
| Raktaja | Savarna & avrana shukla |

**Classification based on Sadhyasadhyata:**

| | |
|---|---|
| Sadhya | Avrana shukla |
| Asadhya | Savrana, paakaatyaya, ajakaa, siraashukla |

**Savrana shukra / shukla (corneal ulcer):**
Sa-associate with; Vrana-ulcer; Shukla-ulcer will be whitish in colour.
Presence of ulcer in the Krishna mandala is called Savrana shukla.
It is a Raktaja Asadhya Vyadhi.

An ulcer occurring in the Krishna mandala which is deep like pierced by a needle is called savrana shukla. It is associated with severe-pain, discharge, and warm lacrimation.

According to Videha, Krishna mandala looks like coral (vidhrumabha) in savrana shukra because of vascularization. (raktaraajinibha)

Sadhya savrana shukla:
Savrana shukra is considered as curable if
Ulcer is not near the pupil.
Ulcer is not deep seated.
Without discharge.
Painless
Not more than two ulcers

Asadhya savrana shukla:
Savrana shukra is considered incurable if following features are seen:
Central perforation of the cornea.
Ulcer covered by fleshy growth
Spreading vascularized ulcer
Ulcer obstructing the vision.
Ulcer involving two patalas.
Redness inside.
Chronic ulcer
Warm lacrimation/discharge.
Formation of nodular lesion resembling mudga (green gram).
Ulcer resembling feathers of titira bird.

Vagbhata names savrana shukla as kshata shukra:
Features of kshata shukra: (Vagbhata)
पित्तं कृष्णेऽथव दृष्टौ शुक्रं तोदाश्रुरागवत्॥
छित्वा त्वचं जनयति तेन स्यात्कृष्णमण्डलम्।
पक्वजम्बूनिभं किञ्चिन्निम्नं च क्षतशुक्रकम्॥
तत्कृच्छ्रसाध्यं, याप्यं तु द्वितीयपटलव्यधात्।

तत्र तोदादिबाहुल्यं सूचीविद्धाभकृष्णता||
तृतीयपटलच्छेदादसाध्यं निचितं व्रणैः|

The features of kshata shukra described by Vagbhata can be understood in three stages
1st stage:
Ulcer caused due to vitiation of pitta in the krishna or Drishti mandala brings about cut/tear in the Prathama patala. It is associated with pricking pain, lacrimation, and redness. The ulcer formed is deep and resembles ripe jambu fruit. This stage is Krichra sadhya.
2nd stage:
The ulcer progresses to the second patala aggravating all the above symptoms. Krishna mandala appears as though pierced by needle. This stage is Yapya.
3rd stage:
The ulcer further progresses to the third patala, producing excessive ulceration covering the whole of cornea. This stage is Asadhya.

Chikitsa:
Different treatment modalities are explained in the management of Savrana/Kshata shukra.

According to sushruta:
Patient should initially undergo Antah parimarjana chikitsa in the form of siravyadha, Virechana, Shiro virechana.
Followed with pradeha, pariseka, nasya, aschotana, abhyanga, tarpana and putapaka.
Gharshana (rubbing) with shirisha beeja, maricha, pippali and saindhava or saindhava alone is done in superficial (prathama patalagata), deep (dvithiya patalagata or so) and rough savrana shukra.
Then lekhana anjana should be applied.

Anjana yogas for savrana shukra:
Jaathimukuladi anjana Jatimukula, Laksha, Gairika and Chandana.
Tamra bhasmadi anjana: Tamra bhasma (16 parts), Shankha bhasma (8 parts), Manahshila (4 parts), Maricha (2 parts), Saindhava (1 part).
Shankhadi anjana: Shankha, Kolasthi, Kataka, Draksha, Yashtimadhu and Swarnamakshika.
Ksharanjana- Madhu, Godanti, Samudraphena and Shirisha kusuma.
Anjana with Madhuka sara and honey.
Anjana with Vibhitaki asthi majja and honey
Mahaneela Gutikanjana.

Internal use: Shadanga guggulu, Lohadi guggulu, Patoladi ghrita etc. are indicated in savrana shukla.

**Avrana shukra (corneal opacity):**
It is raktaja sadhya vyadhi.
Abhishyanda causes the krishnabhaga of netra to appear white in colour like the sky covered with clouds and is associated with mild pain and lacrimation. This condition is called Avrana shukra and is curable. But if the Avrana shukla becomes deep seated, thick, and chronic, it becomes difficult to cure.

Vagbhata names it as shuddha shukra:
In shuddha shukra the krishna bhaga of netra looks white in colour like that of a conch shell and is not very painful. It is caused by the vitiation of the kapha dosha.
Chikitsa:
One should undergo shodhana karma like Siravyadha, Virechana, Nasya and repeated Putapaka before applying Anjana.

Anjana yogas indicated in avrana shukra:
(Anjana should possess lekhana and ropana properties. Anjanas told in Savrana shukla can be used in Avrana shukla also).

- Bhasma of swarna, tamra, seesa, roupya and loha + powder of manahshila, gairika, panchalavana, navaratna, danta (go/ashva), goshringa kasisadi avasadana yoga (explained in Mishraka adhyaya).
- Kukkutanda kapala bhasma, lashuna, trikatu, karanja bija, ela powdered and applied.
- Mahaneela gutika
  The drugs like brihati, madhuyashti, tamra bhasma, saindhava, shunthi are powdered well and triturated with amalaki swarasa. The paste thus obtained is applied to inner surface of a copper vessel and fumigated repeatedly with yava, ghrita and amalaki. Later, the powder is scraped out and rolled into pills by mixing with water and honey.

## 2. Brief knowledge of Sira shukla, Akshipakatyaya and Ajakajata.

**Akshi paakatyaya (Serpiginous ulcer / Hypopyon corneal ulcer):**
"Akshi pakatyaya" means Excessive suppuration of eyes.
It is a Tridoshaja Asadhya Vyadhi.
An inflammatory condition caused due to akshi kopa (abhishyanda) in which there will be vitiation of tridosha leading to severe pain and whitish discoloration of whole of cornea is called Akshipakatyaya.

Vagbhata names it 'Paakatyaya shukla.'
The features of Pakatyaya shukra can be summarized thus:
Involved dosha: Tridoshas and Rakta
Colour of cornea: whitish discolouration like cloudy sky.
Shape of the cornea: convex resembling half part of bean seed.
Signs and symptoms: Acute pain, congestion, burning sensation and swelling.
Pakatyaya shukra should not be treated when there is severe pain.

Chikitsa:
Both Sushruta and Vagbhata has mentioned it as an Asadhya Vyadhi.

**Ajakaajaata (Staphyloma):**
It is Raktaja Asadhya Vyadhi (Vagbhata)
It is Kaphaja Asadhya Vyadhi- Sushruta (Dalhana)
A disease in which reddish tinged mass resembling dry excreta of goat protrudes out by penetrating the Krishna mandala and is associated with pain and sticky discharge is called as Ajakajata.

Vagbhata names it as 'Ajaka.'
Ajaka is a disease caused due to vitiation of rakta dosha, with sticky discharge and coppery black painful, elevated pitika resembling excreta of goat seen in krishna mandala. It is not suitable for treatment as it is incurable.

**Sira shukra:**
Sirashukra is explained only by Acharya Vagbhata.
Doshas involved are Tridosha and Rakta.
It is an Asadhya Vyadhi.
Sira shukra is a disease caused due to vitiation of tridosha and rakta, wherein krishna mandala is covered by coppery coloured blood vessels. Symptoms like pain and burning sensation are seen. Without any reason there will be hot, cold, thick, or clear discharge from the Krishna mandala.

Chikitsa:
Sira shukra is said to be Asadhya. But if there is no loss of vision, it should be treated like Savrana shukra.

## 3. Knowledge of Corneal ulcer, Corneal Opacity, Uveitis, Acute Iridocyclitis, Staphyloma, their aetiology, pathology, symptoms, differential diagnosis, complications, and management.

**Corneal ulcer (Ulcerative keratitis):**
Corneal ulcer may be defined as discontinuation of normal epithelial surface of cornea associated with necrosis of the surrounding corneal tissue. It is characterized by oedema and cellular infiltration.
Cornea is protected by normal defense mechanisms present in tears. Normal corneal epithelium cannot be penetrated by any organism except diphtheria bacillus and gonococcus.

Pre-conditions for an ulcer to develop are:
1. Trauma to the corneal epithelium as by a minute foreign body, misdirected eyelash, or conjunctival concretion.
2. Unhealthy condition of epithelium due to persistent oedema as in absolute glaucoma.

These preconditions are then followed by infection. The infection may be exogenous, carried by a foreign body or local from conjunctivitis or dacryocystitis. Thus, after the infection has settled, there is necrosis of corneal tissue which is sloughed off and an ulcer is formed.

Symptoms of corneal ulcer:
Pain in the eye due to exposure and irritation of the sensory nerve endings.
Lacrimation which may be profuse, due to reflex sensory stimulation.
Photophobia - i.e., intolerance to light.
Headache and blurring of vision.

Signs of corneal ulcer:
Marked blepharospasm i.e., forcible closure of eyelids due to sensory irritation. The eye lids may be oedematous.
Rough and raw yellowish white area on the cornea which stains with fluorescein.
Haziness of the cornea surrounding the ulcerated area.
Ciliary congestion with conjunctival hyperaemia.
Profuse watering but usually no muco-purulent discharge.
The iris is slightly muddy in colour and the pupil is small.

Treatment of corneal ulcer:

1. Treatment of uncomplicated corneal ulcer
- Specific treatment for cause like topical or systemic antibiotics.
- Nonspecific supportive therapy like cycloplegic drugs, systemic analgesics, and vitamins (A, B complex and C).
- Physical and general methods like hot fomentation, wearing dark goggles, rest, and good diet.

2. Treatment of Perforated Corneal Ulcer:
- Depending on the size of the perforation, measures like tissue adhesive glue, covering with conjunctival flap etc. should be adopted.
- Best option is an urgent therapeutic keratoplasty.

**Corneal opacity:**
Corneal opacification or corneal opacity literally means loss of normal transparency of cornea.

Etiology:
Congenital corneal opacities are uncommon. Permanent corneal opacities are due to corneal ulcer, deep keratitis, dystrophy, or degeneration. The corneal tissue is destroyed and replaced by disorderly arranged fibrous lamellae covered with thick irregular epithelium.

Clinical features:
Visual disturbances and cosmetic disfigurement are the common symptoms. The visual impairment caused by corneal opacity may vary depending on its site and density. The opacity situated in the periphery of the cornea does not affect vision while opacity in the pupillary area causes loss of vision.

Types of Corneal Opacity
Depending on the density the corneal opacity is called as:
Nebula: It is a faint opacity which results due to superficial scars in the Bowman's layer and superficial stroma.
Macula: It is a semi dense opacity produced when scaring involves about half the thickness of corneal stroma.
Leucoma (leucoma simplex): It is a dense white opacity which results due to scarring of more than half the thickness of corneal stroma.

Treatment:
There is no satisfactory medical treatment for corneal opacity. The surgical procedures indicated are:
Optical iridectomy: performed in cases with central corneal opacities.
Photo therapeutic keratectomy (PTK): is performed in superficial corneal opacities (nebula).
Keratoplasty: performed in uncomplicated cases with corneal opacities.
Coloured contact lens and tattooing of scar is performed for cosmetic purposes.

**Uveitis:**
The inflammation of the uveal tract is known as uveitis. Since the uveal tract is vascular membrane, the inflammatory process tends to affect the uvea as a whole and does not remain confined to a single part. However, clinically there is always some associated inflammation of the adjacent structures such as retina, vitreous, sclera and cornea.

Causes:
Exogenous infections: e.g. A penetrating injury
Local causes: e.g., Trauma, corneal ulcer, scleritis, herpetic infection, intraocular malignant tumor, sympathetic ophthalmia, orbital cellulitis etc.
Non-specific causes due to allergy: E.g., tubercular allergy.
Specific causes: e.g., Tuberculosis, syphilis, gonorrhoea, virus infection.
Systemic causes: e.g., Rheumatism, gout, diabetes mellitus, sarcoidosis, ankylosing spondylitis, septicemia condition.
Age and Sex: May occur in any age and equally in both the sexes.

Symptoms:
Pain: The ocular pain is usually referred along the branches of 5th cranial nerve. The pain is worst at night.
Redness: Due to the circumcorneal congestion.
Photophobia.
Lacrimation.
Defective vision or blurriness of vision.

Signs:
Lid oedema.
Circumcorneal congestion.
Corneal signs such as corneal oedema, keratic precipitates, posterior corneal opacity.
Anterior chamber signs such as aqueous cells, aqueous flare, hypopyon (sterile pus in the anterior chamber) or hyphema (blood in the anterior chamber).
Pupil is small, inactive, and irregular due to formation of synechia i.e adhesion between pupillary margin and the anterior lens capsule and muddy colour of iris.
Opacities in the vitreous.

Differential diagnosis:
Acute red eye - Acute iridocyclitis must be differentiated from other causes of red eye such as Acute congestive glaucoma and Acute conjunctivitis.

Treatment of uveitis:
Local therapy:

- Cycloplegic drugs - commonly used drug is atropine sulphate eye ointment or drops instilled 2-3 times a day.
- Cortico steroids - reduce inflammation by their anti-inflammatory effect, being anti allergic are of special use in allergic type of uveitis.
- Broad spectrum antibiotic drops are usually prescribed along with steroidal preparations.

Systemic therapy:

- Corticosteroids - Usually treatment is started with high doses of prednisolone.
- Non-steroidal anti-inflammatory drugs such as aspirin, phenylbutazone.
- Immunosuppressive drugs can be used in extremely severe cases of uveitis in which vigorous use of steroids have failed to resolve the inflammation.
- Antibiotics such as azithromycin, tetracycline or erythromycin can be helpful.

Physical measures:

- Hot fomentation diminishes pain and increases circulation as a result more antibodies are brought and toxins are drained.
- Dark goggles give a feeling of comfort specially when used in sunlight.

**Acute Iridocyclitis:**
Iridocyclitis is a type of anterior uveitis that involves the iris and ciliary body. Symptoms includes pain and redness in the eyes. Increased sensitivity to light (photophobia) and blurred vision.

Treatment:
Steroid eyedrops (e.g., dexamethasone, hydrocortisone, prednisolone)
Oral steroid pills / steroidal eye infection.
Symptomatic treatment.

**Staphyloma:**
A staphyloma is an abnormal protrusion of the uveal tissue through a weak point in the eyeball. The protrusion is generally black in colour due to the inner layers of the eye. It occurs due to weakening of outer layer (cornea or sclera) by an inflammatory or degenerative condition.

Types:
Anatomically it can be divided into:
Anterior staphyloma: As a result of total sloughing of cornea with iris plastered behind.
Ciliary staphyloma: Due to bulging of the weak sclera lined by ciliary body. It occurs about 2-3 mm away from the limbus.
Intercalary staphyloma: It is localized bulge in limbal area lined by root of iris. It results due to ectasia of weak scar tissue formed at the limbus following healing of a perforating injury or a peripheral corneal ulcer.
Equatorial staphyloma: It results due to bulge of sclera lined by the choroid in the equatorial region.
Posterior staphyloma: It refers to bulge of weak sclera lined by the choroid behind the equator. Here again the common causes are pathological myopia, posterior scleritis and perforating injuries.

Treatment:
Intercalary staphyloma is treated by localized staphylectomy under heavy doses of oral steroids.

# SARVAGATA ROGA (DISEASES EFFECTING ALL PARTS OF EYE)

## 1. Number of Sarvagata rogas, detailed knowledge of etiology, pathology, clinical features, complications, differential diagnosis, and Management of Abhishyanda, Adhimantha, Hatadhimantha and Shushkakshipaka.

**Sarvagata rogas:**
The term 'Sarvagata' refers to all the parts of the eye including all mandalas and sandhis. Since Drishti mandala has proximity to Krishna mandala, description of Drishtigata rogas should have followed the krishnagata rogas. But Sushruta has described sarvagata rogas after krishnagata rogas. This may be because sandhi, vartma, shukla and krishnagata rogas are caused by Abhishyanda which is explained in Sarvagata rogas. Moreover, Abhishyanda is not a cause for timira etc. diseases explained in Drishtigata rogas.

Classification of sarvagata roga:
According to sushruta: 17
According to vagbhata: 16

| S.N. | Sushruta | Vagbhata |
|---|---|---|
| 1. | Vataja abhishyanda | Vataja abhishyanda |
| 2. | Pittaja abhishyanda | Pittaja abhishyanda |
| 3. | Kaphaja abhishyanda | Kaphaja abhishyanda |
| 4. | Raktaja abhishyanda | Raktaja abhishyanda |
| 5. | Vataja adhimantha | Vataja adhimantha |
| 6. | Pittaja adhimantha | Pittaja adhimantha |
| 7. | Kaphaja adhimantha | Kaphaja adhimantha |
| 8. | Raktaja adhimantha | Raktaja adhimantha |
| 9. | Hathadhimantha | Hathadhimantha |
| 10. | Sashopha akshipaka | Sashopha akshipaka |
| 11. | Ashopha akshipaka | Ashopha akshipaka |
| 12. | Shushkakshipaka | Shushkakshipaka |
| 13. | Amladyushita | Amloshita |
| 14. | Anyatovata | Anyatovata |
| 15. | Vataparyaya | Vataparyaya |
| 16. | Sirotpaata | Akshipaakaatyaya |
| 17. | Siraharsha | |

Vagbhata has included sirotpaata & siraharsha in shuklagata rogas and akshipakatyaya in sarvagata rogas.

Classification based on predominance of dosha:

| Vataja | Pittaja | Kaphaja | Raktaja | Sannipataja |
|---|---|---|---|---|
| Vataja abhishyanda<br>Vataja adhimantha<br>Hathadhimantha<br>Anila paryaya<br>Anyatovata<br>Shushkakshipaka | Pittaja abhishyanda<br>Pittaja adhimantha<br>Amladyushita | Kaphaja abhishyanda<br>Kaphaja adhimantha | Raktaja abhishyanda<br>Raktaja adhimantha<br>Sirotpata<br>Siraharsha | Sashopha akshipaka<br>Ashopha akshipaka |

Classification based on Sadhyasadhyata:

| Vyadhana sadhya | Ashastrakruta | Asadhya |
|---|---|---|
| 4 types of abhishyanda<br>4 types of adhimantha<br>Anyatovata<br>Vata paryaya<br>Sirotpata<br>Siraharsha<br>Sasopha akshipaka<br>Asopha akshipaka | Amladyushita<br>Shushkakshipaka | Hathadhimantha |

**Abhishyanda:**

Abhi - From all sides; Syanda - Discharge

Synonyms: Syanda, Abhisyanna, Akshikopa

Abhisyanda is the main disease in Sarvagata rogas. It is characterized by excessive discharge from all sides of eye. It is a sankramita (contagious disease) and if neglected leads to other complicated eye diseases and spreads from one person to other.

