ANCIENT SURGICAL TECHNIQUES OF OPHTHALMIC DISORDERS IN PARLANCE TO PRESENT DAY PRACTICE

Nithyashree. C T¹, Sujathamma K², Mamatha K V³

¹2nd year PG Scholar, ²Professor and HOD, ³Reader
Dept. of PG studies in Shalakya Tantra, SKAMCH and RC, Vijayanagar, Bangalore, Karnataka, India

Email: nithyashrect18@gmail.com

ABSTRACT

Ayurveda, a science of life is the oldest treasure of medical science where many diseases have been described in detail with prognosis, internal medications and surgical interventions which is gradually achieved by western medicine and following the same with the aid of advanced technology. Shalakyatrantra, one of the specialized branch of ayurveda, deals with the diseases of eyes, ears, nose, throat and head which forms the basis of Ophthalmology, Oro-dentistry and otorhinolaringological considerations in Ancient Indian surgery. Surgery is an integral part of Ayurvedic treatment specially in Netrarogachikitsa, where surgical procedures like Lekhana (scraping), Chedana (cutting), Bhedana (Trephining), Vyadana (Puncturing), Kshara (Alkal), Agnikarma (Cautery) have been clearly indicated in netrarogas. Sushruta being the pioneer of Indian surgery, has mentioned that out of 76 eye diseases 40 diseases can be cured by surgical intervention and we find a beautiful description of indications, contra-indications, pre/intra/post-operative procedure and complications in the operations of the diseases like Arma (Pterygium), Linganasha (Cataract), Pakshmakopa (Trichiasis) and many others. But due to lack of attention and some interference, surgery in netrarogas left over, besides getting the judicious position in Ayurveda. So here systematic analysis is made to correlate the finest kills in the ancient surgical techniques of eye surgeries with the present ophthalmic surgical techniques in conventional medicine.

Keywords: Linganasha, Arma, Pakshmakopa, Utsangini, Chedana, Bedhana, Vyadhana, Lekhana.

INTRODUCTION

Surgery is an integral part of Ayurvedic treatment especially in netrarogachikitsa. A comprehensive and systemic account of pre-operative, operative techniques post-operative
care and related complications with their management in ophthalmic surgeries has been vividly described by ancient surgeons. *Sushruta-samhita*, the most brilliant gems in Indian medical literature is considered as the available foremost authentic text of *ayurveda* in the speciality of *Shalakyatantra* and is considered to be the most advanced compilation of surgical practices of its time, *Sushruta* devotes a complete volume of his experiences to ophthalmologic diseases in *Uttaratantra* where he enumerates a sophisticated classification of eye diseases with complete signs, symptoms, prognosis, medical/surgical intervention and complications. Out of 76 types of *netra rogas* 40 are said to be *Shastra sadya* (surgical and para surgical). His ability to do surgery and managing eye diseases of the time with limited diagnostic aids is a testament to his virtuosity. Preceding scholars like *Acharya Vagbhata* followed the same surgical techniques. Eventhough *Sushruta* belongs to 5-6 century BC many of his contributions to eye surgeries preceded similar discoveries in the western world and thus surgical knowledge is relevance even today.

AIMS AND OBJECTIVES
To correlate the supreme skills of ancient eye surgical techniques with the current ophthalmic surgical techniques

Eye surgeries in history:
When we look back into the diamond distant past, the origin of eye surgeries had its roots more than 4000 years old in India, back to Indus valley civilization which evidenced the opening of skull with a sharp stone. The mythico-religious *shlokas* associated with this civilization were compiled in Sanskrit language between 3000 and 1000 B.C in the form of *vedas*, the sacred book of Hindu religion. This era is referred to as the *vedic* period where we could find the references regarding the replacement of injured eye with artificial eye in Rigveda.

The Upanishad age: The candle of ophthalmology knowledge continued to burn in Upanishad also where one can evidence the separate treatise on *Netrarogas* called *Netrapanishad*. In *Aitareya upanishat* (2/1/1) we could find the reference about the extraction of eye ball from the orbit and fixation of the new eye ball into the cavity.

