

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

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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. *Shalakyatantra*, 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 otorhinolaryngological 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* (Trepining), *Vyadana* (Puncturing), *Kshara* (Alkali), *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 com-

prehensive 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 *netrarogas* 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 4000years old in India, back to Indus valley civilization which evidenced the opening of skull with a sharp stone¹.

The Vedic age:

The mythico-religious *shlokas* associated with this civilization were compiled in Sanskrit language between 3000 and 1000B.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 Rigveda².

The Upanishad age: The candle of ophthalmology knowledge continued to burn in Upanishad also where one can evidence the separate treatise on *Netrarogas* called *Netropanishad*. In *Aitareyaupanishat*(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 cavity³.

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.

Sushruta 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*⁴. So *RajaharshaNimi* deserves the credit of being the first eye surgeon on this earth.

Sushruta and Eye surgeries:

➤ Before proceeding to surgery on the human being, various surgical demonstrations technique are explained by *Sushruta* in *yogyasoothreyaadhyaaya*

- Sushruta has mentioned the importance of taking consent before surgery in the context of Ashmarichikitsa⁵.
- 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 *vyadhanasadyavyadhis* 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 *agnikarma* 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 *TridoshajaLekhanasadyavyadhi* where nodular swelling originates in the lower lid with the pus point opening in inner surface⁶, 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 *mandalagrashastra* or leaves (*gojihwa/shephalipatra*)⁷.

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:

Table no: 01

<i>UtsanginiBedhana and lekhana</i>	Chalazion Cyst Incision and Curettage
<i>Bedhana with Shastra</i> (Sharp instruments)	Incision is made with a sharp blade.
<i>Lekhana with mandalagrashastra and shephalipatra</i>	Curettage with curette

2) PAKSHMA KOPA

A type of *vartmaroga* 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 Pakshmakopa⁹:

POORVA KARMA

After proper *Snehanaand 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 surgery¹⁰

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 no: 02

<i>Pakshmakopa Shastra chikitsa</i>	Trichiasis surgery
Site of incision: two parts below the <i>Bru</i> (eyebrow),one part above the <i>Pakshma</i> (eyelashes), equidistant from the <i>Apanga sandhi</i> (outer canthi) and the <i>Kaninika sandhi</i> (inner canthi) ¹¹	2-3 mm above the lid margin, in Anterior lamellar and Tarsal wedge resection surgery ¹²
Shape of incision: <i>Yavakruti</i> (barley corn shape)	Elliptical incision is made on the lid
Excision: The skin of the eye lids should be excised Obliquely in the size of <i>Yava</i> ¹³ (barley corn)	An elliptical strip of skin muscle and tarsal plate is resected in tarsal wedge resection.

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* draws 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 *shuklamandala* is known as *arma* (*IyarthigacchathiithiArma*)

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 (*snayumamsaavrita*) 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 *muchutiyantara*. 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 *kaninika-sandhi*. 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 conjuncti-

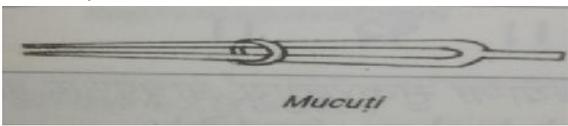
val tissue undergo degeneration and proliferates as vascularised tissue under the epithelium which ultimately encroaches the cornea so surgical excision is the only satisfactory treatment.

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
3. Surgical excision with amniotic membrane graft.
4. Postoperative use of antimetabolic drugs such as mitomycin-C or thiotepa.¹⁶

Paralance steps:

Table no: 03

<i>Armachedana</i>	pterygium excision
For separation and elevation of <i>Arma</i> , <i>badisha</i> and <i>muchutiyantras</i> are used.	Forceps are used.
	
<i>Arma</i> should be lifted up for its clear separation with thread	Pterygium is lifted and rotated nasally
Excision of <i>Arma</i> with <i>Mandalagra</i> Shastra	Plain or curved scissors are used for excision
<i>Lekhanaanjana</i> with <i>Pippali</i> (Piper longum), <i>Adrakha</i> (Gingiber officinalis), <i>Lahshuna</i> (Allium sativum), <i>yashti</i> (Glacyrrhizaglabra), <i>Amla</i> (Embilica officinalis), <i>Haridra</i> (Curcuma longa) and <i>Mircha</i> (Piper nigrum) are used post operatively to avoid recurrence.	After excision conjunctival grafts and Mitomycin-c drop are used.

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.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:

Table no: 04

<i>LinganashaShastraChikitsa</i>	CataractSurgery
Site of incision: Avoiding 2/3 rd portion of <i>sukla mandala</i> towards <i>apanga</i> from <i>krisnamandala</i> . ¹⁸	External scleral incision: 1/3 rd to 1/2 thickness scleral groove is made about 3mm behind the limbus. ¹⁹
The <i>Shalaka</i> should be introduced into the eyeball at <i>daivikritachidra</i> (the junction of medial 2/3 rd and lateral 1/3 rd of the area between limbus and outer canthus)	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. ²⁰
If puncturing is perfect, water bubble comes out with a small sound	Indicates Keratomeenters into the posterior chamber and water is nothing but the aqueous humour
After puncturing the eye ball, the papillary area of the lens has to be scrapped and curetted with the tip of <i>shalaka</i> (probe) and with the help of induced sneezing by closing the opposite nostril,	Anterior capsulotomy, and aspiration of cortex and nucleus
<i>LinganashaVyadhanashalaka(Yavavaktra)</i> 	Keratome(Internal corneal inision) 

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 our *acharya'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:

SushrutAcharya 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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