Importance of abhishyanda:

प्रायेण सर्वे नयनामयास्तु भवन्त्यभिष्यन्दनिमित्तमूलाः |

तस्मादभिष्यन्दमुदीर्यमाणमुपाचरेदाशु हिताय धीमान् ||

Abhishyanda is considered as the root cause of almost all the eye diseases. Therefore, abhishyanda should be treated at the earliest by an intelligent physician.

Nidana: The Nidanas for Abhishyanda are:

1. Nija (internal cause) - Due to vitiation of doshas.
2. Agantuja. Due to external causes.

Abhisyanda is classified in four types: Vataja, Pittaja, Kaphaja and Raktaja.

1. **Vataja abhishyanda (Subacute catarrhal conjunctivitis / allergic conjunctivitis):**

It is a Vataja Vyadhana Sadhya Vyadhi.
Vataja abhishyanda is a condition which is characterized by pricking pain, stiffness, horripilation, foreign body sensation, roughness, headache, dryness, and cold discharge from eyes.

According to vagbhata:
The characteristic features of Vataja Abhishyanda are:
Type of pain: Pricking, throbbing, and piercing.
Site of pain: Temporal region, eyes, eyebrows, and forehead.
Discharge: Dry scanty or excessive discharge with clear cold lacrimation.
Painful movement of eyes, difficulty in opening and closing of eyes, nasal blockage, and mild swelling.
Patient feels as though insects are moving in the eyes and are filled with small foreign bodies.
Patient gets relief with unctuous (snigdha) and hot (ushna) measures.

2. **Pittaja abhishyanda (Acute catarrhal conjunctivitis / Purulent Conjunctivitis):**

It is a Pittaja Vyadhana Sadhya Vyadhi,
Pittaja abhishyanda is a severe inflammatory condition characterized by burning sensation, excessive hot lacrimation, and yellowish discolouration of eyes. Patient feels as though smoke is coming out of eyes and desires for cold mgs.

According to vagbhata:
The characteristic features of Pittaja Abhishyanda are:
Burning sensation as though smoke is coming out from the eyes.
Swelling of eyelids externally with bluish black discoloration and moistness (kleda) within the lids.
Redness of eyes with yellowish hot discharge.
Yellowish appearance of objects.
Eye appears as though it is burnt by kshara (alkali).

3. **Kaphaja abhishyanda (acute mucopurulent conjunctivitis):**

It is a Kaphaja Vyadhana Sadhya Vyadhi.
Kaphaja abhishyanda is characterized by repeated discharge which is cold, slimy, white, and sticky in nature. It is associated with heaviness and swelling in the eyes. The patient desires for warm things.

According to vagbhata:
The Characteristic features of Kaphaja Abhishyanda are:
Swelling of the eyes.
Itching in the eyes.
Profuse, thick, slimy, unctuous, whitish discharge.
Patient feels lethargic and sleepy.
Lacks interest towards food.

4. **Raktaja abhishyanda (Acute mucopurulent conjunctivitis):**

It is a Raktaja Vyadhana Sadhya Vyadhi.
Raktaja abhishyanda is a condition in which, the eyes become red due red coloured siras present all over the eyes. The tears are also coppery red in colour. Besides these, symptoms of pittaja abhishyanda like burning sensation, Inflammation, desire for cold things etc. are also seen.

According to vagbhata:
Raktaja abhishyanda is a disease characterized by red coloured lacrimation, exudates, and blood vessels. The whole mandala becomes red in colour. The other lakshanas are like pittaja abhishyanda.

**Adhimantha (Glaucoma / Uveitis):**

Adhi - Excessive
Mantha - Churning type of pain
If Abhishyanda is not treated, the symptoms get further aggravated leading to respective Adhimantha. For e.g., Vataja abhishyanda if left untreated leads to Vataja adhimantha. Similar is the case with all other types of adhimantha. 'Severe pain' in the eyes is the characteristic feature of Adhimantha,

Adhimantha samanya lakshana:
Adhimantha is characterized by severe pain in half part of the head.

Type of pain: It is like the pain experienced on pulling out the eyes from the socket or churning. Apart from these symptoms, features of the respective doshas are also seen.

Types of Adhimantha: It is of four types. Vataja, Pittaja, Kaphaja and Raktaja.

1. **Vataja adhimantha:**

It is a vataja vyadhana sadhya Vyadhi.
Vataja Adhimantha is characterized by:
Type of pain: Severe pain as though eye is pulled out from the socket, eye is churned with pestle, pricking, tearing, squeezing, and bursting.
Site of pain: Half side of the head including the eye.
Foreign body sensation, swelling of eye muscles, muddy, tensed eyes and twitching of the eyes.

According to vagbhata:
If Vataja abhishyanda is neglected, it leads Vataja adhimantha which is characterized by tinnitus, giddiness, and churning type of pain in the forehead, eyes, eyebrows etc.

**2. Pittaja adhimantha (Acute Congestive glaucoma):**

It is a Vyadhana Sadhya Vyadhi.
Pittaja Adhimantha is characterized by:
Signs:
Redness: of eyes like capillary network or 1ike a section of liver.
Swelling: the edges of the eyelids will be inflamed and swollen.
Discharge: yellow coloured.

Symptoms:
Burning sensation: as though burnt by fire or kshara being applied over wound
Objects appear yellow in colour.
The patient may faint due to severe pain and burning sensation.

According to vagbhata:
Vagbhata also has similar view and describes the colour of the eyes, like that of piece of yakrit and burning sensation like burning of coal.

**3. Kaphaja adhimantha:**

It is a Kaphaja Vyadhana Sadhya Vyadhi.
Kaphaja adhimantha is a disease characterised by swelling associated with mild congestion, discharge and itching in the eyes. There will be stickiness, heaviness, and muddy appearance of eyes with cold sensation and horripilation. Patient visualizes the objects with difficulty. The visualized objects appear hazy as if filled with sand or dust. It is also associated with symptoms like headache and blockage in the nose.

According to vagbhata:
The Characteristic features of Kaphaja Adhimantha are:
Depressed krishna mandala and elevated Shukla mandala.
Excessive salivation and nasal blockage.
Patient visualizes hazy as though eyes are filled with sand/dust.

**4. Raktaja adhimantha (Iridocyclitis / secondary glaucoma):**

It is a Raktaja Vyadhana Sadhya vyadhi.
Raktaja adhimantha is characterised by the following features:
Eyes appear red like that of bandhujeeva (hibiscus flower)
Experiences blackouts in front of eyes.
Intolerance to touch, bloody discharge, pricking pain and burning sensation in the eyes.
Patient visualizes flame and redness in all the directions.
Krishna mandala appears as if soapnut is immersed in the blood.

According to vagbhata:
The characteristic features of Raktaja Adhimantha are:
Pain: as though eye is pulled out, severe pain in temporal region, teeth, orbit, and scalp.

Appearance: eye appears red like that of bandhuka pushpa or arishta phala dipped in blood. Krishna mandala looks like fire.
Patient will be intolerant to touch and experiences blackouts.
Raktaja adhimantha will have same features like that of raktaja abhishyanda but in severe form.

Sadhyasadhyata of adhimantha:
If a person suffering from Adhimantha follows faulty regimen he is sure to lose his vision,
In Kaphaja adhimantha - within 7 nights
In Raktaja adhimantha - within 5 nights
In Vataja adhimantha - within 6 nights
In Pittaja adhimantha sadya eva (immediately/within a day)

Samanya chikitsa:
The chikitsa for Abhisyanda and Adhimantha are same
l) Nidana parivarjana (Abhishyanda is the nidana in case of adhimantha)
2) During stage or Amavastha: Any of these procedure, mentioned below are done for 4 or till Amapachana lakshanas are observed.
Langhana
Pralepa
Dhuma
Swedana
Tiktanna bhojana
3) Depending on the avastha and dosha, Snehana, Swedana, Siravyadha, Virechana. Basti, Aschotana, Pariseka, Pralepa, Abhyanga, Sirobasti, Nasya, Tarpana, putapaka and Anjana are indicated in all kinds of Abhishyanda.

Bahirgundana is a special treatment procedure indicated in the purvaroopa avastha of abhishyanda where in churnas are sprinkled over closed eyes.
Eg: Powders of devadaru, ativisha, lodhra and saindhava.

Contraindications
Anjana, ghrita, kashaya rasa, guru bhojana and snana are contraindicated in the amavastha of abhishyanda.

**Vataja abhishyanda / adhimantha chikitsa:**
Snehapana: Ghritapana with purana-ghrita.
Swedana.
Siravyadha in Upanasika or kapalastha sira.
Sneha virechana tilwaka ghrita.
Basti: Anuvasana (In dhatukshaya janya) and Niruha,
Tarpana: any vatahara ghrita,
Putapaka: with Snaihika dravya.
Snaihika Dhoomapana

Aschotana (Sheetala prayoga):

1. Ksheera prepared from usheera, yashtimadhu and pippali.
2. Hribera, tagara, manjistha and udumbara boiled in goat's milk.

Snehana Nasya: Shalaparni, dugdha and madhura dravya siddha taila.
Seka (sukhoshana): Pallava, mula and twacha of eranda, ajapaya, sita ksheerapaka kantakari mula siddha ksheera.
Sirobasti
Anjana yogas

1. Paste prepared out of yashtimadhu, haridra, haritaki, devadaru triturated with ajadugdha.
2. Gutikanjana: Swarna gairika, saindhava, pippali, shunthi triturated with ajadugdha,

Pathya: Milk processed with vatahara drugs, triphala ghrita or purana ghrita to be taken internally after meals.

**Pittaja abhishyanda / adhimantha chikitsa:**
Snehapana, swedana
Sira mokshana.
Virechana.
Sthanika chikitsa: Seka.
Tarpana
Aalepa
Nasya
Anjana
Pitta visarpa chikitsa
Ghrita for Tarpana and Nasya: Ghee prepared out of sheetala dravyas like shali, durva, pashana bheda, rakta chandana, haridra, daru haridra, nilotpala, lodhra, sariva, musta, Ananta mula, yashti madhu.
Seka: With ksheera paka prepared out of the above drugs,
Aschotana: With ghrita prepared with yasti madhu and lodhra.

Anjana yogas
Rasakriya prepared out of sharkara, kshaudra, shyama trivrit, yashti madhu.
Rasakriya prepared out of musta, samudraphena, utpala, vidanga. ela, amalaki, bijaka.
Paste prepared out of taleesa patra, ela, swarna gairika, ushira and Shankha bhasma in breast milk.
Rasakriya prepared out of dhataki and with breast milk.

**Kaphaja abhishyanda / Adhimantha chikitsa:**
Apatarpana: Fasting for three days.
Snehapana: With tilvaka ghrita.
Swedana: With leaves of tagara, peelu, arka, kapitta, nirgundi.
Sira mokshana
Avapida nasya

Anjana:
Varti prepared out of Saindhava, hingu, triphala, madhuka, prapoundarika, tuttha, triturated with water.
Varti prepared out of Trikatu, triphala, haridra, vidanga sara.
Varti prepared out of haritaki, haridra, yashtimadhu.
Kushta, devadaru, shankha, patha, chitramula, trikatu and manahshila.
Ksharanjana.
Dhoomapana with kaphahara dravyas.
Seka: Nimba patra, lodhra, mandara patra, ghrita and ksheera. (yogaratnakara).
Pralepa: Paste prepared with Hribera, agaru, devadaru, kushta.
Kavalagraha with kaphahara dravyas.
Aschotana with decoction prepared out of gomutra, tilwaka, brihati, lodhra aragvadha mula tvak.
Tarpana: Ghrita prepared with agaru, priyangu, nalada, devadaru and goat's liver.
Putapaka with ruksha dravya: Goat's liver should be cooked with kushta, tagara, darvi along with honey and ghee.
Pathya Apathya: Annapana which does not aggravate kapha,

**Raktaja abhishyanda / adhimantha chikitsa:**
Line of treatment indicated for Raktaja Adhimantha, Raktaja Abhishyanda, Sirotpata and Siraharsha are one and the same.
Sneha pana – with kaumbha sarpi (10-year-old ghee) or mamsa rasa.
Raktamokshana is done thereafter.
Virechana: Using trivritadi kalka siddha ghrita with sharkara.
Shirovirechana: With ghrita and sharkara.
Pradeha: Powders of pittaghna dravyas like nilotpala, ushira, daru haridra, agaru, yashti madhu, lodhra, musta mixed with shata dhauta ghrita.
Pariseka: Lodhra, triphala, yashtimadhu, sharkara, bhadramustha with cold water.
Nasya: Powders of sugar, madhuka and nilotpala, breast milk processed with ghritamanda.
Dhuma
Aschotana and Seka: Prepare a pottali with fine powders of kasheru and yashti madhu and keep this in a bowl of rain water. This water should be used for aschotana and seka.
Anjana: Prepared using arjuna, gambhari, dhataki pushpa, amalaki, bilwa twak, brihati, kantakari, bimbi, lodhra, manjishta with ikshu rasa.
Tarpana with snigdha dravyas
Snehana Putapaka
Internally: Shadanga guggulu (Kashaya of triphala, patola patra, nimba twak and vasa kwatha mixed with guggulu).

**Hathadhimantha (Atrophic bulbi or phthisis bulbi):**
It is an Asadhya Vyadhi.
If vataja adhimantha is neglected, it gives rise to severe pain and shrinking of eyes.
This condition is called hathadhimantha and is said to be incurable.

According to vagbhata:
Adhimantha if neglected leads to hathadhimantha which is characterized by different types of pain, ulcer in Drishti and loss of vision.

Shushkakshipaka (Xerophthalmia / Ophthalmoplegia):
It is a Vataja Sadhya Vyadhi.
Shushkakshipaka is a disease condition in which the eyelids become dry, constricted, hard and rough. The patient visualizes objects finds difficulty in opening the eyes.

According to vagbhata:
Features of Shushkakshipaka are:
It is caused due to vitiation of vata and pitta.
Characterized by foreign body sensation, pricking, and cutting type of pain.
The eyelid and eyes become dry, rough, and coated.
Difficulty in opening and closing of eyelids.
Eye appears constricted and dry, associated with pain and inflammation.
Patient desires for cold things.

Chikitsa:
Anjana

1. Saindhava, daru haridra, shunthi triturated in matulunga swarasa, ghrita and stri dugdha.
2. Shunti triturated with sarpi and stanya.

Sarpi pana and tarpana: Jeevaniya dravya Siddha ghrita.
Snehana putapaka
Nasya: Anutaila or ghrita prepared from jeevaniya dravyas.
Pariseka

1. Kashaya prepared with ksheera and saindhava.
2. Kashaya prepared with haridra, daru haridra and saindhava.

**Akshipakatyaya (Pan ophthalmitis):**
It is an Asadhya Vyadhi
Akshipakatyaya is described as Sarvakshi roga by Acharya Vagbhata and Acharya Sushruta has described it under krishnagata roga.

Akshipakatyaya means the whole eye is inflamed. It is characterized by, the following features:
Swelling, severe pain and dirty discharge from eyes.
Coating of krishna mandala by kapha (whitish).
Moistness and redness in shukla mandala.
Burning sensation in the eyes.
Obstruction of vision.
Intermittent pain.

## 2. Brief Knowledge of Amloshit, Vata paryaya, Anyato vata, Sashopha & Ashophakshipaka- Pilla roga, Sirotpata and Siraharsha.

**Amloshita:**
Acharya Vagbhata names Amladyushita as Amloshita.
Amloshita is a condition in which the annasara i.e., the product of digestion undergoes amlata by mixing with malas formed due to the vitiation of pitta and rakta. This further reaches the eyes to produce or reddish discolouration. The other features produced in the eye are swelling, burning sensation, inflammation, severe lacrimation, and blurred vision.

Chikitsa:
Treatment of Amladyushita is like the treatment of pittaja abhishyanda. Even though raktamokshana is indicated in pittaja abhishyanda, it is contra indicated in amladyushita, because it is an ashastrakruta vyadhi (surgeries are contraindicated).

**Vata paryaya:**
(As per Sushruta: Ocular pain due to trigeminal neuralgia, glaucoma.
As per Vagbhata: Atrophy of eyes/microphthalmos).
It is a Vataja Sadhya Vyadhi
Synonyms: Vata viparyaya, Syaanda maarutha

Vataparyaya is a condition in which the vitiated vata circulates and gets localized to produce pain in the eyes, eyebrows, and eyelids alternatively (the pain shifts from eyes to eyebrows, to lids hence the name Vata Paryaya).

According to vagbhata:
Like in Anyatovata, the vitiated vata produces deformity of the eyes. The eyes become small and appearance of the eye gets changed.

Chikitsa:
Treatment for Vata paryaya and Anyatovata are like that of Vataja Abhishyanda.

- Snehana, Swedana, Raktamokshana, Basti, Snehavirechana, Tarpana, Putapaka and Ghritapana as in Vataja Abhishyanda.
- Pariseka with Haridra, Daru haridra and Saindhava siddha ksheera.

**Anyatovata (referred pain in the eye):**
It is a Vataja Vyadhana Sadhya Vyadhi.
Anyatovata means pain manifests in the eyes due to vitiated vata present in various other parts of the body.
The condition in which the vitiated vayu situated in other regions such as the back or nape of the neck, ear, head, and chin produces pain either in the eyebrows or eyes is known as Anyatovata.

According to vagbhata:
The vitiated vata moves from different regions to cause severe pain in the nape of neck, eyes, and temporal region. In this there will be no stickiness, swelling or redness. The eye becomes shrunken and there will be lacrimation. Such a condition is called Anyatovata.

Chikitsa:
Treatment for Anyatovata is like that of Vataja Abhisyanda.
Snehana, Swedana, Raktamokshana, Basti, Snehavirechana, Tarpana, Putapaka as in Vataja Abhishyanda.
Sarpi and ksheera before food

a. Vrikshadani, kapittha, panchamula, karkata rasa, ksheera siddha ghrita.
b. Meshashringi, ksheera siddha ghrita.
c. Arjuna siddha ghrita.

**Akshipaka (Cellulitis of eyeball):**
Akshi- Eyes; Paka- Suppuration
Akshipaka means suppuration of the eyes.

Sashopha akshipaka:
If akshipaka is associated with oedema it is called "Sashopha Akshipaka" and if it is not associated with oedema, it is called 'Ashopha Akshipaka.'
It is a Tridoshaja Vyadhana Sadya Vyadhi.