It is important to note that before Sushruta-samhita the knowledge of Ophthalmology and surgery was so advanced and the specialists had written separate treatise of their own like *Videhatantra*, *Nimitantra*, *Satyakitantra*, *Galavatantra*. Perhaps with cultural lag these treatise have been lost forever and at present we have only records of them.

*Sushrutha* himself has uttered that he followed *Nimitantra* while explaining *Netrarogas* and the available literature related to ophthalmological surgeries is reproduced from original text of *Nimitantra* in *uttaratantra* of *Sushrutasamhita*. So *Rajaharsha Nimi* deserves the credit of being the first eye surgeon on this earth.

*Sushrutha* and Eye surgeries:
- Before proceeding to surgery on the human being, various surgical demonstrations technique are explained by *Sushrutha* in *yogasoothreeyaadhyaya*
Sushruta has mentioned the importance of taking consent before surgery in the context of Ashmarichikitsa.

In Broo (eye brows) and Akshivartma (eye lids) tiryakchedana (Horizontal incision) is indicated.

China bandha (t-bandage) is mentioned for eye bandaging.

He classified the 40 eye diseases based on the surgical procedures like Chedana, Bhedana, Lekhana and vyadhanasa Sandvyadhis where the particular techniques have been indicated in particular eye diseases.

A good description of bloodletting in diseases like siraharsha (orbital cellulitis), savranashukra (corneal ulcers), Puyalasa (Dacryocystitis) and Adhimanta (Glaucoma)

Description of Kshara karma and agni-karma in eye diseases

Various suturing materials are described by Sushruta for suturing purposes.

Various Eye surgeries are explained by Acharyas with reference to different parts of eye.

VARTMA MANDALA SHASTRA CHIKITSA

1) Utsangini
It is a Tridoshaja Lekhanasadyavyadhi where nodular swelling originates in the lower lid with the pus point opening in inner surface, the discharge resembles egg yolk. According to Vagbhata and Sharangadhara, it can occur in any lid, looks coppery brown from external lid surface. If the pidaka is small and suppurative (pakwa) Bhedana followed by Lekhana has to adopt.

POORVA KARMA
After proper Snehana, Shodhana, Patient is made to lie down in supine position. The lid should be everted by holding it in between the left thumb and finger and fomentation is applied with pad of cloth dipped in warm water.

PRADHANA KARMA
- If the pidaka is large, hard, nonsuppurative Chedana (Excision) should be done
- If the pidaka is small, suppurative, bedana (incision) should be done with a sharp instrument.
- Followed by lekhana (Scraping) with mandalagrasastra or leaves (goji-hwa/shephilipatra).

PASCHAT KARMA
When bleeding ceases, fomentation should be done and the operated part should be rubbed with the powder of Manasila, tagara, Ela, Saindhava mixed with honey (Pratisarana). Then the lid should be washed with kashaya prepared from Haridra, lodra, madhuka and honey Vrana bandana for 3 days.

In modern Utsangini can be correlated to Chalazion cyst, a chronic non infective granulomatous inflammation of the Meibomian gland. It is usually seen in upper lid than the lower lid and the nodule is noted on the lid and a reddish purple area where the chalazion usually points, is seen on the palpebral conjunctiva after eversion of the lid. The conventional and effective treatment for chalazion is Incision and Curettage.
Paralance:

**Utsangini Bedhana and lekhana**
Bedhana with Shastra (Sharp instruments)
Lekhana with mandalagrasastra and shephalipatra

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<tr>
<td>Chalazion Cyst Incision and Curettage</td>
</tr>
<tr>
<td>Incision is made with a sharp blade.</td>
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<tr>
<td>Curettage with curette</td>
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</table>

2) **PAKSHMA KOPA**
A type of vartramoga where the vitiated doshas causes inward turning of eye lashes (Nirvartayantipakshmani)\(^8\) The lashes directed inwards will damage both shukla and krishna mandala (sclera and cornea) hence surgical intervention (shastra, agni and kshara karma) is mentioned in ancient literature.