Sashopha akshi paka is an inflammatory disease caused due to vitiation of tridoshas. The swelling resembles pakva udumbara (ripe fig) and is coppery in colour with frequent cold or hot, sticky discharge. Symptoms such as burning sensation, horripilation, pricking pain and heaviness are also seen.

According to vagbhata:
Sashopha akshipaka is caused due to the vitiation of tridoshas and rakta. It is characterised by swelling, severe pain, burning sensation, and spitting. Shukla mandala appears red like that of a ripe 'fig fruit.' There will be frequent discharge, which is either hot or cold, clear, or unctuous, thin, or thick.

**Ashopha akshipaka:**
It is a Tridoshaja Vyadhana Sadhya Vyadhi.
Ashopha akshi paka is a disease caused due to tridoshas. It is characterized by all the symptoms of sashopha akshipaka, but there will be absence of shopha (swelling).

**Alpa shopha (according to vagbhata):**
Mild swelling along with all the other features of Sashopha akshipaka is known as Alpa shopha.

Chikitsa of Sashopha and ashopha Akshipaka:
Treatment of both Sashopha and Ashopha Akshipaka is like Raktaja Abhishyanda Chikitsa.

According to Vagbhata:
Snehana, swedana followed with Siravyadha.
Then Snehana followed by Virechana with trivrit ghrita, draksha and haritaki kashaya.
Seka: Shweta lodhra fried in ghrita is powdered and tied in cloth. It is then triturated with warm water and used for seka (Shulahara).
Aschotana: Kashaya of daru haridra, prapaundarika or stri dugdha.
Saindhava kalpanas: indicated when there is foreign body sensation, redness, excessive lacrimation, and pain.
Tamra triturated in loha patra with gomutra is used for dhoopana along with ghrita (Vedanahara).
Pippali and saindhava triturated with dadhi sara in tamra patra is used for lepa.
Shankha bhasma and stri dugdha triturated in tamra patra is used for dhoopana along with shami patra applied with ghrita (very soon reduces pain & foreign body sensation).

**Pilla roga:**
Following 18 diseases are considered as pilla rogas as they are dirghanukala bandhi (persist for long time).
1-4. Utklishta (kaphaja, pittaja, raktaja and sannipataja)
5. Kukunaka
6. Pakshmoparodha
7. Shushkakshipaka
8. Puyalasa
9. Bisavartma.
10. Pothaki
11. Amloshita
12. Alpaakhya (Alpa shopha)
13-15. Abhishyanda (pittaja, kaphaja and raktaja)
16-18. Adhimantha (pittaja, kaphaja and raktaja)

Chikitsa:
The chikitsa for above mentioned 18 diseases are already described. When they attain chronicity and become pillakhya rogas, the general line of treatment to be adopted are as follows:
Snehana, swedana.
Followed by Vamana, Siravyadha and Virechana.
After the above Shodhana karmas, patient is subjected to Lekhana karma to remove the doshas.
Seka is done with the extract obtained by triturating 1 pala tuttha, 20 seeds of maricha and 30 pala kanji and stored in copper vessel.
Anjana with Rasakriya prepared by boiling the kashaya of karanja beeja, tulasi and buds of jasmine is helpful in pilla roga.

Application of paste of tagara triturated with kashaya of abhaya is pilla nashaka.
In pilla roga, patient must repeatedly undergo lekhana, raktamokshana and virechana. And should daily follow aschotana, anjana, navana nasya and dhumapana.

**Sirotpata (Allergic Conjunctivitis / Episcleritis):**
It is a Raktaja Vyadhana Sadhya Vyadhi.
Sirotpata is a condition wherein the siras of netra becomes coppery red in colour and after sometime the coppery red colour of siras disappears and attains normalcy. This occurs repeatedly and may or may not be associated with pain.

Chikitsa:
Sirotpata should be treated like Raktaja abhishyanda.
Specific anjanas in sirotpata:
Ghrita with madhu
Saindhava, kaseesa with stanya
Shankha, manahshila, tuttha, daru haridra, saindhava with honey
Shirisha pushpa swarasa, sura, maricha with honey
Gairika with honey

**Siraharsha / sirapraharsha (Advanced stage of Episcleritis / Acute orbital cellulitis):**
It is a Raktaja Vyadhana Sadhya Vyadhi.
If sirotpata is neglected, it leads to a more severe condition called sirapraharsha. In this, there will be coppery or clear, thick, bloody discharge and loss of vision.

Chikitsa:
Sira harsha should be treated like Raktaja Abhishyanda.

Specific Anjanas in Siraharsha:
Phanita with madhu
Rasanjana with honey
Kaseesa, saindhava with honey
Vaitraamla (Amlavetasa), Stanya, phanita with saindhava

## 3. Knowledge of Conjunctivitis, Glaucoma, Dry Eye Syndrome including their etiology, pathology, clinical features, differential diagnosis, complications, and their management.

**Conjunctivitis:**
Conjunctivitis is an inflammation of the conjunctiva. It is commonly due to an infection or an allergic reaction.
Conjunctivitis may be caused due to the following factors:

1. Exogenous: In this, the causative agents are introduced in the conjunctival sac from outside. These agents may be microorganisms, foreign bodies, or chemicals.

2. Endogenous: In this method, there may be blood-borne infection or there may be allergic response or there may be conjunctival affection as a result of general metabolic disturbance as in gout.
3. By local spread of lesion from the surrounding structures like skin, lacrimal apparatus, cornea, sclera, uveal tract, or orbit.

Classification of Conjunctivitis:

1. Infective conjunctivitis:

a. Bacterial conjunctivitis: Acute bacterial conjunctivitis, chronic bacterial conjunctivitis, angular conjunctivitis.
b. Viral conjunctivitis: Adeno virus conjunctivitis, entero virus conjunctivitis, molluscum contagiosum conjunctivitis, herpes simplex conjunctivitis.
c. Chlamydial conjunctivitis: Trachoma, adult inclusion conjunctivitis, neonatal chlamydial conjunctivitis.
d. Ophthalmia neonatorum
e. Granulomatous conjunctivitis: Parinaud's conjunctivitis.

2. Allergic conjunctivitis

a. Simple allergic conjunctivitis - Hay fever conjunctivitis, seasonal allergic conjunctivitis, perennial allergic conjunctivitis.
b. Vernal - keratoconjunctivitis
c. Atopic kerato conjunctivitis
d. Giant papillary conjunctivitis
e. Phlyctenular conjunctivitis
f. Contact dermo conjunctivitis

3. Cicatricial conjunctivitis
4. Toxic conjunctivitis

**Infective conjunctivitis:**

Despite the natural protective mechanism of the conjunctiva in the form of low temperature due to exposure to the air, presence of enzyme in the tears called lysozyme which has a definite anti-bacterial property and the mechanical action of blinking and flushing action of the lacrimal secretion, the conjunctival sac may be infected with pathogenic organism causing infective conjunctivitis.

**Acute bacterial conjunctivitis:**

It is common and usually self-limiting condition caused by direct eye contact with infected secretions. It is also called as acute mucopurulent conjunctivitis as it is characterized by muco purulent discharge. The most common causative organisms are staphylococcus aureus, streptococcus pneumonia, and moraxella catarrhalis.

Symptoms:
Redness, foreign body and burning sensation, discharge, mild photophobia, slight blurring of vision and sticking of the lid margins.

Signs:
Flakes of mucopus seen in the fornices, canthi and lid margins are an important sign.
Conjunctival congestion
Chemosis
Petechial hemorrhages.
Cilia usually matted together with yellow crusts.

Differential diagnosis:

- From other causes of acute red eye.
- From other types of conjunctivitis.

Treatment:
About 60% of cases resolve within five days without treatment.
Topical and systemic antibiotics.
Anti-inflammatory and analgesic drugs.
Irrigation of conjunctival sac.
Wearing of dark glasses.

**Viral conjunctivitis:**
Several viruses can cause conjunctivitis. The conjunctival reactions to the virus infection may be variable. Chiefly they are as follows:

a. Inflammation with follicle formation in the conjunctiva is follicular conjunctivitis. This is the commonest reaction.
b. Conjunctivitis with oedema of the conjunctiva and minimal conjunctival discharge but copious lacrimation and big patches of sub-conjunctival hemorrhages are seen/ in epidemic varieties.
c. Hyperemia of the conjunctiva,
d. Formation of conjunctival ulcers or membrane.

In case of viral conjunctivitis, there is always a tendency for cornea to be affected. The typical viral lesion is kerato conjunctivitis.

Clinical presentations:
Acute Viral conjunctivitis may present in two forms:
Acute follicular conjunctivitis: It is an acute catarrhal conjunctivitis associated with marked follicular hyperplasia especially of the lower fornix and lower palpebral conjunctiva.
Acute haemorrhagic conjunctivitis: It is an acute inflammation of conjunctiva characterized by multiple conjunctival haemorrhages, conjunctival hyperaemia, and mild follicular hyperplasia.

Treatment:

- Supportive treatment is usually given.
- Antiviral drugs are ineffective.
- Promising results are reported with adenine arabinoside
- Corticosteroids should not be used in active stage

**Ophthalmia neonatorum:**

Definition: It is bilateral conjunctival inflammation of the newborn within the first month of life.

Causative organisms: Gonococcus, streptococcus haemolyticus, staphylococcus aureus, streptococcus pneumonia.

Mode of infection:

Eye may be infected in three ways:

a. Before birth: through infected liquor amnii.
b. During birth: This is the commonest due to infected birth canal and if child is born with face presentation.
c. After birth: From soiled clothes, first bath of new born or fingers with infected lochia.

Signs and symptoms

Pain and tenderness in the eyeball

Conjunctival discharge: Purulent in gonococcal ophthalmia neonatorum and mucoid or mucopurulent in other bacterial and neonatal inclusion conjunctivitis.

Lids are usually swollen.

Conjunctival may show hyperemia and chemosis.

Corneal involvement, though rare may occur in herpes simplex.

Diagnostic criteria:

a. Purulent conjunctivitis in the newborn
b. Conjunctival smear shows gonococcus

Treatment:

1. Prophylaxis - Needs antenatal, natal, and postnatal care.

a. Antenatal measures - Thorough care of mother and treatment of genital infection when suspected.
b. Natal measures -
    - Deliveries should be conducted under hygienic conditions, taking all aseptic measures.
    - The new born baby’s closed lids should be thoroughly cleansed.
c. Postnatal measures - Use of either 1% tetracycline ointment or 0.5% erythromycin ointment or 1% silver nitrate solution into the eyes of the babies immediately after birth.

2. Antibiotics are given to infants born to mothers with untreated gonococcal infection.

**Allergic conjunctivitis:**
It is inflammation of the conjunctiva due to allergic reactions.

**Simple allergic conjunctivitis:**
It is a mild, non- specific allergic conjunctivitis

Etiology:

- Exogenous allergens: Pollens, vegetables, animal dusts and drugs like penicillin, atropine, and pilocarpine.
- Endogenous allergens: Bacterial products from a septic focus particularly due to staphylococcus.

Symptoms:

- Itching and burning sensation of the eyes.
- Photophobia and watering.

Signs:

- Marked hyperaemia of conjunctiva.
- Chemosis of conjunctiva.
- Conjunctival discharge is scanty and watery but not muco-purulent.
- Eosinophils in conjunctival smear is noted.
- Oedema of the lids.

Treatment:

- Elimination of allergens if possible.
- Local palliative measures which provide immediate relief include:
    a. Vasoconstrictors like adrenaline, ephedrine and naphazoline.
    b. Sodium chromoglycate drops in preventing recurrent atopic cases.
    c. Avoid steroid eye drops.
- Systemic anti histamine drugs are useful in acute cases with marked itching.
- Desensitization has been tried without much rewarding results.

**Vernal Keratoconjunctivitis (VKC) or spring catarrh:**
It is a recurrent, bilateral, self-limiting disorder in which both IgE and cell mediated immune mechanisms play important roles.

Etiology:
Age: 4-20 yrs; More common in boys than girls.
Season: More common in summer.
Exiting factor: Dust

Symptoms:
Marked itching and burning sensation.
Mild photophobia, lacrimation, ropy discharge, and heaviness of the lids.

Signs:

- Palpebral form - Upper tarsal conjunctiva of both eye is involved. Lesion is characterized by the presence of hard, flat-topped papillae arranged in a cobble stone fashion.
- Bulbar form is characterized by dusky, red triangular congestion of bulbar conjunctiva in palpebral area. Gelatinous, thickened accumulation of tissues around the limbus and presence of tranta's spots (whitish raised dots) along the limbus.
- Mixed form shows the combined features of the above.

Treatment:
General measures:

- Allergen avoidance
- Cool compresses
- Lid hygiene
- Dark goggles to prevent photophobia

Local treatment:

- Mast cell stabilizers
- Antihistamines and antibiotics
- Mucolytic agent- Acetyl cysteine (0.5%)
- Steroids

Systemic treatment:

- Oral anti histamines and antibiotics
- Immunosuppressive agents

Surgical treatment:

- Superficial keratectomy is indicated in case of large vernal plaque,

**Atopic kerato conjunctivitis:**
It is a rare bilateral disease that typically develops in adulthood following a long history of eczema. Asthma is also extremely common in these patients. Symptoms are like those in vernal keratoconjunctivitis but are frequently more severe and unremitting.

Treatment:
Like vernal kerato conjunctivitis.

Giant papillary conjunctivitis:
It is the inflammation of conjunctiva with formation of very large sized papillae seen more frequently in contact lens wearers.

Symptoms:
Foreign body sensation, redness, itching, increased mucous production, blurring and contact lens intolerance.

Signs:
Mucous discharge, papillary hypertrophy of the upper tarsal conjunctiva associated with hyperemia.

Treatment:
Remove the stimulus such as wearing of contact lens.
Anti-histamines, non-steroidal anti-inflammatory drugs.
Disodium cromoglycate relieves the symptoms.

**Phlyctenular Conjunctivitis:**
It is an allergic inflammatory reaction of the conjunctiva to some endogenous toxin which is bacterial in origin.

Etiology:
Age: usually 3 to 15 years of age.
Unhygienic conditions
Undernourished children.
Exciting factor: Usually tubercular toxin, but toxins from other organisms like staphylococcus may also be responsible for the disease.

Symptoms:
Discomfort in the eye.
Irritation and reflex watering
Photophobia

Signs:
The phlycten which means a bleb appears as a pinkish white nodule varying from 1 to 3 mm in size usually at the limbus.
It may be one or many in number.
Phlycten may also appear on the bulbar conjunctiva.
In case of secondary infection, the whole of the conjunctiva becomes congested and mucopurulent discharge develops.

Treatment:
Local therapy -Topical steroids, antibiotic drops, atropine eye ointment.
Specific therapy -Eradicate the causative conditions like tubercular infection etc.
General measures -High protein diet supplemented with vitamin A, C, and D.

**Toxic conjunctivitis:**
It is an irritative, follicular response which occurs after prolonged administration of topical medication.

**Glaucoma:**
Aqueous outflow:
Aqueous flows from the posterior chamber via the pupil into the anterior chamber, from where it exits the eye by two different routes.

1. Trabecular (conventional) route: It accounts for approximately 90% of aqueous out flow. The aqueous flows through the trabeculum into the schlemm's canal and is then drained by the episcleral veins,
2. Uveoscleral (unconventional) route: It accounts for the remaining 10% in which aqueous passes across the face of the ciliary body into the suprachoroidal space and is drained by the venous circulation in the ciliary body, choroid and sclera.

Factors which cause rise in Intra ocular pressure are:

1. An increase in the volume of the intra-ocular contents:

a. Increase in quantity of the aqueous humour due to an increase in the rate of aqueous production or due to a decrease in the rate of outflow of the fluid as a result of obstruction in its drainage.
b. Increase in the blood volume due to an increased arterial and capillary volume or due to a decrease in venous outflow.
c. Increase in the volume of the lens and the vitreous.

2. External pressure upon the globe:

Definition of Glaucoma: It is a condition in which a group of ocular disorders characterized by progressive optic neuropathy resulting in a characteristic appearance of the optic disc and a specific pattern of irreversible visual field defects. It is associated frequently, but not invariably with raised intra-ocular pressure. (Normal IOP is 11 to 21 mm of Hg by Schiotz tonometer).

Classification of glaucoma:

1. Congenital
2. Acquired

a. Primary (without any obvious cause)

- Open angle (chronic simple glaucoma)
- Closed angle (angle closure glaucoma)

b. Secondary (When obvious cause is present)

**Congenital glaucoma:**
It refers to abnormally high IOP which results due to developmental anomaly of the angle of the anterior chamber.

**Primary open angle glaucoma (chronic simple glaucoma):**

It is a type of primary glaucoma, where there is no obvious cause for the rise of intra ocular pressure and angle of the anterior chamber remains wide. It is characterized by-

- Slowly progressive, raised intraocular pressure.
- An open anterior chamber angle.
- Characteristic optic disc cupping.
- Specific visual field defects.

Symptoms:

1. Onset is very insidious and usually asymptomatic.
2. Mild headache and eye ache may occur.
3. Presbyopic glasses may require frequent changes due to accommodative weakness.
4. Defect in field of vision.
5. Gradual dimness of central vision is noted at central stage.
6. In later stages there may be night blindness due to peripheral field defect and loss of function of peripheral parts of retina.

Signs:

1. Anterior segment: At later stage pupil, reflex becomes slightly sluggish and cornea becomes slightly hazy.
2. Rise in intraocular pressure: There will be an exaggeration of normal diurnal variation. In most patients IOP (Intra ocular pressure) falls during evening. A variation in IOP over 8 mm Hg (schiotz) is diagnostic of glaucoma.
3. Ophthalmoscopic examination reveals
    a. Pale optic disc
    b. Cupping of the optic disc (Cupping means excavation of the disc).
    c. Pulsation of the retinal arteries at the margin of the disc.
4. Defects in the field of vision:
   It is known that in chronic simple glaucoma, there is damage of nerve fibre and so the field defects are clinically manifested according to the nerve fibre bundles affected. In advanced stage of glaucoma, the peripheral field defect gradually extends all around the periphery, until only a central tubular field vision remains. Finally in absolute stage, the central field is also abolished and the eye becomes blind.

Diagnostic tests for chronic simple Glaucoma:

1. Tonometry : Schiotz or applanation tonometry is used to measure IOP.
2. Central corneal thickness measurement (CCT): To know the corneal thickness.
3. Diurnal variation test : Repeated observation of IOP for 24 hours.
4. Gonioscopy: A method of evaluating the anterior chamber angle to provide information regarding the type of glaucoma.
5. Documentation of optic disc changes
6. Slit lamp examination of anterior segment: To rule out causes of secondary open angle glaucoma.

7. Perimetry: To detect visual field defects.
8. Nerve fibre layer analyser (NFLA): To detect the glaucomatous damage to the retinal nerve fibres.
9. Water drinking test : It is a provocative test required in border line cases. In it, after 8 hours fast, baseline IOP is noted and the patient is asked to drink 1 litre of water, following which IOP is noted every 15 minutes for 1 hour. The maximum rise in IOP occurs in 15-30 minutes and returns to baseline level after 60 minutes in both normal and glaucomatous eye. A rise in IOP by 8mmHg or more is diagnostic of POAG (Primary Open Angle Glaucoma).

Diagnostic criteria of chronic simple glaucoma:

1. Elderly person complaining of gradual dimness of vision.
2. Raised intraocular pressure.
3. Field defects.
4. Cupping of optic disc.
5. External appearance of the eye will be normal.

Differential diagnosis :

1. Immature cataract: IOP will be normal and no cupping of the disc.
2. Optic atrophy: Though optic disc is pale, there will be no glaucomatous cupping and IOP will be normal.

Treatment:

As soon as diagnosis of glaucoma is made, the treatment should be started. The aim of the treatment is to lower intraocular pressure to a level where further visual loss does not occur. This can be achieved by:

1. Medical therapy

- Topical beta blockers lower the IOP by reducing aqueous production. E.g. Timolol maleate (0.25, 0.5%; 1 to 2 times/day), Betaxolol (0.25%; 2 times/day).
- Prostaglandin analogues decrease the IOP by increasing the outflow of aqueous. E.g. latanoprost (0.005%), travoprost (0.004%).
- Adrenergic drugs like epinephrine, hydrochloride (0.5% to 2%; 1-2 times/day) and brimonidine (0.2%; 2 times a day) lowers IOP by increasing aqueous outflow and decreasing aqueous production respectively.
- Pilocarpine (l, 2, 4%; 3-4 times/day) dilates blood vessels and in this way helps absorption of aqueous humor and lowers intraocular pressure.

2. Laser trabeculoplasty: This can be done by using argon laser or diode laser. It should be considered in patients where IOP is uncontrolled despite medical therapy.
3. Surgical therapy: Trabeculectomy is the most frequently performed surgery. It is a filtration surgery which provides a new channel for aqueous outflow and successively controls the IOP (below 21 mm Hg).

Pseudo glaucoma or low tension glaucoma - It is a condition which is not glaucoma in the true sense. There will be cupping of the disc and visual field changes similar those in chronic simple glaucoma, the angle of anterior chamber is also wide. But the intraocular pressure remains normal or subnormal.

**Primary angle closure glaucoma (PACG):**

This is a condition in which the intraocular pressure is raised as a result of obstruction to the outflow of the aqueous due to extreme narrowness or closure of the angle of the anterior chamber consequent upon the close proximity of iris to the cornea in the absence of any other ocular or systemic disease.

Etiology:

- It is common in women than in men and affects frequently at $6^{th}$ and $7^{th}$ decades of life.
- Type of individual - Highly nervous individual with unstable vasomotor system.
- Type of eye affected.

a. Usually hypermetropic eye (small eye) with shallow anterior chamber.
b. Eyes in which iris - lens diaphragm is placed anteriorly.
c. Eyes with a narrow angle.
d. Heredity.
e. Seasonal incidence: More in rainy season due to diminished light.

Mechanism of closure of narrow angle:

It varies and is commonly due to the following factors.

Dilatation of the pupil: On dilatation of pupil, the iris collects at the angle and so closes the already narrow angle. Thus it is dangerous to put atropine in the eye of an elderly person with a shallow anterior chamber.

A swelling or anterior displacement of the ciliary body due to congestion and oedema of the ciliary body.

Relative pupillary block - Any cause that dilates the pupil like darkness, anxiety or mydriatic drugs leads to build up of aqueous in posterior chamber. This is called as physiological ‘iris bombe.’ This ballooning of the peripheral iris closes the already narrow angle.

Classification and clinical presentation of PACG:

PACG can be understood and managed in three stages-

1. Latent primary angle closure glaucoma.
2. Subacute or intermittent and acute primary angle closure glaucoma.
3. Chronic primary angle closure glaucoma.

1. **Latent primary angle closure glaucoma (Primary angle closure suspect).**

Symptoms are absent in this stage.
Eclipse sign - To elicit decreased axial anterior chamber depth. This can be done by throwing light across the anterior chamber through a pen light from the temporal side and noting the shadow on the nasal side.
Slit lamp examination reveals decreased anterior axial and anterior chamber depth, convex shaped iris, lens, diaphragm, and close proximity of iris to the cornea in the periphery.
Treatment: Prophylactic laser iridotomy

2. **Subacute or intermittent & acute primary angle closure glaucoma.**

Symptoms:
In subacute cases - Unilateral transient blurring of vision, coloured haloes, headache, brow ache and eye ache.
In acute cases - Pain, nausea, vomiting, progressive impairment of vision, redness, photophobia, and lacrimation.
Signs:
Lids - Oedematous.
Conjunctiva - Chemoses and congested.
Cornea - Oedematous and insensitive.
Anterior chamber - Very shallow.
Angle of anterior chamber completely closed.
Iris - discoloured.
Pupil - Semi-dilated, non-reactive to both light and accommodation.
IOP - Elevated (between 40 and 70mmHg).
Optic disc - Oedematous and hyperaemic.

Management : It is a serious ocular emergency condition and needs to be managed as below.

1. Immediate medical therapy to lower IOP.
2. Definitive treatment like laser peripheral iridotomy (PI), laser iridotomy or filtration surgery.
3. Prophylaxis of the fellow eye - prophylactic laser iridotomy or surgical peripheral iridectomy should be performed on asymptomatic eye.

3. **Chronic primary angle closure glaucoma**

Clinical features:
IOP - Constantly raised
Eyeball - Painless without congestion
Optic disc - Glaucomatous cupping
Visual field defects - Similar to POAG
Gonioscopy reveals more than 270° of angle closure along with peripheral anterior synechiae.

Treatment:

1. Medical therapy similar to POAG
2. Laser iridotomy
3. Trabeculectomy
4. Prophylactic laser iridotomy in the fellow eye.

**Tear film:**

Tear film consists of three layers, which from posterior to anterior are:
Mucus layer - It consists of mucin, secreted by conjunctival goblet cells and glands of Manz. It helps in lubrication and in converting hydrophobic corneal epithelium into hydrophilic one.
Aqueous layer - It is secreted by main and accessory lacrimal glands, The tears mainly comprise of water, electrolytes, dissolved mucins, and proteins. It also contains antibacterial substances like lysozyme and lactoferrin,
Lipid layer - It is the outermost layer of the tear film, formed from the secretions of meibomian, zeis and moll glands. It prevents evaporation of the aqueous layer, maintains tear film thickness, and lubricates the eye lids as they slide over the surface of the globe.

**Dry eye:**

Definition:
A disorder of the tear film due to tear deficiency or excessive evaporation, which causes damage to the interpalpebral ocular surface and is associated with symptoms of ocular discomfort.

Clinical features:
Symptoms:
Dryness, foreign body sensation, itching and burning sensation that characteristically worsens during the day.

Signs:
Posterior blepharitis and meibomian gland dysfunction may be present.
Conjunctiva shows mild keratinization and redness.
Tear film - May show stingy mucous and particulate matter. Marginal tear strip is reduced or absent. (normal height is 1mm).
Cornea - Punctate epithelium erosions, filaments, and mucous plaques. Cornea may lose luster.
Signs of the causative disease such as Trachoma, Stevens Johnson syndrome, Lagophthalmos etc.

Investigations:
The aim of the investigation is to quantify the diagnosis of dry eye.
The tests measures the following parameters.
T-BUT (Tear Break Up Time) – for testing stability of tear.
Schirmer, fluorescein clearance and tear osmolarity – For knowing tear production.
Rose Bengal staining - For detecting even mild cases of KCS (Kerato Conjunctivitis Sicca).

Treatment:
Dry eye is not curable. The following treatment modalities is being advised.
Patient should be educated against exposure to causative factors such as dry environment or toxic drugs etc.
Tear substitutes - Cellulose derivatives, carbomers, polyvinyl alcohol, petrolatum mineral oil in the form of drops, gels, and ointments.
Mucolytics - Such as acetylcysteine 5% drops.
Punctual occlusion - To reduce drainage and preserve natural tears.
Treatment of causative disease such as lagophthalmos, posterior blepharitis etc.

# DRISHTIGATA ROGA (VISION DISORDERS)

## 1. Number of Drishtigata rogas detailed knowledge of - etiology, pathology, clinical features, differential diagnosis, and management of Timira, Kaacha and Linga nasha.

**Classification of drishtigata roga:**

| Sushruta – 12 | Vagbhata - 27 |
|---|---|
| 1. Vataja timira | 1 – 6. Six types of timira |
| 2. Pittaja timira | 7 – 12. Six types of kaacha |
| 3. Kaphaja timira | 13 – 18. Six types of linganasha |
| 4. Raktaja timira | 19. Pitta vidagdha drishti |
| 5. Sannipataja timira | 20. Amla vidagdha drishti |
| 6. Parimlayi timira | 21. Ushna vidagdha drishti |
| 7. Pitta vidagdha drishti | 22. Doshaandhya |
| 8. Kapha vidagdha drishti | 23. Dhooma darshi |
| 9. Dhooma vidagdha drishti | 24. Hrishwa jadhya |
| 10. Hrishwajaadhya | 25. Nakulaandhya |
| 11. Nakulaandhya | 26. Gambheerika |
| 12. Gambheerika | 27. Aupasargika linganasha |

In addition to these, Acharya sushruta has mentioned Animittaja and sanimittaja linganasha.

**Timira, kaacha and linganasha:**

'Timira' literally means darkness.

Timira, kaacha and linganasha can be considered as progressive stages of a disease where there will be distorted vision which eventually ends up in complete loss of vision.

| Stages | Sushruta | Vagbhata | Modern |
|---|---|---|---|
| 1. Timira | Vitiation of doshas in I, II, and III patala (no ragata). | Vitiation of doshas in I and II patalas. | Partial obstruction of vision. |
| 2. Kaacha | Vitiation of doshas and pigmentation (ragata) in III patala | Vitiation of doshas and pigmentation (ragata) in III patala | Moderate obstruction of vision |
| 3. Linganasha | Vitiation of dosha in IV patala | Vitiation of dosha in IV patala | Complete obstruction of vision |

The clinical features of timira are dependent upon the site of lodging of vitiated doshas in the patala. (for e.g. Vitiation of doshas in second patala means first patala and second patala are involved similarly involvement of fourth patala indicates vitiation of all the four patalas).

**Prathama patalagata dosha lakshana:**

In this condition, the vitiated doshas spreads within the siras and get confined to the prathama patala of the drishti causing blurriness of vision.

According to vagbhata:
The vitiated vatadi doshas gets localized in the first patala of the eye through their respective siras. In this condition the person will not be able to see the objects clearly, but sometimes without any reason he starts viewing objects clearly.

Probable correlation: first stage of cataract / refractive errors like myopia.

**Dwitiya patala gata dosha lakshana:**
When doshas gets localized in the second patala, the vision gets distorted and patient starts visualizing objects which are not present such as mosquitoes, hair, webs, rounded objects, flags, different types of rays, ear rings, moving objects like meteors or stars, rain, clouds, and darkness. The real objects look unreal, far off objects appear nearer and near objects appear far. Like this there will be confusion in seeing the objects and one is unable to see the hole of a needle even after much effort.

According to vagbhata:
If the doshas get localized in the second patala, existent and non-existent objects are seen, Objects present near are seen only with effort and distant small objects cannot be seen. Distant objects are seen as near and vice versa.
Visual defects are also based on the localization of doshas-

- If the doshas localized in circular manner in the drishti - Objects appear circular.
- If the doshas are localized in the middle of the drishti - Single object is seen as double.
- If the doshas are localized in multiple areas of the drishti - Single object appear as many.
- If the doshas are localized inside the drishti - Small objects appear big and vice versa.
- If the doshas are localized in the lower part of the drishti - Near objects cannot be seen.
- If the doshas are localized in the upper part of drishti - Distant objects cannot be seen.
- If the doshas are localized in the sides of the drishti - Objects in the periphery cannot be seen.

The disease with above symptoms is called Timira.

Note: Dwitiya patalagata dosha lakshanas mentioned by Vagbhata is similar to Triteeya patalagata dosha lakshanas mentioned by Sushruta.

Probable correlation: Cataract/ Refractive errors/ Vitreous Opacity

**Triteeya patala gata dosha lakshana:**
If the doshas get localized in the third patala,

- Objects placed above can be seen but, cannot see the objects placed below.
- Big objects are seen as though covered with cloth.
- Visualizes a person without ear, nose, or eyes.
- The doshas gets aggravated and the colour of the drishti changes depending on the involved dosha.

Based on the localization of doshas the following features of drishti is seen

- If the doshas are localized in the lower part of drishti - Near objects cannot be seen.
- If the doshas are localized in the upper part of drishti - Distant objects cannot be seen.
- If the doshas are localized in the sides of the drishti - Objects in the periphery cannot be seen.
- If the doshas are localized in all the sides of drishti - Mixed visualization (over lapping).
- If the doshas are localized in the centre of drishti – Single object is seen as double.
- If the doshas are localized in two places of drishti - Single object is seen as three.
- If the doshas are unstable - Many objects are seen.

The disease with the above symptoms is called as Timira.

According to vagbhata:
When doshas reach the third patala, drishti attains colour and this condition is called Kaacha.

- The person cannot visualize the objects placed below and hence looks upwards.
- Objects are visualized as though covered by a thin cloth.
- The drishti attains its colour depending on the involved dosha.
- The visual capacity reduces depending on the intensity of vitiated doshas.

Probable correlation : This stage can be correlated to immature cataract.

**Chatura patala gata dosha lakshana:**
'Linga' means Chakshurendriya shakti - Visual capacity.
Linganasha is loss of vision.
When the doshas enter the fourth patala and obstructs the vision completely, it is called as 'Linganasha.' In this stage, one perceives only darkness. But if the condition is not so aggravated or grave, the patient can visualize moon, sun, star, sky, lightening, burning and glowing objects. Linganasha is also called as Nilika or Kaacha.

According to vagbhata:
If this stage of third patala (kaacha) is ignored, the vitiated doshas enters and gets localized in the fourth patala causing complete covering of the drishti mandala leading to linganasha (blindness).

Probable correlation : Mature cataract

**Vataja timira, kaacha and linga nasha:**
In Vataja timira patient sees the objects as curved/distorted, moving, dirty, slightly reddish, and visualizes webs, hairs, mosquitoes, and rays of light but intermittently gets clear vision.
Vataja Kaacha: If the above stage is neglected, it leads to condition called kaacha. In this the drishti will be red in colour and visualizes the face without nose. The patient also sees scattered light of moon and lamp etc. (coloured hallows). The curved objects look straight and vice versa.

Vataja Linganasha: The stage of kaacha further advances and leads to drishti being covered with smoke and dust. Drishti appears bright red in colour and may be either big Or small. This further leads to complete loss of vision and this condition is known as linganasha.

**Pittaja timira, kaacha and linga nasha:**

In Pittaja timira, patient falsely visualizes flashes of sunlight, lightening, glow of worm and spark of fire. The objects appear deep blue in colour like the feather of the peacock or titira.
In Pittaja kaacha, the drishti appears light blue and hence, visualizes objects also in the same colour. Sun, moon, fire, mirage, and rainbow is viewed as surrounded by haloes.
In Pittaja linganasha, the drishti is unctuous, blue in colour similar to the colour of honey bee or yellowish like bell metal. In this there will be loss of vision.

**Kaphaja timira, kaacha and linga nasha:**

In Kaphaja timira the objects are viewed as white and unctuous, like a conch shell, moon, flower of kunda or petals of kumuda. Even if the sky is clear (cloudless), patient sees as though the clouds are moving.
In Kaphaja kaacha the objects appear lustreless like covered moon, sun etc. Drishti appears white in colour.
In Kaphaja linganasha
The drishti is solid, unctuous and appears white like conch shell, flower of kunda, moon, kumuda (lily) or alum.
The drishti is not stable like a drop of water placed on lotus leaf
Drishti constricts in bright light and dilates in dim light.
There will be loss of vision.

**Raktaja timira, kaacha and linga nasha:**

Raktaja timira - A patient of raktaja timira views all objects as red, green, dark, or as though covered with black smoke.
Raktaja kaacha - Drishti appears red or black and the person views all the objects as red or black.
Raktaja linganasha - In this, the colour of the drishti further changes to the colour of coral, petals of red lotus or black, It is lustreless and the patient is unable to see anything.

**Samsargaja and sannipataja timira, kaacha and linga nasha:**

When there is vitiation of doshas in combination of two or three, then the lakshanas of combined doshas are seen in timira, kaacha and linganasha.
A patient of sannipataja timira views objects,
In different colours
one object as many
As though spread all around
Double vision all around
Views objects more or less than the normal
Flashes of light.
Vision sometimes becomes clear and sometimes hazy without any reason.

In kaacha and linganasha, various kinds of colours appear in the drishti due to the vitiation of tridoshas.

**Parimlaayi (Eale's disease / cataract):**

It is a Pittaja Yapya Vyadhi

Parimlayi is caused when vitiated Pitta combines with Rakta tejas.

The patient visualizes yellow colour in all direction like the rising sun and flashes of light similar to firefly or other shining objects glittering in tree.

Further, drishti appears thick and fire like. It may also appear as light blue circular band.

When the doshas subside, the patient visualizes clearly .

**Sadhyasadhyata of drishtigata roga:**

| | Sushruta | Vagbhata |
|---|---|---|
| Sadhya | 6 types of timira<br>Kaphaja linga nasha<br>Dhoomadarshi<br>Pitta vidagdha drishti<br>Kapha vidagdha drishti | 6 types of timira<br>Kaphaja linga nasha<br>Dhoomara<br>Pitta vidagdha drishti<br>Ushna vidagdha drishti<br>Amla vidagdha<br>Dosha andhya |
| Yapya | 6 types of kaacha | 6 types of kaacha<br>Nakula andhya |
| Asadhya | 5 types of linga nasha<br>Gambheerika<br>Nakula andhya | 5 types of linga nasha<br>Gambheera<br>Hrishwa jadya<br>Aupasargika linganasha |

Rogas in the first and second patala is Sadhya.

Third patalagata is Yapya.

Fourth patalagata is Asadhya except Kaphaja linganasha.