**Surgical procedure of Pakshmakopa**\(^9\): **POORVA KARMA**

After proper Snehana and shodhana, Patient should sit in proper position (Upavishta)

**PRADHANA KARMA**
The bulky part of the eyelid with an incision at two parts below the Bru (eyebrow), one part above the Pakshma (eyelashes), equidistant from the Apanga sandhi (outer canthi) and the Kaninika sandhi (inner canthi) should be excised obliquely in the shape & size of a barley-corn (Yavakarachedana) with the help of a sharp instrument. Then the surgeon should stitch the margins with (horse) hair and the part should be treated with ghrita and Madhu.

**PASCHAT KARMA**
Two end of the stitch should be fixed by a bandage over the forehead. When the surgeon has ascertained the scar is firmly united and lid has become stable (sthira) he should remove the stitches of hair. In case the above measure fails, the lid should be everted & the fold afflicted with the doshas be treated by agni karma and Ksara karma.

**Trichiasis surgery**\(^10\)

Epilation: Mechanical removal of eye lashes with forceps
Electrolysis and cryoepilation: Method of destroying the lash follicles by electric current by double freeze thaw technique.
Tarsal wedge resection and Transposition of tarso conjunctival wedge: When many cilia are misdirected
Bick procedure modified by Reeh: An inverted house shaped lid shortening is performed

**Paralance steps:**

<table>
<thead>
<tr>
<th>Pakshmakopa Shastra chikitsa</th>
<th>Trichiasis surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site of incision:</strong> two parts below the Bru (eyebrow), one part above the Pakshma (eyelashes), equidistant from the Apanga sandhi (outer canthi) and the Kaninika sandhi (inner canthi)(^11)</td>
<td>2-3 mm above the lid margin, in Anterior lamellar and Tarsal wedge resection surgery(^12)</td>
</tr>
<tr>
<td><strong>Shape of incision:</strong> Yavakruti (barley corn shape)</td>
<td>Elliptical incision is made on the lid</td>
</tr>
<tr>
<td><strong>Excision:</strong> The skin of the eye lids should be excised obliquely in the size of Yava(^13) (barley corn)</td>
<td>An elliptical strip of skin muscle and tarsal plate is resected in tarsal wedge resection.</td>
</tr>
</tbody>
</table>
We could see the reference of cutting the eye lashes with Badishayantra in case of extra line of lashes (Pakshma mala) and cut properly and it can be exactly correlated to Epilation technique (Mechanical remove of eye lashes with forceps).

The reference of Agni karma (Cautery) in pakshmakopachikitsa drags one’s attention towards Electrolysis technique of destroying the lash follicles what contemporary medicine practicing now.

**Shuklagataroga**

3) **ARMA**

It is a diseases of Shukla Mandala (White part of eyeball) described by all Acharyas in Ayurvedic Text. The gradually spreading extra membrane in shuklmandala is known as arma (IyarthigacchathiittiArma)

Five types of Arma have been described in the Ayurvedic text which is an example of fine elaboration of disease in ancient science are follow:

*PrastariArma*– It is wide and thin structure having red colour mixed with blue, situated on the white part of eye ball.

*Shukla Arma*– It is a soft, white structure progressing slowly and evenly on the white part of eye ball.

*KshatajArma*– It is a developing muscle on the white part of sclera resembling in colour of lotus flower. It has been called RaktajaarmabyVagbhata.

*AdhikamamsajaArma*– It is wide, soft, thick structure on the white part of eye ball resembling to the colour of liver i.e. brown.

*SnayuArma*– It is progressing muscular growth in stripe shape, rough and pale in colour on white part of eye ball.

**Indications for Surgical treatment** – When Armais fleshy, thick (charmabha) highly elevated (bahala),fleshy growth covered by tendon and muscle (snayumamsaaavrita) which encroaching cornea (krishnamandalaga) is indicated for chedana (excision).14

**Surgical procedure for Arma:**

**POORVA KARMA**

Patient should give oily food and gritha before surgery and is made to lie down in a bed, where head is slightly in a downward position or he can sit comfortably. The eyes should be given fomentation with a cotton cloth dipped in warm water. The powder of saindhava should be pasted with the juice of Bijapooraka and applied to the eyes (akshisamroshana).