**Samanya chikitsa for timira:**

Based on the predominance of dosha, the following chikitsa can be adopted.

| Vagbhata | Sushruta |
|---|---|
| Snehapana<br>Raktamokshana<br>Virechana<br>Nasya<br>Anjana<br>Shiro basti<br>Basti kriya<br>Tarpana<br>Lepa<br>Seka | Samshodhana<br>Raktamokshana<br>Virechana<br>Samshamana Nasya<br>Putapaka<br>Anjana<br>Dhooma<br>Tarpana |

For pana - Purana ghrita or triphala ghrita
Raktamokshana should be done in prathama and dwitiya patalagata timira.
Virechana - Ghrita prepared out of dashamoola yukta triphala kalka, triphala panchamoola kwatha, dugdha and eranda taila.
In Timira - Nasya, tarpana etc. kriyakalpas should be done depending on the predominant dosha as in abhishyanda.
Niruha and Anuvasana basti as mentioned in Vataja peenasa roga.

Triphala prayoga in timira:
Triphala churna + Tila taila → Vataja timira
Triphala churna + Ghrita → Pittaja timira
Triphala churna + Madhu → Kaphaja timira

**Vataja timira chikitsa:**
Shodhana: Eranda taila with milk is given for 'Virechana.
Nasya: Jeevantyadi taila (Vagbhata).
Putapaka: Saindhava, ghrita, honey mixed with flesh of vulture, deer etc.
Anjana: Vasadhyanjana (vasa of vulture, snake, cock mixed with madhuyashti)

**Vataja kaacha chikitsa:**
Anjana: Srotonjana is kept in the mouth of krishnasarpa tied with kusha grass and kept for 1 month. Then the srotonjana is removed and mixed with equal quantity of saindhava and jati kusuma.
Tarpana: shatahavadi ghrita (Shatahava, kushta, jatamamsi, kakoli dwaya, yashti, prapoundarika, sarala, pippali and devadaru along with ghrita and ksheera).
Putapaka: Prasadana and snehana putapaka.

**Pittaja timira chikitsa:**
Shodhana: Virechana with triphala ghrita
Nasya: Nasya with kakolyadi ghrita (madhuroushadhi siddha ghrita).
Tarpana: Tarpana with madhuroushadhi siddha ghrita (kakolyadi ghrita).
Putapaka: The above ghrita along with mamsa.
Siravyadha: To be done after snehapana,
Virechana: With sharkara, ela, trivrit churna and honey.
Seka and lepa: With Sheetala dravyas is done on netra, mukha and Shiras.
Anjana: Prepared out of sariva, padmaka, ushira, mukta, lodhra and chandana.
Rasakriyanjana: Rasanjana, kshaudra, sita, manahshila and yashti.
Pratyanjana: Rasanjana/sauveeranjana with equal quantity of tuttha.

**Pittaja kaacha chikitsa:**
Anjana: Meshashrunga and sauveeranjana to be mixed with srotoanjana or rasanjana in equal quantity.
Rasakriyanjana: Swarasa of Palasha pushpa, rohita, madhuka pushpa is mixed with supernatant part of madira and madhu.

**Kaphaja timira chikitsa:**

Snehapana: With ghrita prepared from guduchi, triphala and pippali

Siravyadha

Virechana : With pooga, abhaya, shunthi, krishna, nishotha and danti beeja kashaya

Nasya: Goshakrut siddha taila.

Taila prepared from ushira, lodhra, triphala and priyangu.

Dhoomapana: With vidanga, pata, apamarga and ingudi.

Tarpana: With ghrita prepared out of ksheeri vruksha kashaya, haridra and nalada kalka.

Putapaka: With Jangala mamsa, pippali, madhu, saindhava lavana.

Anjana

a. Kokilavarti anjana : krishna loha bhasma, trikatu, triphala, saindhava, rasanjana.
b. Vimalavarti anjana: shankha, priyangu, manahshila, triphala, trikatu.
c. Rasakriyanjana:

- Manahshila, trikatu, shankha bhasma, madhu, saindhava, kaseesa and rasanjana.
- Kaseesa, rasanjana, shunthi, guda.

**Sannipataja timira chikitsa:**

Depending on the predominance of dosha

- Tarpana
- Putapaka
- Nasya

Anjana should be performed

Anjana yogas in Sannipataja timira-

a. Anjana prepared out of bone marrow of nocturnal animals, flowers of mesha shringi, sroto anjana, yashtimadhu.
b. Anjana with ushira, pippali, saindhava, ghrita and madhu.

**Raktaja and parimlaayi timira chikitsa:**

Pittaja timira nashaka nasya, tarpana, putapaka etc is indicated.

Sira mokshana is contraindicated in Kaacha.

**Linganasha chikitsa:**

- Vataja linganasha : Asadhya
- Pittaja linganasha : Asadhya
- Kaphaja linganasha: Shastra sadhya

**Shastra karma for kaphaja linga nasha:**

Indications for Shastra Karma:

In Kaphaja linganasha, Shastrakarma can be done if :

The drishti is not semilunar, sweat drop or pearl shaped.

The drishti is instable, irregular, thin at the centre, striated or shining excessively.

Drishti is not painful or red in colour.

Vagbhata has advised surgery - when linganasha is completely formed (ghani bhuta) or when, there is, complete loss of vision and not associated with any complications.

Contra indications for shastra karma:
The patients not suitable for Siravyadha are contraindicated for shastrakarma.

Purvakarma:
Shastrakarma is carried out on an auspicious day in a room devoid of heat or cold.
Patient should undergo snehana and swedana procedures.

Pradhana karma:
The patient is made to sit comfortably on chair and an attender should hold his head firmly.
The surgeon should open the eyes of the patient wide and ask the patient to look towards his nose and confidently hold Yavakriti Shalaka with thumb, middle and index finger of his right hand.
Incision and Puncturing should be made near the outer canthus leaving two-third part of sclera from the cornea in a place devoid of blood vessels (daivikruta chidra).
The proper puncturing (vyadha) is characterized by production of a typical sound and outflow of drop of al liquid (vari bindu).
Once the proper puncturing is done, eye should be irrigated with human milk.
Swedana with vataghna leaves should be given from outside the eye by firmly holding the Shalaka in position.
Then drishti mandala is properly scrapped (lekhana) with the tip of the Shalaka.
Even after scrapping if the dosha (kapha) remains, patient is asked to blow closing the opposite nostril to expel the accumulated kapha.

Paschat karma:
Then ghrita is applied to the eyes and bandaged.
Later the patient is made to lie in supine position in a room devoid of dust, smoke, wind, sunlight.
Patient is advised not to belch, cough, sneeze, spit, or shiver.
Regimens like ahara, vihara as explained in snehapana vidhi should be followed.
Every third day eyewash (prakshalana) should be done with kashaya prepared from vataghna dravyas to avoid aggravation of vata.
After three days, mrudu swedana should be done externally.
All the above regimens should be followed for ten days.
Later on nasya, tarpana, laghu anna, shirobasti etc. should be followed for improving drishti.

**Samyak siddhi lakshana:**
The drishti becomes clear similar to the Sun in a cloudless sky.
Pain and discomfort gets relieved.

Complications of surgery:
Redness, swelling, pain, blood mixed discharge, adhimantha and loss of vision.

Pathya in timira:
Jeevanti shaka, tanduliyaka, vara vastuka, kshetra vastuka, bala mulaka, pakshi mamsa, jangala mamsa, patola, karkotaka, karavella, vartaka, arani (agnimantha), shigru, nila, sahachara along with ghee.

Special measures for preventing timira:
Daily, early morning sprinkle the eyes by filling the mouth with water.
Rub the palms and place it over the eyes immediately after having meals.

## 2. Brief Knowledge of Abhighataja lingnasha, sanimittaja & Annimittaja Lingnasha Doshandhya/Kaphavidagdha drishti, Naktandhya, Ushna vidagdha drishti, Pittavidagdha drishti, Dhumadarshi, Hriswajadya, Gambhirika, Nakulandhya, Nayanabhighata.

Drishtigata rogas are 12 in number. Apart from these, two more drishti gata rogas are being mentioned.
They are called 'Bahya Linganasha' because they are caused due to external factors & not due to vitiation of the dosha.
Based on the known & unknown etiology they are classified into 2 types as:

1. Sanimittaja
2. Animittaja

Both are said to be Asadhya

1. Sanimittaja linga nasha (with specific cause):

In this the cause of vision loss is well known. Various types of head injuries, ocular trauma, polluted air etc. (Dalhana) cause Signs and symptoms as seen in Abhishyanda and finally leads to complete loss of vision.

2. Animittaja linga nasha (without specific cause):

Since there is no specific cause, loss of vision is attributed to.
Gods, sages, gandharva, large snakes
Glittering objects/solar or lunar eclipse.
In this condition, in spite of the drishti being clear and transparent like the colour of vaidurya (as there will be no accumulation of malas) there will be loss of vision.
Probable correlation: Amaurosis - In this condition there will be loss of vision but no signs will be seen on examination.

**Aupasargika linga nasha:**
Aupasargika linganasha is considered as Bahya linga nasha by Vagbhata and is said to be Asadhya.

When weak minded individuals are exposed to bright, luminous objects or bright sunlight, vatadi doshas get localized in the eye and dries up the pitta resulting in complete loss of vision. But, the drishti mandala appears clear (like vaidurya), stable and painless.

**Doshandhya (Raatrandhya):**
Doshandya is a condition in which the doshas scatters and covers the drishti during night causing obstruction of vision. But during daytime, the rays of sunlight liquifies the accumulated doshas in the drishti, enabling the person to see clearly.

Chikitsa:
Karanjadi varti - Varti prepared out of karanja, utpala, swarna gairika, ambhoja.
Varti prepared out of trikatu, triphala, ela, manahshila, samudraphena triturated with goat's milk.
Yakrit Pippali Anjana:
Pippali is placed in liver of goat and cooked in putapaka method,
Then it is dried and powdered. This powder is triturated with madhu and used as anjana.
It is considered as the best anjana for naktandhya.
Probable correlation: Night blindness as in vitamin A deficiency, Cortical Cataract, Retinitis pigmentosa etc.

**Kapha vidagdha drishti:**
It is a Kaphaja Sadhya Vyadhi.
Kapha vidagdha drishti is a condition in which the vitiated kapha gets localized in drishti and makes it appear white. The patient perceives all objects in white colour.
When dosha invades all the three patalas - the patient is unable to view objects at night. But during day, due to the sunlight the kapha depletes and restores some amount of vision.

Chikitsa:
Kaphaja abhishyandahara chikitsa like nasya, seka, anjana, putapaka, and tarpana. Vamana, virechana is also advised.
Internally trivrit ghrita, tilvaka ghrita or purana ghrita.

Anjana yogas:
Anjana prepared out of sroto anjana, saindhava, pippali, renuka and aja mutra.
Manahshila, abhaya, trikatu, bala, tagara, samudraphena with goat's milk.
Spleen and liver of goat cooked using ghee and taira is used internally. The same is mixed with sarshapa taila & used as anjana.
Probable correlation: Night blindness / Retinitis pigmentosa

**Naktandhya:**
Acharya Dalhana has quoted that sage Videha has mentioned Naktandhya as a condition causing loss of vision at night in diseases like Hrishwa jadya, Nakuladhya, Kaphavidagdha drishti etc. Among these Hrishwa jadya and Nakulaandhya are said to be Asadhya.

**Ushna vidagdha drishti:**
According to Vagbhata:
If a person gets immersed in cold water immediately after exposure to sunlight, all the three doshas along with rakta gets vitiated and produces ushma. The ushma thus generated moves upwards and gets localized in netra causing symptoms such as:
Severe burning sensation
Muddy discolouration of sclera (shuklabhaga)
Patient is unable to view objects early during day
Night blindness

**Pitta vidagdha drishti:**
It is Pittaja Sadhya Vyadhi
Pitta vidagdha drishti is a condition in which the vitiated pitta gets localized in drishti and makes it yellow. The patient perceives all objects yellow in colour.
If dosha localizes in the third patala - No vision during day but can see objects at night. This is because pitta decreases at night due to the effect of Sheeta guna.

According to Vagbhata:
Peeta - yellow (both drishti and darshana becomes yellow)
The features of Pitta vidagdha drishti are:
The patient perceives all objects as yellow.
The drishti appears yellow.

Chikitsa:
Pitta abhishyandahara chikitsa like nasya, seka, anjana, putapaka, and tarpana.
Internally triphala ghrita, tilvaka ghrita and purana ghrita.

Anjana yogas:
Anjana prepared out of rasanjana, jati patra rasa, kshaudra, talisa, swarna gairika and go shakrit.
Anjana prepared out of kashmari, gambhari pushpa, yashti madhu, daru haridra, lodhra, rasanjana and honey.
Anjana prepared out of saindhava, mudga, trikatu, sauveeranjana, manahshila, haridra, daru haridra and rakta chandana.

Probable correlation: Day blindness (Hemeralopia) / Central cataract
Siravyadha is contraindicated in pitta and kapha vidagdha drishti

**Amla vidagdha drishti:**
It is an Aushadha Sadhya Vyadhi.
The disease in which excess intake of sour substances, vitiates tridoshas and rakta leading, to dirty discharge, itching in the eyes and blurriness of vision is known as Amla vidagdha drishti.

Chikitsa:
Similar to Pitta vidagdha drishti.

**Dhooma darshi:**
It is Pittaja Sadhya Vyadhi.
In Dhoomadarshi, the drishti gets vitiated due to grief, fever, excessive exhaustion, or headache leading to smoky vision i.e. all objects are seen as though covered with smoke.

According to vagbhata it is called 'Dhoomara':
Vatadi doshas gets vitiated in person suffering from grief, fever, or diseases of head. Due to this, vision will be blurred as though covered with smoke. This condition is called as Dhoomara.

Chikitsa:
Since it is a Pittaja roga, it should be treated simitar to Pittaja / Raktaja Abhishyanda, Pittaja visarpa and Pittaja vidagdha drishti.
Purana ghrita pana.
Snigdha Virechana.
Alepa with paste of Sheeta veerya dravya,
Anjana with:

1. Go shakrit rasa, ksheera and ghrita.
2. Rasakriya prepared with swarna gairika and taleesa churna.

Nasya using ghrita prepared with meda, ananta, manjishta, darvi, yashti, go ksheera and tila taila.
Tarpana using the above ghee or go ghrita.
If there is no response to the above treatment Siravyadha is advised.

Probable correlation: Smoky vision is a symptom seen in conditions like refractive errors, glaucoma, or early cataract.

**Hrishwa jadya:**
It is Pittaja Asadhya Vyadhi
It is a condition in which -
There will be difficulty in day vision.
Objects appear smaller in size.

According to vagbhata:
In this condition the eye becomes small due to the vitiation of pitta and hence all the objects appears smaller.
Probable correlation: Refractive errors, Choroiditis

**Gambheerika:**
"Gambheera" denotes deep. In this the eyeball is pulled inwards.
It is Vataja Asadhya Vyadhi.

The disease in Which the eyes get shrunken, disfigured, pulled inwards and associated with severe pain due to the vitiation of vata is called Gambheerika.

Acharya vagbhata names it as Gambheera.
The vitiated vata dosha constricts the siras of drishti & pulls the drishti mandala inwards.
This condition is called Gambheera.
Probable correlation: Phthisis bulbi / Endophthalmitis.
Phthisis bulbi is a small, shrunken, non-functional eye.

**Nakulandhya:**
It is a Sannipataja Asadhya Vyadhi.
The word ‘Nakula’ is indicative of shining and glowing appearance of the eyes of mongoose.

Nakulandhya is a condition in which tridoshas get vitiated in drishti mandala causing glittering of eyes like that of mongoose. Here objects are perceived in various colours during day time.

According to vagbhata:
The condition in which vitiated doshas make the drishti to shine like that of a mongoose is called as Nakulandhya. Duc to the vitiation of tridoshas in the drishti, the patient perceives various colours during day and cannot see anything at night.

Acharya charaka has named it as kapotandhya.

Chikitsa:
Though Sushruta considered Nakulandhya as Asadhya vyadhi, Vagbhata has included it under Yapya vyadhi.
Vagbhata has advised to follow Tridoshaja timira chikitsa.

Anjana yogas:
Rasakriya anjana prepared using ghrita, kshaudra, gomaya swarasa, tarkshya, gairika and talisapatra.
Anjana prepared by triturating maricha and dadhi.
Probable correlation: Night blindness / Colour blindness

Ocular diseases disturbing vision:
These are the ocular diseases disturbing vision.

| Sushruta | Vagbhata |
|---|---|
| 1. Pitta vidagdha drishti<br>2. Shleshma vidagdha drishti<br>3. Dhumadarshi<br>4. Hriswa jadya<br>5. Nakulandhya<br>6. Gambhirika | 1. Pitta vidagdha<br>2. Ushna vidagdha<br>3. Amla vidagdha<br>4. Dhumara<br>5. Hrishwaja<br>6. Nakulandhya<br>7. Gambhira<br>8. Doshandhya |

**Nayanabhighata (Ocular injuries and their management in Ayurveda):**
The eye is a sensitive organ exposed to the external environment and is more prone to injuries. It is well protected by a hard bony cavity called the orbit. The eyelids, eyelashes and eyebrows protect it from external factors like dust and sunlight. The soft tissues in the eyeball acts like a cushion and protects it from injuries.

Injury to the eye occurs by various means and this results in severe pain, swelling and redness of the eyes.

Causes of ocular injury:
The causes of ocular injuries mentioned by Acharya Videha are as follows:

- Application of teekshna anjana on already strained eyes.
- Exposure to wind, heat, smoke, dust etc.
- Insect bite.
- Eye getting injured due to water sports (swimming against water flow, diving etc).
- Keeping awake at night.
- Excessive fasting, straining, tiredness, fearfulness.
- Weak eyes visualizing sun, fire, lunar eclipse, stars and moving objects continuously.

All the above factors produce redness, burning, pricking sensation, swelling, inflammation, foreign body sensation and other different types of pain in the eyes.

**Traumatic wounds:**
Sushruta mentions 6 types of Vrana or traumatic wounds. They are— l. Chinna 2. Bhinna 3. Viddha 4. Kshata 5. Picchita and 6. Ghrishta. In these conditions Sadyovranahara chikitsa is indicated.

**Displacement of the eye ball:**
Injury or a hard blow can either push the eyes outwards (vilambita netra) or inwards (ati pravishta netra).

Chikitsa (Sushruta):
Treatment of Ati pravishta netra (pushed inwards) is done by:

- Holding the breath (Praanoparodha).
- Inducing vomit (Vamana).
- By sneezing (Kshuta).
- Throttling (Kantha rodha).

Treatment of Vilambita Netra (protruded) is done by:
Placing the eyes in original position (Purasthat)
Deep inspiration (Uchinganam).
Pouring of cold water over the head (Shirase vaari avasechanam).

General line of treatment in ocular injuries:
In ocular injuries the treatment to be adopted are:
Nasya and Tarpana - with ghrita prepared from aja ghrita, goghrita, madhuka, utpala, jeevaka and rishabhaka
Mukha lepa with madhura, sheetala dravyas.
Netra parisheka - lodhra, yashtimadhu, ajaksheera.
Snigdha, sheeta and madhura aushadhis as indicated in kshataja and pittaja shoola (abhishyanda).
The injuries caused by sweda, agni, dhuma, bhaya, shoka, ruja and abhighata are treated accordingly on similar lines.

**Foreign body removal in ayurveda:**
Foreign bodies in the eye causes watering, redness, and difficulty in blinking. The eyelid should be everted and foreign body can be removed by adopting any of the following method alone or in combination.
Parisechana: Pouring stream of water or kashaya.
Adhmapana: Blowing of air.
Parimarjana: Cleaning or removing the foreign body with piece of cotton / cloth, hair, or tip of tongue.
Lekhana: Scrapping is done in case of small embedded foreign particles.

Sadhyasadhyata of nayanabhighata:
The ocular injuries are said to be sadhya if:

- The eye ball is situated in its proper position (yatha sthitha).
- The vision is clear (anavila darshana).

The conditions which are said to be Yapya are:

- Crushed eyes (picchita nayana).
- Deeply seated eyes (ati avasanna).
- Laxed eyes (srasta).
- Loss of vision(hata druk).
- Mild congestion (tanu raga).
- Dislocated eyes (chyuta).
- Dilated pupil (Visteerna drishti).
- Blurred vision (asat pradarshi).

Based on involvement of Patalas:
Sadhya - If one patala is injured
Kruchrasadhya - If two patalas are injured
Asadhya - If three patalas are injured.

## 3. Knowledge of Refractive errors, Cataract including their etiology, pathology, clinical features, differential diagnosis, complications, and their management.

**Error of refraction:**
**Emmetropia:**
When parallel rays of light from infinity come to focus on the retina with accommodation at rest, the condition is called emmetropia (normal refraction).
In the emmetropic (normally refracted) eye, entering light rays are focused on the retina by the cornea and the lens. During accommodation, the ciliary muscles adjust the shape of the lens so as to properly focus images onto the retina.

Accommodation: The process by which the ciliary muscles change the focal length of an eye lens to focus distant or near objects on the retina is called accommodation.

**Ametropia:**
When parallel rays of light from infinity do not come to a focus upon the retina with the accommodation at rest, is known as ametropia.

Causes of ametropia:

1. Abnormal length of the eye ball - Change in the axial length of the eye ball is the most important cause of ametropia. Too long or too short lengths of the globe result in myopia or hyperopia respectively.
2. Abnormal curvature of cornea and the lens - Too much or too less curvatures of cornea or lens cause myopia and hyperopia respectively.
3. Abnormal refractive indices of the media - Increase in the indices of the refractive media (cornea, aqueous and lens) result while the opposite condition leads to hyperopia.
4. Abnormal position of the lens - Forward displacement of the lens leads to myopia and backward displacement leads to hyperopia.

Types of errors of refraction:
Myopia or short sightedness
Hyperopia or long sightedness and
Astigmatism

**Myopia:**
Myopia is a type of refractive error in which parallel rays of light from infinity comes to a focus in front of the retina when accommodation is at rest.

Etiology:
Increased antero - posterior length of the eye ball (Axial myopia).
Increased curvature of cornea or lens or both (Curvature myopia).
Anterior displacement of crystalline lens (Positional myopia).
Increased refractive index of crystalline lens due to senile nuclear sclerosis (Index myopia).

Types of Myopia:
Developmental myopia: It is rare and is characterized by an abnormally long eyeball at birth.
Simple myopia: It is the most common type of myopia which progresses during childhood and adolescence. It generally stops to progress by the age of 21 years.
Pathological myopia: It is essentially a progressive or degenerative condition which manifests in early childhood. The refractive error rapidly increases during period of active growth and may reach 20 to 30 (Diopters) by the age of 25.

Clinical features:
Inability to see distant objects clearly.
Eye strain, headache
Occasionally floaters and flashes of light seen.
Eyes are prominent with slightly dilated pupils in pathological myopia.
Deep anterior chamber.
Ophthalmoscopy reveals vitreous degeneration and opacities, a big optic disc with myopic crescent.
A highly myopic eye is prone to develop retinal hemorrhage due to vitreous detachment and lattice degeneration leading to detachment of retina.

Treatment:
Optical treatment: Prescription of appropriate concave, lenses.

Surgical correction:
Radial Keratotomy (RK) - In this technique, a central corneal optical zone (3 - 4mm) is spared and 8 or 16 radial corneal incisions are placed.
Photo Refractive Keratectomy (PRK) - Ablates the central anterior corneal stroma with the help of excimer laser to reduce the corneal curvature.
Laser in situ keratomileusis (LASIK) - It is an effective technique for the correction of myopia between 1 and 9 D. A laser refractive the corneal stroma is performed using an excimer laser.
Phakic lens implantation - Involves placement of an anterior chamber lens.
Removal of crystalline lens - Corrects high axial myopia of about 21D.

**Hyperopia (Hypermetropia):**
Hyperopia is an error of refraction wherein parallel rays of light from infinity come to a focus behind the retina when accommodation is at rest.

Etiology:
1. Axial hyperopia: In this the antero-posterior length of the globe is shorter than normal.
2. Curvature hyperopia: In this the curvature of the cornea or lens is flatter than normal.
3. Index hyperopia: A decrease in the refractive index of the lens.
4. Posterior dislocation of the lens: Backward dislocation of the lens.
5. Aphakia (absence of lens) is an example of high degree hyperopia.

Types:
Simple hypermetropia: It includes axial and curvatural hypermetropia. It occurs due to the normal biological variations in the development of eye ball.
Pathological hypermetropia: It includes index hypermetropia (due to acquired cortical sclerosis), positional hypermetropia (due to posterior subluxation of lens), aphakia (absence of lens) and consecutive hypermetropia (due to surgically over corrected myopia).
Functional hypermetropia: Occurs due to paralysis of accommodation as seen in third nerve paralysis.

Clinical features:
Blurring of vision for distance as well as for nearby.
Asthenopic symptoms such as eye strain and headache.
The axial length of the eye ball is usually smaller than normal.
The diameter of the cornea is reduced and the anterior chamber is often more shallow than usual.

Treatment:
Optical treatment: Hyperopia with asthenopia is corrected by prescribing convex lenses.

Surgical correction:
Laser thermal keratoplasty (LTK) - In this holmium laser is used to reshape the cornea.
LASIK - It steepens the central cornea and is used to correct hyperopia upto 4D.
Refractive lensectomy
Conductive keratoplasty: It is a non-laser procedure that flattens the peripheral cornea and steepens central cornea. It is recommended for treatment of mild to moderate hyperopia between +0.75 and +3D.

**Astigmatism:**
Astigmatism is that condition in which the refraction varies in different meridians of the eye. Hence a point of focus cannot be formed upon the retina.

Etiology:

Curvature astigmatism: It is the most common and is caused by abnormalities in the curvature of the cornea
Index astigmatism: A small amount of astigmatism occurs due to inequalities in the refractive index of different sectors of the lens.

Types:
Astigmatism is divided into two categories-

1. Regular
2. Irregular

**1. Regular Astigmatism:**

Astigmatism is said to be regular when the refractive power changes uniformly from one meridian to another (i.e. there are two principal meridians). They are classified into the following types:
Simple astigmatism: Where one of the principal meridians is emmetropic and the other is either hyperopic or myopic.
Compound astigmatism: Where both the principal meridians are either hyperopic or myopic.
Mixed astigmatism: Where one of the principal meridians is hyperopic and the other is myopic.

Clinical features:
Higher degrees of astigmatism often cause poor visual acuity but vision is not much impaired in mixed astigmatism.
Symptoms of asthenopia are present.
The optic disc appears oval or blurred.

**2. Irregular Astigmatism:**

When the curvature and the refractive power of the refractive media are markedly irregular leading to multiple focal points, that produce completely blurred images on the retina, such a condition is called irregular astigmatism.
The irregular astigmatism is caused by corneal scar, penetrating injuries of the eye, keratoconus, lenticonus, and immature cataract. The patient with irregular astigmatism often suffers from distorted vision and headache.

Treatment:
Optical treatment: Regular astigmatism can be corrected by appropriate cylindrical lens or sphero-cylindrical combination in the form of spectacles.
Irregular astigmatism cannot be corrected by spectacle lenses due to irregularity in the curvature of meridians and hence soft or rigid gas permeable toxic lenses are prescribed.

Surgical correction:
Photo astigmatic keratectomy - Using excimer laser to flatten the steeper meridian.
LASIK - Toric LASIK ablations may correct refractive error upto 7D sphere and 3D cylinder.
Conductive keratoplasty: The spots are applied to flatten meridian to induce steepening.
Corneal transplantation is indicated in case of corneal scarring and ectasia.

**Presbyopia:**

Presbyopia is not a refractive error but a physiological condition of gradual loss of accommodative power due to age related decrease in the elasticity of lens capsule and lens substance. Typically, presbyopia becomes noticeable by the time a person reaches the early or mid-40's. Besides lenticular changes, loss of ciliary muscle function is also implicated in the development of presbyopia.

Clinical features:

The onset may be noticed by development of asthenopic symptoms like headache, heaviness or tiring of eyes on prolonged near work.

Blurring of near vision especially in dim light.

The patient prefers to keep newspapers and books at a greater distance than usual because less accommodative effort is needed.

Treatment:

The goal of correction of presbyopia is to strengthen amplitude of accommodation by prescribing the convex lenses for near vision.

Presbyopic spectacles can either be single vision reading glass (convex), or bifocals (distant and near vision) or progressive or multifocal lenses.

Surgical correction include conductive keratoplasty, photo-refractive keratectomy, LASIK.

Laser based refractive surgery has been the main line of the treatment in recent years.

**Cataract:**

Cataract is a clouding of the lens of the eye. Cataract is commonly seen in the old age.

If the lens is cloudy, blurred image is seen. The word cataract is derived from the latin word cataract meaning water fall.

The lens grows in size continuously throughout life and in this respect, it is unique among the organs of the body. As the lens fibres elongated and new once forms, the older once are pushed towards the depth of the lens. So that the youngest lens fibres are the most superficially located.

Aetiopathogenesis of cataract:

Cataract is usually caused by the degeneration and opacification of the lens fibres. The loss of trans patency occur because of abnormalities of the lens fibres.

Any factor, physical or chemical, which disturbs the intra and extracellular equilibrium of water and electrocytes tends to bring about opacification.

Cause:

Long term exposure to UV rays.

Secondary effect of disease such as diabetes.

Coagulation of proteins.

Classification of cataract:
Morphological classification
Based on the density and site of opacity cataract may be classified as:
Capsular (anterior, posterior)
Subcapsular (anterior, posterior)
Cortical
Nuclear
Lamellar (zonular)
Sutural
Coralliform

Etiological classification:
Congenital or developmental cataract: Congenital cataract is present at the birth. Developmental cataract is that cataract, which develops during the development of the lens.
Senile cataract: Age related cataract.
Complicated cataract: It is secondary to inflammatory or degenerative diseases like uveitis, high myopia, retinal detachment, glaucoma, retinitis pigmentosa etc.
Metabolic: It is caused by endocrine disorders like Diabetic mellitus.
Traumatic: Caused due to mechanical Injuries such as concussion and penetrating injuries.
Radiational: X-rays, gamma rays, ultraviolet rays, laser radiations.
Dermatogenic: Atopic dermatitis, Werner's syndrome.
Toxic: Long term administration of corticosteroids, miotics, chlorpromazine etc.

**Senile cataract:**
It is also called as age related cataract. It is the commonest type of acquired cataract.
Morphologically, senile cataract occurs in two forms:

1. Cortical senile cataract (soft)
2. Nuclear cataract (hard)

Etiology:
Age: Usually above 50 years.
Sex: Is equal in either sex.
Bilaterality: Usually bilateral but almost always one eye is affected earlier than the other.
Heredity: It plays an important role in the incidence of cataract.
Dietary factors: Deficiency of proteins, amino acids, and vitamins.
Other factors include exposure to ultraviolet irradiations, smoking and dehydration.

1. **Cortical senile cataract:**

Pathology: The lens fibres of the cortex are mainly affected. There is hydration due to accumulation of water droplets in between the fibres, and replacement of soluble by insoluble proteins. The proteins are first denatured and then are coagulated forming opacity. Ultimately the whole of the lens becomes opaque and assumes a pearly white appearance.

Symptoms:
Gradual impairment of vision
Polyopia i.e. one object appears multiple
Rainbow haloes around the light

Clinical Signs:
The development of senile cortical cataract can be divided into the following stages -

1. Stage of lamellar Separation.

- It is a presenile stage characterized by collection of fluid between the lens fibres resulting in lamellar separation.
- Usually this stage is asymptomatic, except that the patient becomes slightly hyperopic.

2. Incipient stage:

- White radial wedge shaped spokes with clear areas in between are visible is the periphery of the lens.
- On fundal examination: The opacities appear as dark lines against red fundal glow.
- Visual disturbance such as polyopia (many images of an object) is the common symptom in this stage.

3. Intumescent stage:

- The lens become swollen due to imbibition of the fluid and hence the anterior chamber becomes shallow.
- The progressive hydration causes swelling and opacification of the lens.
- Upto this stage, the lens is not completely opaque. There remains a clear zone of lens fibres between the pupillary margin of the iris and the lens opacity (immature cataract).
- On fundal examination: Very little red fundal glow can be seen.
- Test: If an oblique beam of light is thrown upon the eye, the iris casts a shadow upon grey opacity.

4. Mature stage :

- The entire cortex and the lens becomes opaque white.
- The vision becomes reduced to perception of hand movement or light only.
- On examination: No fundal glow
- Test: If an oblique beam of light is thrown upon the eye, the iris does not cast any shadow. This is because when the lens is completely opaque the pupillary margin lies almost in contact with the opaque lens.

5. Hyper mature stage: There are two types of hypermature cataract.

- Hypermature morgagnian: If the stage of mature cataract is neglected, then hypermature stage sets it. In this the whole of the soft cortical matter liquifies to form that the lens is now converted into a bag of milky fluid with the hard nucleus settled at the bottom of the bag.
- Hypermature sclerotic: The loss of fluid from the mature cataractous lens makes the lens shrunken. The shrinkage of the lens leads to deepening of the anterior chamber and tremulousness of the iris. The lens becomes flatter, the capsule becomes thick and the cataract appears brownish.

**2. Nuclear senile cataract:**

Pathology: The nuclear fibres undergo a process of sclerosis. When this process becomes more intensified, the nuclear cataract starts. The nucleus becomes diffusely cloudy and obstructs the light rays. The progress of the cataract is slow and this type of cataract never becomes hypermature.

Symptoms:
Progressive dimness of vision but no polyopia.
No complaint about seeing haloes around the light.

Signs:
The lens appears brown, dark brown or black.
Iris shadow is usually present.
Depending on the advancement of the cataract the vision is reduced to counting fingers or perception of hand movements.
On examination: There is a central dark against the red fundal glow.

Management of cataract:

1. Nonsurgical measures:

Treat the cause of cataract
Measures to delay progression like intake of iodine, calcium, and potassium
Measures to improve vision like prescription of suitable glasses, low vision aids and use of dark goggles.

2. Surgical measures:

Intracapsular cataract extraction (ICCE)
Extracapsular cataract extraction (ECCE)

Surgical technique:

1. Intracapsular cataract extraction (ICCE): In this technique, the entire cataractous lens along with the intact capsule is removed. Therefore, weak, and degenerated zonules area prerequisite for adopting this method.
   Now it has been almost replaced by planned extra capsular techniques and is indicated only in subluxated and dislocated lens.

2. Extracapsular cataract extraction (ECCE): In this major portion of the anterior capsule with epithelium, nucleus and cortex are removed leaving behind intact posterior capsule. The technique is safe and most suited for posterior chamber intra ocular lens (IOL) implantation. Phacoemulsification is the most popular method of extracapsular cataract extraction.

Currently ECCE with IOL implantation is the most preferred surgery.

1. Small incision cataract surgery:

It is a type of extracapsular cataract extraction. It is a safe and suture less surgery. The steps of surgery are similar to ECCE with some modifications in the external scleral incision and delivery of the nucleus.

2. Phacoemulsification:

It is an extracapsular lens extraction performed with the help of a phacoemulsification machine. The phacoemulsifier provides controlled irrigation and aspiration. The phacoemulsification is performed by a phaco hand piece, the tip of which vibrates 28,000 to 60,000 times per second. The emulsified lens is removed by aspiration-infusion.

## 4. Study of Eale's disease, Hypertensive & Diabetic Retinopathies, Age related Macular degeneration, Strabismus, Retinitis pigmentosa, Night blindness, Amblyopia, Central serous retinopathy, Optic Neuritis and Optic atrophy

**Eale's disease:**

The eponym 'Eale's disease' is used to describe patients with nonspecific inflammation of the peripheral retinal veins. It is also known as periphlebitis and is characterized by recurrent vitreous hemorrhage.

Etiology: Not exactly known, but may be allergic or toxic in origin.

Clinical signs:

There is phlebitis of peripheral retinal veins, which appear thickened, tortous and congested.
There is sheathing of the affected veins.
Retinal haemorrhages appear near the affected veins, if the haemorrhage is massive, it enters into the vitreous.

Symptoms:

Sudden appearance of floaters (black spots) in front of the eye.
Painless loss of vision due to vitreous haemorrhage.

Treatment:
Absence of proper aetiology makes treatment of Eale's disease unsatisfactory. But still the following treatments are usually given.
Medical - l. Local and systemic corticosteroids 2. Anti-tubercular therapy
Laser photocoagulation in the stage of neovascularisation
Vitreo-retinal surgery

**Hypertensive retinopathy:**
Hypertension affects almost all the organs in the body directly or indirectly. In the eye, hypertension can affect the retinal and choroidal vessels directly. Hypertensive retinopathy may cause loss of vision due to macular haemorrhage, retinal oedema, and hard exudates.

Pathogenesis:
Vasoconstriction, arteriosclerosis and increased vascular permeability are the three main factors which play a major role in the pathogenesis of hypertensive retinopathies.

Signs:
Arterial narrowing: may be focal or generalized.
Cotton wool spots: in severe hypertension.
Flame shaped retinal haemorrhages and retinal oedema.
Swelling of the optic nerve head.
Arteriosclerosis involves thickening of the vessel wall

Treatment and management:
Major aim is to prevent, limit or reverse target organ damage by lowering the patient's high blood pressure.