**PRADHANA KARMA**

Paricharaka (attendant) should hold both the eyelids firmly to keep eye widely open and Patient is asked to look laterally towards apanga (outer canthus), hold the pterygium with Badishayantra at wrinkled area then lift the Arma for its clear separation with thread after passing the thread under its surface and elevate it gently with muchutiyantra. The arma thus weakened should be cut at krishnamandala (cornea) leaving 1/4th part remain on shukla mandala (sclera) with mandalagrashastra then flap is lifted towards kaninikasandhi. The residue should be scraped with the application of lekhanaanjana.15

**PASCHAT KARMA**

After cutting, the operated part edge of Arma should be smeared with powder of yavanala, trikatu, saindavalavana then eye should be...
anointed with *madhu* and *gritha*. Then eye bandaging should be done for 3 days. The warm mixture of honey and ghee with cold water should be dropped to the head with the bandage intact.

For the next 5 days *gritha* should be given internally with warm water as *anuupana*. Bandage should be removed and fomented with *karanjabeejaksheerapaka*. *Aschothana* with *lodra*, *yashtimadhu*, *palasha*, *patola*, *haridra*, *daruharidra* mixed with honey.

In conventional medicine it can be compared to *Pterygium*, a degenerative and hyperplastic condition of conjunctiva, where sub conjunctival tissue undergo degeneration and proliferates as vascularised tissue under the epithelium which ultimately encroaches the cornea so surgical excision is the only satisfactory treatment.

Indicated procedures are;

1. McReynold’s operation – transplantation of pterygium in lower fornix is not performed now.
2. Surgical excision of Pterygium with conjunctival autograft
4. Postoperative use of antimitotic drugs such as mitomycin-C or thiotepa.\(^{16}\)

<table>
<thead>
<tr>
<th>Paralance steps:</th>
<th>Table no: 03</th>
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<tbody>
<tr>
<td><strong>Armachedana</strong></td>
<td>pterygium excision</td>
</tr>
<tr>
<td>For separation and elevation of <em>Arma</em>,<em>badisha</em> and <em>muchiyantras</em> are used.</td>
<td>Forceps are used.</td>
</tr>
<tr>
<td><em>Arma</em> should be lifted up for its clear separation with thread</td>
<td>Pterygium is lifted and rotated nasally</td>
</tr>
<tr>
<td><strong>Excision of Arma with MandalagraShastra</strong></td>
<td>Plain or curved scissors are used for excision</td>
</tr>
<tr>
<td><em>Lekhanaanjana</em> with <em>Pippali</em>(<em>Piper longum</em>),<em>Adrakha</em>(<em>Gingiber officinalis</em>), <em>Lahshuna</em>(<em>Allium sativum</em>), <em>yashti</em>(<em>Glacyrrhizaglabra</em>), <em>Amla</em>(<em>Embilica officinalis</em>), <em>Haridra</em>(<em>Curcuma longa</em>)and <em>Mircha</em>(<em>Piper nigrum</em>) are used post operatively to avoid recurrence.</td>
<td>After excision conjunctival grafts and Mitomycin-c drop are used.</td>
</tr>
</tbody>
</table>

**Drishtimandala Shastra chikitsa**

4) **Kaphajalinganasha**

*Sushruta* mentioned it as *vyadhanasadyavyadi*  

**Poorvakarma:**

Patient should undergo *snehana Swedana*, *virechana* before surgery. He should be made to sit and positioned properly after which he should be asked to fixed his gaze towards his own nose continuously. The patient should sit comfortably facing the sun. The attendant should hold head of the patient without shaking  

**Pradhana Karma:**
Patient should be asked to fix his gaze towards his own nose continuously. The surgeon should sit in front of him and hold the Yavakarashalaka between the thumb middle finger and index finger.

The Surgeon should open the eyes & puncture the eyeball towards the temporal canthus avoiding two parts of sukla mandala from Krsnamandala. The puncture should be made neither too high nor too low, nor at the sides and saving the network of veins it should be directed towards the daivikritachidra (Laterally). The proper puncturing results in a typical sound and the outflow of a drop of liquid.