**Diabetic retinopathy:**
Diabetic retinopathy remains the most common retinal condition that an ophthalmologist is likely to come across. The prevalence of diabetic retinopathy has been reported in several population based studies. It usually occurs 8-10 yrs after the onset of diabetes mellitus, controlled or uncontrolled.

Classification:
Broadly diabetic retinopathy is divided into:

1. Non- proliferative diabetic retinopathy (NPDR)
2. Proliferative diabetic retinopathy (PDR)
3. Diabetic maculopathy
4. Advanced diabetic eye disease (ADED)

**Non proliferative diabetic retinopathy (NPDR)**

Ophthalmoscopic features of NPDR

1. Micro aneurysms in the macular area.
2. Retinal haemorrhages - both dot and blot haemorrhages, superficial haemorrhages (flame shaped).
3. Oedema characterized by retinal thickening.
4. Whitish yellow waxy looking hard exudates.
5. Cotton wool spots.

**Proliferative diabetic retinopathy (PDR):**

- The hallmark of PDR is occurrence of neovascularization characterized by proliferation of new vessels from the capillaries at the optic disc or elsewhere in the fundus.
- Vitreous detachment and vitreous haemorrhage.

Management:

- Regular screening for diabetic retinopathy and controlling the systemic risk factors.
- Medical treatment such as:

1. Anti Vascular Endothelial Growth Factors (Anti VEGF) drugs
2. Protein kinase C (PKC) inhibitors
3. Antioxidants such as vitamin E
4. Intravitreal steroids to reduce macular oedema

- Photocoagulation (Laser)
- Surgical treatment in advanced cases of PDR.

**Age related macular degeneration:**

**Macula:**

Macula is an oval shaped highly pigmented yellow spot near the centre of retina. Histologically, it has two or more layers of ganglion cells. Near its centre is the fovea having the largest concentration of cone cells which is responsible for central high resolution vision. Age related macular degeneration (ARMD) is a degenerative disorder affecting the macula. It occurs in persons over 50 years of age. It is a bilateral disease and is a leading cause of blindness in developed countries.

Etiopathogenesis:

Risk factors which may affect the age of onset and progression of the disease include age, race, heredity, hypertension, smoking, dietary factors such as high fat intake and other factors including cataract surgery, high exposure to sunlight, blue iris colour etc.

Clinical types:

1. Dry (oedema,) ARMD
2. Wet (Exudative) ARMD

1. **Dry (Non Exudative) ARMD**

It is responsible for 90% cases of ARMD.

Symptoms:
Mild to moderate gradual loss of vision.
Distorted vision and difficulty in reading due to central shadowing.
Vision is often better in bright light.

Signs:
Ophthalmoscopically, occurrence of macular drusens, focal hyper pigmentation and pale areas of retinal pigment atrophy is noticed depending on their stages.

2. **Wet (Exudative or Neovascular) ARMD:**

It is responsible for only 10% cases of ARND but is associated with comparatively marked loss of vision.

Signs:
Lesions of exudative ARMD seen in the chronological disorder
Drusens with retinal pigment epithelial detachment.
Choroidal neovascularization.
Hemorrhagic pigment epithelial detachment.
Hemorrhagic detachment of neuro sensory retina.
Disciform sub retinal scarring in the macular region.

Diagnosis is by:
Slit lamp examination
Fundus fluorescein angiography (FFA)
Optical coherence tomography (OCT)

Management of Dry ARMD:
Prophylaxis: Antioxidant supplement, ocular sun protection measures, avoiding smoking etc.
An amsler grid should be provided for self-test on regular basis.
Provision of low vision aids.
Experimental surgeries such as miniature intra ocular telescope implantation and retinal translocation.
Laser photocoagulation.

Management of Wet ARMD:
Intra vitreal anti VEGF (Vascular Endothelial Growth Factor) therapy.
Photodynamic therapy (PDT).
Trans pupillary thermotherapy (TTT).
Photocoagulation.
Surgical treatment - sub macular surgery and macular translocation surgery.

**Strabismus:**
When both the eyes moves together keeping their visual axes parallel, the movements are known as conjugate movements. For each of these movements, two muscles take part one muscle from each eye. These pair of muscles which work together are known as synergic muscles.

| Type of conjugate movements | | Synergic muscles involved |
|---|---|---|
| 1. Dextro-version | Horizontally to right | Right lateral rectus and left medial rectus |
| 2. Laevo-version | Horizontally to left | Left lateral rectus and medial rectus |
| 3. Dextro-elevation | Upwards and to left | Right superior rectus and inferior oblique |
| 4. Laevo-elevation | Upwards and to left | Left superior rectus and inferior oblique |
| 5. Dextro-depression | Downwards and to right | Right inferior rectus and left superior oblique |
| 6. Laevo-depression | Downward and to left | Left inferior rectus and right superior oblique |

Strabismus is a condition in which the eyes are not properly aligned with each other. It typically involves a lack of coordination between the extra ocular muscles, which prevents bringing the gaze of each eye to the same point, thus hampering the proper binocular vision. In other words misalignment of the visual axes of the two eyes is called strabismus or squint.

Classification:
Apparent squint or pseudo strabismus.
Heterophoria (Latent squint).
Heterotropia (Manifest squint).

**Pseudo strabismus:**
In pseudo strabismus, the visual axes are in fact parallel, but the eyes seem to have a squint as in prominent epicanthal fold, where in normally visible nasal aspect of globe is covered giving a false impression of squint.

**Heterophoria (Latent Squint):**
It is a condition in which there is a tendency of non-alignment of visual axes which is corrected or compensated by fusional reflex.

Symptoms:
Headache or aching of eyes, blurring of print, or jumbling together of words while reading and intermittent diplopia.

Diagnosis:
By cover test: One eye is covered and another eye is made to fix on an object. If there is heterophoria, the eye under cover deviates. As soon as cover is removed the covered eye corrects the deviation, and regains its normal position quickly.
By Maddox rod test: By placing Maddox rod in different meridians heterophoria can be detected.
Other diagnostic tests: Include Maddox wing test, synoptophore, krimsky corneal reflex.

Treatment for Heterophoria:
Refractive error correction.
Orthoptic treatment to increase fusional range and muscle power is done with synaptophore (Synaptophore is an apparatus for diagnosis and treatment of strabismus).
Surgical treatment - By this method, the weak muscle is strengthened or its antagonist is made weaker.

**Heterotropia (Manifest Squint):**
It is condition in which deviation of the eye remains constant (visual axes retain their abnormal relation to each other) in all directions of gaze.
They are of two types.

1. Concomitant strabismus
2. Incomitant strabismus

1. Concomitant strabismus:

It is a type of manifest squint in which the amount of deviation in the squinting eye remains constant (unaltered) in all the directions of gaze and there is no associated limitation of ocular movements.

Symptoms:
Usually there is no symptom. The main feature of concomitant squint is the failure of binocular vision.

Investigations:
Cover test.
Testing the movements of the eyeball.
Recording visual acuity.
Grading of binocular vision and measuring the angle of squint by synoptophore.

Treatment:
Correction of refractive error.
Occlusion to cure amblyopia - The normal eye must be kept constantly occluded by a suitable occluder for 3 months.
Surgical measures- By this the squinting eye is made straight.
Fusion exercises- Indicated after surgery.

2. Incomitant strabismus:

It is a type of heterotropia, in which deviation is caused by paralysis of extraocular muscles and is a condition in which the deviation of eye varies in different directions of gaze.

Symptoms:
Diplopia, vertigo, and nausea.

Investigation:
Ocular posture and head posture to know the deviation of eyeball.
Cover test.
Ocular movements test - To know the involved muscles.
Diplopia test.
Other methods include synoptophore examination, Hess screen test, Forced Duction Test (FDT) etc.

Treatment:
Treatment of the underlying cause.
Occlusion of the affected eye to avoid diplopia.
Injection of vitamin $B_1$, $B_6$, $B_{12}$.
Surgical measure consist mainly of tackling the contracture of the direct antagonist and over action of the contra lateral synergist.

**Retinitis pigmentosa:**

Bilateral progressive loss of vision beginning with night blindness and associated with bone corpuscular pigment deposits, narrowed arteries and optic atrophy characterize primary pigmentary retinal degeneration is referred to as retinitis pigmentosa (RP).

Etiology:
The condition is inherited as a recessive trait with a 20% incidence of consanguinity of the parents. The severity of the disease varies with the site of mutation in the rhodopsin gene. Rhodopsin, a visual pigment found in the rods is responsible for night blindness.
There may be a large number of patients of RP with no family history of the disease. The exact etiology of RP is therefore unknown. It primarily affects rods and cones, particularly the former and the retinal pigment epithelium. The degeneration starts in the equatorial zone and slowly spreads both anteriorly and posteriorly.

Fundus picture:

- Black pigment spots like bone corpuscles, along the blood vessels, mainly in the equatorial region.
- Yellow waxy appearance of the optic disc.
- Retinal arteries markedly narrow.

Symptoms:

- Night blindness.
- Later on dimness of vision.
- Tubular vision occurs in advanced cases.

Investigations

- Electro-retinogram (ERG).
- Electro-occulogram (EOG).
- Perimetry.

Treatment: Till date there is no effective treatment for the disease.

1. Measures like vasodilators, placental extracts, transplantation of rectus muscles into supra choroidal space, ultrasonic therapy etc. have been tried to stop the progression of the disease.
2. Correction of refractive errors.
3. Low vision aids such as magnifying glasses and night vision device.
4. Rehabilitation of the patient.
5. Counselling to be done to affected individuals not to undergo consanguineous marriage or produce children.

**Night blindness:**

It means poor vision in feeble illumination. It is mainly either due to the damage to the rods or deficient regeneration of visual purple. It can be detected by an instrument known as adaptometer.

Causes:

Congenital and hereditary conditions like high myopia, familial congenital night blindness and Oguchi's disease.

Diseases of the eye like retinitis pigmentosa, peripheral chorio-retinitis, myopic degenerative changes in the periphery of the retina, chronic simple glaucoma, retinal detachment.

Systemic diseases like vitamin-A deficiency, cirrhosis of liver.

Conditions of the ocular media like paracentral lenticular and corneal opacities interfering with the light rays in dim light.

**Amblyopia:**

Amblyopia also called as “Lazy eye” is a condition in which partial loss of vision occur in one or both the eyes. It involves decreased vision in an eye that otherwise appears normal. It may be either congenital or acquired. Acquired. amblyopia may be organic (toxic) or functional.

In amblyopia, visual stimulation either fails to be or is poorly transmitted through the optic nerve to the brain for a continuous period of time.

Types:
Depending upon the cause, amblyopia is of the following types:

a. Strabismic amblyopia - Resulting from unilateral constant squint.
b. Stimulus deprivation amblyopia - As in congenital or traumatic cataract, ptosis, and central corneal opacity.
c. Anisometropic amblyopia - Occurs in an eye having higher degree of refractive error than the fellow eye.
   Isometropic amblyopia - Is bilateral amblyopia occurring in children with uncorrected high refractive error.
d. Meridional amblyopia - Occurs in children with uncorrected astigmatic refractive error.
e. Toxic amblyopia: Due to the effect of exogenous or endogenous poisons such as tobacco, ethyl alcohol, methyl alcohol etc.

Clinical characteristic of an Amblyopic eye:
Visual acuity is reduced.
Crowding phenomenon i.e. visual acuity is less when tested with multiple letter charts (Snellen's chart) than when tested with single charts (optotype).
Fixation pattern may be central or eccentric.
Color vision is usually normal, may be affected in deep amblyopia with vision below 6/36.

Treatment: (should be started as early as possible).
Refractive error if any should be corrected.
Occlusion therapy - Occlusion of the healthy eye allows the weaker eye to get stronger.
Penalization: In this vision in the normal eye is blurred with atropine. It is best in the treatment of relatively mild amblyopia.

**Central serous chorio retinopathy:**
It is an idiopathic disorder characterized by spontaneous serous detachment of neurosensory retina at the macula, with or without retinal pigment epithelium detachment.

Etiology:

- Age and sex: Affects typically young adult (20-50 yrs), males more than females.
- Psychological stress.
- Steroid administration.
- Hypertension.
- Pregnancy (usually 3rd trimester).
- Systemic lupus erythematosus.

Symptoms:
Sudden painless loss of vision.
Associated with relative positive scotoma.
Micropsia and meta-morphopsia.

Signs: Ophthalmoscopic examination reveals:
A round or oval detachment of sensory retina present at the macula.
Foveal reflex is absent or distorted.
Multi-focal pigmentary changes suggest chronicity.

Investigations:
Amsler grid.
Fundus fluorescein angiography (FFA).
Optical coherence tomography (OCT).

Treatment:
Observation and Reassurance.
Laser photocoagulation.
Photodynamic therapy (PDT).
Intra vitreal anti VEGF agents (Vascular Endothelial Growth Factor).

**Optic neuritis (Inflammation of the optic nerve):**
Optic neuritis is an inflammatory, infective, or demyelinating process affecting the optic nerve.
This can be divided into:
Papillitis: When the optic nerve head is inflammed.
Retrobulbar neuritis: When the nerve behind the eyeball is affected.
Neuroretinitis: Combined involvement of optic disc and surrounding retina in the macular area.

Symptoms:
Visual loss: sudden, progressive, and profound.
Dark adaptation is reduced.
Visual obscuration in bright light.
Impairment of color vision.
Episodic transient obscuration of vision on exertion and exposure to heat.
Pain (marked in patients with retrobulbar neuritis).

Signs:
Visual acuity: Reduced.
Color vision: Severely impaired.
Pupil shows ill-sustained constriction to light.
Papillitis: Hyperaemia and oedema of the disc, blurring of margins, retinal veins are congested and tortuous.
Retrobulbar neuritis: Fundus appears normal, occasionally temporal pallor of the disc may be seen.
Visual field: Relative central or centrocaecal scotoma.
Visually evoked response (VER): Shows reduced amplitude and delay in transmission time.

Treatment:
Treatment of the cause.
Corticosteroid therapy.
There is no effective treatment for idiopathic and hereditary optic neuritis associated with demyelinating disorders.

**Optic atrophy:**
Optic atrophy refers to degeneration of the optic nerve. It occurs due to the damage caused to the axons at any point between their origin in the ganglion cells of the retina to their termination in lateral geniculate body,

Classification and Causes:

- Primary optic atrophy: It is simple degeneration of nerve fibers without any complicating process within the eye. E.g. Syphilitic optic atrophy.
  Causes: Trauma to the optic nerve or chiasma or compression of these structures by tumour, demyelinating diseases, toxic conditions (toxic amblyopia) and malnutrition ($B_1$ deficiency).
- Secondary optic atrophy: It occurs following any pathologic process which produces optic neuritis or papilloedema.
- Consecutive atrophy: It is sequel to the certain diseases of the retina. eg retinitis pigmentosa, occlusion of central retinal artery and glaucoma.

Symptoms:
Loss of vision may be sudden or gradual.
Loss of visual field will vary depending on the damaged fibres.

Signs:
Pupil is semi dilated and direct light reflex is very sluggish or absent.
Ophthalmoscopic features of optic atrophy in general are pallor of the disc and decrease in the number of small blood vessels.

Treatment:
Treat the underlying cause to preserve the remaining vision. However when complete atrophy sets in vision cannot be recovered.

MISCELLANEOUS DISEASES

## 1. Xerophthalmia and other malnutritional eye disorders.

**Malnutrition:**
Malnutrition or malnourishment is a condition that develops when the body does not get the right number of vitamins, minerals, and other nutrients it needs to maintain healthy tissue and organ functions. Among Malnutritional disorders of eye Xerophthalmia is the main.

**Xerophthalmia:**
The term Xerophthalmia refers to a spectrum of ocular diseases caused by vitamin A deficiency ranging from night blindness to severe corneal destruction.
Etiology:
Xerophthalmia results either from inadequate supply of vitamin A or its defective absorption. It is usually seen in children below 5 years of age in low socio-economic strata of society.

Classification:
For diagnostic and therapeutic purpose World Health Organization (WHO) has classified Xerophthalmia as :

| Classification | Ocular signs |
|---|---|
| XN | Night blindness |
| X1A | Conjunctival xerosis |
| X1B | Bitot's spots |
| X2 | Corneal xerosis |
| X3 | Corneal ulceration<br>Less than 1/3$^{rd}$ (X3A)<br>More than 1/3$^{rd}$ (X3B) |
| XS | Corneal scar |
| XF | Xerophthalmic fundus |

Clinical features:
(Changes are seen in the conjunctiva. cornea and fundus).
XN - Night blindness is the earliest feature of xerophthalmia.
X1A- Conjunctival xerosis is characterized by lustreless conjunctiva associated with wrinkling.
X1B – Bitot's spot is a white foamy lustreless triangular plaque situated on the bulbar conjunctiva. It is usually bilateral and situated temporally.
X2 - Corneal xerosis is characterized by lack of lustre in the cornea and decreased corneal sensitivity. Sometimes keratinized plaques may be seen on the cornea.
X3A, X3B - Corneal ulceration/keratomalacia is a late stage of xerophthalmia.
XS - Corneal scar is formed after healing of the ulcer. If the scar covers the pupillary area, vision is hampered.
XF - Xerophthalmic fundus- Lesions appear as yellow discrete dots in the peripheral fundus.

Treatment:
In infants xerosis can be prevented by administering prophylactic vitamin A in mothers during pregnancy.
Artificial tears (methyl cellulose) or lubricating eye drops should be used as local ocular therapy.
Corneal ulcer should be treated accordingly.
Generally the daily requirement of vitamin A for a child is 3000 - 4000 IU.
Protein rich diet should be supplemented to facilitate absorption of vitamin A.
In mild to moderate degrees of xerophthalmia, vitamin A rich dietary supplement such as green vegetables, carrot, egg, butter, fish, cod-liver oil gives satisfactory results.

**WHO recommended vitamin A therapy for xerophthalmia.**

| Patients | Age | Dose | Schedule |
|---|---|---|---|
| Children | < 12 months | 100000 IU | 1st & 2nd day, Repeat 2 – 4 weeks later |
| Children | 12 months or older | 200000 IU | 1st & 2nd day, Repeat 2 – 4 weeks later. |

Other malnutritional diseases of eye:
Vitamin B1 (Thiamine) deficiency: Causes external ophthalmoplegia, nystagmus, ptosis, retinal haemorrhages, conjunctival and corneal dystrophy and acute retrobulbar neuritis.
Vitamin B2 (Riboflavin) deficiency: Causes photophobia, conjunctival irritation, burning, angular blepharon conjunctivitis and peripheral corneal vascularization.
Vitamin B3 (Niacin) deficiency: Causes pellagra and optic neuropathy.
Vitamin B6 (Pyridoxine) deficiency: Causes optic neuritis and angular blepharo conjunctivitis.
Vitamin B12 (Cobalamine) deficiency: Causes optic neuropathy and nutritional amblyopia.
Vitamin C deficiency: Causes haemorrhage in the lids, conjunctiva, anterior chamber, retina, and orbit. It also delays wound healing.
Vitamin D deficiency: Causes zonular cataract, papilloedema and increased lacrimation.

**Malnutritional ocular diseases in ayurveda:**
Diseases of eye caused exclusively due to malnutrition are not described in our classics. But while mentioning the general cause of eye diseases, Acharya Sushruta includes various dietary factors such as kulattha, masha and intake of alcoholic preparations like shukta and aranala as causative factors responsible for ocular disorders.

Importance of nourishment to sense organs:
प्रीणनमिन्द्रियाणां इति मात्रावतो लक्षणमाहारस्य भवति (C. Vi. 2/6)
इन्द्रियाणि समाश्रित्य प्रकुप्यन्ति यदा मलाः|
उपघातोपतापाभ्यां योजयन्तीन्द्रियाणि ते|| (C. Su. 28/20)

Acharya Charaka tells that for nourishment of sense organs, proper quantity of food is necessary and intake of improper food will lead to formation of 'mala' (because of improper digestion). This mala in turn accumulates in the indriyas to produce diseases.

According to acharya vagbhata:

सर्वदा च निषेवेत स्वस्थोऽपि नयनप्रियः||

पुराणयवगोधूमशालिषष्टिककोद्रवान्|

मुद्गादीन् कफपित्तघ्नान् भूरिसर्पिःपरिप्लुतान्||

शाकं चैवंविधं मांसं जाङ्गलं दाडिमं सिताम्|

सैन्धवं त्रिफलां द्राक्षां वारि पाने च नाभसम्|| (A. H. U. 16/61-63)

The following ahara should be consumed regularly to keep the eyes always healthy: Purana yava, godhuma (wheat), shali, shastikashali, kodrava, mudga, etc. Kapha pittahara ahara along with ghee, shaka (vegetables), jangalamamsa, dadima, sita, saindhava, triphala, draksha and jala (nabhasa).

## 2. Knowledge of ocular trauma and their management.

**Ocular trauma:**

The eye is well protected by the bony orbit, the eye lids, eye lashes and their blink reflex. But in spite of these, injuries to the eyes are not uncommon. Ocular injury is the leading cause for mono-ocular blindness. Serious eye injuries involving the orbit or intra-ocular structures are usually classified into those caused by blunt objects, large sharp objects, small flying particles or burns. The type and extent of damage sustained by a traumatized eye depends on both the mechanism and force of the injury.

Classification of ocular trauma:

| Mechanical | Non mechanical |
|---|---|
| • Blunt trauma<br>• Penetrating injuries<br>• Perforating injuries<br>• Extra ocular foreign bodies<br>• Intra ocular foreign bodies<br>• Sympathetic ophthalmitis | • Chemical burns<br>a. Acid burns<br>b. Alkali burns<br>• Thermal injuries<br>• Electrical injuries<br>• Radiational injuries<br>a. UV radiations<br>b. Infra-red radiations<br>c. Ionizing radiations |

Mechanical injuries can be further classified as follows:

1. Closed globe injuries
    A. Contusion
    B. Lamellar laceration
2. Open globe injuries
    A. Laceration
        a. Penetrating injury
        b. Perforating injury
        c. Intraocular foreign body
    B. Rupture

**Closed Globe Injury**

In closed Globe injury, 'eye wall' (sclera and cornea) does not have a full thickness wound, but there is intraocular damage. It includes contusion and lamellar laceration.

a. Contusion: It is a result of blunt trauma. Injury may occur at the site of impact or at a distant site.
b. Lamellar laceration: It is caused by sharp object resulting in partial thickness wound in the bulbar conjunctiva or the eye wall,

**Open Globe Injury:**

Open Globe injury refers to the full thickness injury of the eye wall i.e. cornea, sclera, and the intraocular structures. It includes rupture and laceration of the eye wall.

a. Rupture: It refers to a full thickness wound of eye wall caused by the impact of blunt trauma, The eyeball ruptures at its weakest point by an inside out force.
b. Laceration: Full thickness wound of the eye wall, caused by a sharp object. It can either be a penetrating or perforating injury.

**Penetrating injury:**

It is usually a single full thickness laceration of the eyeball. It has a site of entrance and does not have any exit wound. It is often caused by sharp objects such as metal, wood, or stone.

**Perforating injury:**

It has both an entrance and exit wounds caused by sharp objects.

**Intra ocular foreign body injury:**

It is a penetrating injury in which intra ocular foreign body is retained causing lacerations at the entrance. Foreign bodies which are commonly responsible for such injuries include chips of iron, steel, stone, plastics, and wood. It may damage the ocular structures by its mechanical effects, introduction of infection and reaction of foreign bodies.

Diagnosis:

- Slit lamp examination including gonioscopy.
- Plain X-ray as most foreign bodies are radio opaque.
- CT and MRI scan.

Treatment: Special surgical or non-surgical techniques should be employed to remove the foreign body depending on its site in the anterior chamber, iris tissue lens, vitreous or retina.

**Extra ocular foreign body injury:**

Injury due to extra ocular foreign bodies are quite common. Foreign bodies such as small particles of dust, wood, stone, husk of paddy, wings of insects may hit upon the surface of the eye ball and may be retained either in the conjunctiva or on the cornea. Minute foreign bodies are generally washed away by tear flow. Retained foreign body produces immediate discomfort, irritation, profuse watering, and reflex blinking. Pain, photophobia, and defect in vision are noticed when foreign body is embedded in the cornea. Eversion of upper lid is required to discover foreign body present in the superior fornix and slit lamp examination reveals corneal foreign body.

Treatment: Foreign bodies such as particles of dust or coal can be removed with the help of cotton swab after surface anaesthesia. The embedded foreign body on the cornea can be removed with the help of hypodermic needle.

**Blunt trauma:**

Blunt trauma or non-perforating injuries of the eye are caused by blunt objects such as a direct blow to the eye by fist, tennis, or cricket ball. The eye can also be traumatized in road accidents, fall and sports. When the eye is struck, it is compressed antero-posteriorly and correspondingly stretched in the equatorial plane. The injury may cause displacement, rupture, and tear of the intraocular structures with or without rupture of the globe. It may cause serious diminution of vision or may often have a delayed effect.

**Chemical burns:**

Acid and alkali burns in the eye are commonly caused by detergents, disinfectants, fertilizers, pesticides etc. but serious eye injuries occur in industries where strong acids and alkalies are often used. The outcome of any chemical burn depends on the concentration and pH of the offending agent and duration of exposure. It is one amongst the most urgent of ophthalmic emergencies.

1. Alkali burns:

Alkali burns are more severe than acid burns because they damage cells and penetrate the tissues rapidly. Common alkalies responsible for burns are lime, caustic potash or caustic soda and liquid ammonia. Acute ischemic necrosis of conjunctiva, cornea and iris occurs leading to symblepharon, recurrent corneal ulceration, complicated cataract, and secondary glaucoma in later stages.

2. Acid burns:

Acid injuries tend to be less severe, as they remain confined to the ocular surface and does not penetrate deeper. Common acids responsible for burns are sulphuric acid, hydrochloric acid, and nitric acid. Mild burns result in loss of the corneal and conjunctival epithelium. Strong acids cause instant coagulation of all the proteins which then act as a barrier and prevent deeper penetration of the acids into the tissue. However, severe acid burn can incite a marked inflammation that can damage the corneal matrix.

Medical management:
Ocular irrigation with normal saline or Balanced Salt Solution (BSS).
Double evert the lid and remove any remaining chemical from ocular surface with a swab stick and forceps.
Intensive topical administration of corticosteroids.
A broad spectrum topical antibiotics and frequent lubrication with preservative free eye drops.
High doses of ascorbic acid to promote wound healing.
Therapeutic soft contact lenses helps in epithelial healing and prevention of corneal melting.

**Thermal injuries:**

Thermal burns may be caused due to boiling water, cigarette lighters, molten metals, hot ashes etc. Eyelids are often involved in thermal burns because of the eye closing reflex. The heat induces coagulation of the conjunctival and corneal surface. Watering, blepharospasm, visual impairment and pain are the primary symptoms. Subsequently cornea may become opaque.

Treatment:
Application of cycloplegic agent relieves pain.
Local and systemic antibiotics prevent infection.

**Electrical injuries:**

A strong electrical shock can damage the eye causing corneal opacities, uveitis, cataract, and retinal haemorrhages.

**Radiational injuries:**

Ultra violet radiations like exposure to welding, direct exposure to sunlight causes superficial corneal ulceration resulting in ocular discomfort and pain.
Treatment consists of topical cycloplegic antibiotic ointment and patching. Use of protective glasses prevents further damage.
Infrared rays of sunlight are absorbed by ocular pigment epithelium causing photoretinitis (solar retinopathy).

Ionizing radiation given to patients in neoplasms causes direct damage to the tissue or blood vessels resulting in ischemic necrosis. This type of radiation also leads to loss of eye lashes, blepharitis, dry eye syndrome, cataract and radiational retinopathies. The prophylaxis include protection of the eye before exposing to radiation. Frequent instillation of tear substitutes, use of bandage, contact lens are helpful. Radiational cataract is managed by surgery.

**Sympathetic ophthalmitis:**
It is a bilateral granulomatous inflammatory response from injury to one eye (exciting eye) followed by the development of symptoms in the uninjured eye (sympathizing eye). Its incidence has significantly reduced due to improved technique of wound repair and prompt use of corticosteroids.

## 3. Introduction to Eye bank, Eye donation, Corneal Transplantation

**Eye bank:**
VP Filatov is considered as the father of modern Eye Banking. He showed that cadaver tissue stored at 4°c could be used as donor material. This ultimately led to the establishment of eye banks for the collection and storage of tissue. The first Eye Bank was set up in New York in 1959 and Eye Bank Association of America was founded in 1961. This organization laid down the standards for obtaining, preservation, storage, and usage of donor tissue.
An Eye Bank is a non-profit organization with an aim to acquire and provide donated human eye tissue for corneal transplantation. It also provides the tissue for research and education. The eye bank also holds the responsibilities of ensuring the safety and efficacy of donor corneas. Eye banks provide tissue for:

1. Cornea transplant.
2. Treating conditions such as keratoconus.
3. Corneal scarring.

**Collection of the tissue:**
When an organ / tissue donor dies, consent for donation is obtained either from donor registry or from donor's next kin. The entire eye called the 'globe' may be surgically removed (enucleated) or only the cornea may be excised in situ and placed in storage media, There is a wide variety of storage media used in eye banking. Commercial preparations as well as organ culture medium can preserve corneas. The eye tissue is then transported to eye bank for processing.

**Medical standards in Eye banking:**
The medical standards and regulations are intended to assure the high possible standards of safety and efficacy for donor cornea, In order to improve the safety of eye banking regular reviews and improvements in the standards and certification of eye banks and eye bank's personnel is essential. The medical standards broadly include medical directors and their qualifications, eye bank technicians their qualifications and training, laboratory facilities, acceptability of donor tissue, record keeping of donor tissue, enucleation procedures,

inspection of donor tissue and lastly certification and recertification of eye banks and eye bank technicians.

**Eye bank personnel include:**

1. Eye bank in charge - should be a qualified ophthalmologist to evaluate, process and distribute the donor tissue.
2. Eye bank technician - the duties of trained eye bank technicians are:
   To keep the eye collection kits ready.
   To assist in enucleation of donor eyes.
   To record data pertaining to donor material and waiting list of patients.
   To assist in corneal preservation and storage.
3. Clerk cum store keeper - the duties are :
   To maintain meticulous records.
   To coordinate with other eye banks.
   To distribute cornea to eye surgeons / eye banks.
4. Medical social worker or public relation officer is required:
   To supply publicity material to common public.
   To promote voluntary eye donation.
5. Driver cum projectionist is required:
   To maintain vehicle of the eye bank
   To screen films of eye donation promotion in the community.

**Facts about Eye donation:**

The eyes have to be removed within 6 hours of death. So the nearest Eye Bank or eye collection centre must be informed immediately irrespective of the initial pledging of eye donation.

Eye removal takes only 10-15 minutes and leaves no scar or disfigurement of the face.

Only the cornea is transplanted for all practical purpose and not the entire eyeball. However, other part of eye is used for research and education purpose.

Eye donation gives sight to two persons as one blind person is transplanted with one eye.

The donated corneas are transplanted to patients eye who are in waiting list in accordance with the priority based on guidelines to avoid malpractices.

The eyes cannot be removed from living human being in spite of his / her consent.

The eyes are never bought or sold.

Eye donation is never refused.

**Corneal transplantation:**

Corneal transplantation, also known as Corneal grafting, is a surgical procedure where a damaged or diseased cornea is replaced by donated corneal tissue (the graft).

**Keratoplasty:**

Means surgery to cornea. When the entire cornea is replaced, it is known a Penetrating Keratoplasty and when only part of cornea is replaced it is known as lamellar Keratoplasty. The graft is taken from a recently dead individual.

Indications:
Corneal grafting is usually done to improve visual acuity by replacing the opaque or distorted host tissue by clear healthy donor tissue. Commonly it is indicated in the following conditions.
Thinning of cornea.
Corneal infection and perforation.
Corneal ulcers.
Swelling of cornea.
Cloudy cornea.

**Procedure:**
The donor cornea can be obtained from an eye bank. The operation can be performed either under local or general anesthesia. The size of the graft is determined. The grafts smaller than 6mm are inadequate while grafts larger than 8.5mm are prone for complications. The surgery is performed under following steps:
The corneal button is cut, using a trephine, from a donor corneoscleral ring.
The host diseased cornea is trephined and the opaque button removed with scissors.
The donor corneal button is sutured to the host cornea.

**Prognosis:**
The results of corneal transplant is very gratifying in restoring vision if cornea is not vascularized and insensitive.

## 4. Preventive Ophthalmology and Community Ophthalmology

**Preventive and community ophthalmology:**
Community ophthalmology is defined as a discipline of medicine which utilizes the methodologies of public health, community medicine and clinical ophthalmology to protect or promote ocular health and prevent blindness.
Community ophthalmology is foreseen as a health management approach in preventing eye diseases, lowering eye morbidity rates, and promoting eye health through active community participation at ground level. This branch of medicine also seeks to address the problem of preventable or avoidable blindness.
Community ophthalmology also requires to investigate the magnitude of the problem, the cause of blindness and the eye diseases in the community, the availability of eye services and the attitude of the community towards the services. It strives to instill community awareness on eye health through various strategies and provides comprehensive eye care services like vitamin-A supplementation, vision screening in schools, as well as training of primary eye care workers.

**Definition of Blindness according to WHO**

A person having visual acuity of less than 6/60 or 2/200 with correcting glasses in the better eye in day light is defined as blind. A concentric contraction of visual field to an average radius of 10 degrees is considered equally disabling.

Blindness is a global public health problem and adversely affects the productivity of population. The high prevalence of blindness is more evident in developing countries because of the poor access to eye care facilities. The world health organization's programme for prevention of blindness was initiated in 1978.

**Causes of Blindness:**

The WHO has listed six major causes of blindness, they are Cataract, Glaucoma, Diabetic retinopathy, Trachoma, Vitamin-A deficiency, and Onchocerciasis.

The causes of blindness in developed countries are quite different from that in developing or underdeveloped nations. In the developed countries, glaucoma, myopia, developmental ocular anomalies, macular degeneration, diabetic retinopathy, and cataract are the major causes of blindness while cataract, infectious diseases of the eye (trachoma and allied conditions), malnutrition, ocular injuries and glaucoma are common causes in the developing or underdeveloped countries.

**National Programme for Control of Blindness in India:**

Government of India launched the National Programme for Control of Blindness (NPCB) in the year 1976 with the intention of reducing the prevalence of blindness. A three tier health care system has been adopted for the delivery of eye care services in the country as 70 percent of Indian population lies in the rural areas.

Primary eye care: The facilities of primary health care have to be provided at every primary health centre and subcentre. The paramedical ophthalmic assistant carries out refractive evaluation, identifies and motivates cataract patients for surgery. They also conduct eye screening camps, provides primary treatment, and refers them to ophthalmologist for further evaluation and management.

Secondary eye care: Basic ophthalmic equipments and trained medical staff and ophthalmologists are present in District hospitals. The staff actively participate in eye screening and surgery.

Tertiary eye care: Services of tertiary eye care are available in the Ophthalmology department in all medical colleges, regional and private institutions. These institutions, not only give specialized eye care but also train ophthalmic surgeons and paramedics to work in district and subdivisional hospitals.

**The Present Objective of NPCB Include:**

Reduction in the backlog of blindness through identification and treatment of blind.

Development of comprehensive eye care facilities in every district.

Development of human resources for providing eye care facilities.

Improvement in quality of service delivery.

Securing participation of voluntary organizations and private practitioners in eye care.

Enhancement in community awareness on eye care.

Setting up of mechanism for referral, coordination and feedback between organizations dedicated to prevention, treatment, and rehabilitation.

**Vision 2020:**

The WHO and IAPB (International Agency for Prevention of Blindness) in the year 1999 have jointly launched Vision 2020 Right to Sight.

The main objective of Vision 2020 is to eradicate the avoidable blindness by 2020 in order to give all people needlessly going blind, the Right to Sight.

Vision 2020 in India:

The vision 2020 programme in India have primarily targeted seven ocular diseases.

1. Cataract,
2. Childhood blindness.
3. Refractive errors and low vision.
4. Corneal blindness.
5. Diabetic retinopathy.
6. Glaucoma and
7. Trachoma.

Proposed structure for vision 2020 : The right to sight

1. Primary:

Vision centres must be 20,000 in number. The following programmes are included in this study.

- Refraction and prescription of glasses.
- Primary eye care.
- School eye screening programme.
- Screening and referral services.

2. Secondary

Service centres must be 2000 in number. It includes:

- Cataract surgery,
- Facilities for refraction.
- Other common eye surgeries.
- Referral services.

3. Tertiary

a. Training centres 200 in number.

Tertiary eye care including

Retinal surgery, corneal transplantation, glaucoma surgery etc.

Training and organisation of CME programmes.

b. Centres of excellence - 20 in number.

Professional leadership.

Strategy development.

Continued medical education.

Laying of standards and quality assurance.

Research.

# THANK YOU