As soon as the puncture has been done, the shalaka is held firmly in proper position. While the eye should be irrigated with human milk and fomented with vata hara dravyas and the substance of the lens should be punctured and scraped with shalaka. The patient should be made to blow out with force after closing the nostril of opposite side to expel accumulated kapha. When the patient is able to see the sun in the sky devoid of clouds, when the sight is clear (prakasha) and pain less, then it should be understood as properly scraped. Then the shalaka should be removed out slowly. The eye should be lubricated with gritha and bandaged with vastrapatta. There after patient should be made to lie in supine position in a room free from wind, smoke, dust.\footnote{17}

**Paschat Karma:**

He should be instructed to avoid belching, coughing, sneezing, spitting and shivering during the period.

Open the bandage after 3 days

- *Prakshalana with vata hara kashaya*
- *Mriduswedana*
- Bandage again
- Continue same steps for 7 days.

**Paralance Steps:**

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<tr>
<th>LinganashaShastraChikitsa</th>
<th>Table no: 04</th>
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<tbody>
<tr>
<td><strong>Site of incision:</strong> Avoiding 2/3\textsuperscript{rd} portion of sukla mandala towards apanga from krisnamandala.\footnote{18}</td>
<td>CataractSurgery</td>
</tr>
<tr>
<td>External scleral incision:1/3\textsuperscript{rd} to ½ thickness scleral groove is made about 3mm behind the limbus.\footnote{19}.</td>
<td></td>
</tr>
<tr>
<td>The Shalaka should be introduced into the eyeball at daivikritachidra (the junction of medial 2/3\textsuperscript{rd} and lateral 1/3\textsuperscript{rd} of the area between limbus and outer canthus)</td>
<td>Sclero-corneal tunnel incision in SICS: pars plana, a part of uveal tract which lies 4 – 6 mm, away from the limbus having very less blood supply.\footnote{20}.</td>
</tr>
<tr>
<td>If puncturing is perfect, water bubble comes out with a small sound</td>
<td>Indicates Keratome enters into the posterior chamber and water is nothing but the aqueous humour</td>
</tr>
<tr>
<td>After puncturing the eye ball, the papillary area of the lens has to be scrapped and curetted with the tip of shalaka(probe) and with the help of induced sneezing by closing the opposite nostril,</td>
<td>Anterior capsulotomy, and aspiration of cortex and nucleus</td>
</tr>
<tr>
<td>LinganashaVyadhahmaskalahaka(Yavvaktra)</td>
<td>Keratome( Internal corneal inision)</td>
</tr>
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DISCUSSION

- **Acharyas** have described various surgical procedures with indications; management of post-op complications indicates utmost care was given during the practice of surgical techniques.
- The concept of practical training mentioned in yogyasoothreeyaadhyaya is still relevant even today where the medical professionals are trained by performing surgery on dummies and other objects which have similar features.
- **Yavakarachedana** explained under Pakshmakopachikitsa simulates the technique of tarsal plate wedge resection practiced by the current day ophthalmologists.
- **Utsanginilekhanapoorvabhedana Shastra chikitsa** is similar to the present technique of chalazion cyst incision and curettage.
- The procedure of separating the Arma from the conjunctiva during procedure of Armachedana catches one’s attention as the same is seen being followed even today.
- **Lekhanaanjana** (scarifying agent) as paschat karma of Armachedana are having anti-angiogenic properties to stop the growth of tissue and the same is adopted at present where they use anti mitotic drug (Mitomycin-C) to check the recurrence.
- **Akshisamroshana** before Armachedana to elevate the surface of arma for easy excision is an outstanding exemplary of ouracharya’s technique.
- The types of Arma mentioned in our classics are not explained in the conventional science and thus could be an area of research.
- The incision in Kaphajalinganasha Shastra chikitsa which is self-sealing without any sutures explained by our Acharyas is authenticated one, as in nowadays also.
- Though the surgical steps are explained for Kaphajalinganasha, there is no clear reference about the extraction of lens, which would have been more relevant to present era.

CONCLUSION:

Sushruta Acharya is considered as the “Father of Surgery” even by the modern science. The descriptions of shastra karma in parlance to modern surgical ophthalmology explained here, understand in agreement of the same fact. The other surgical techniques explained in our classics though does not have a parlance in the contemporary science, are also of scientific value from the purview of quicker healing and to avoid recurrences. Now it is a time to review classics by developing our own idea and methodology which would be better to serve the society by adopting classical method.

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