



Surgical Techniques in Ayurveda (Shalakya Tantra-Ent) Mentioned by Acharya Sushruta

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 12 Oct 2023	<p><i>In this article, we've covered the ENT surgery methods and techniques that Acharya Sushruta detailed in his famous book, the Sushruta Samhita. The founder of the Sushruta Samhita, Acharya Sushruta, is hailed as the "Father of Surgery" and "Father of Plastic Surgery." An essential component of Ayurveda is Shalakya Tantra, which focuses on the analysis and treatment of conditions affecting the mouth, nose, ears, teeth, throat, head, and eyes. Shalakya Tantra is described as "Shalakayah Yatkarma Shalakyam, Tat Pradhanam Tantram Shalakyam" by Acharya Dalhana. It denotes a location where Shalakas (instruments resembling rods) are utilised for therapeutic purposes. The Shalakya Tantra branch of Ayurveda deals with these instruments and how to employ them for therapeutic purposes. It can be found in numerous Ayurvedic treatises today. Sushruta Samhita contains the majority of the Shalakya Tantra, but it is also found here in fragmented form. Detailed discussions of surgical tools (yantras), various incision kinds, various suturing and bandaging techniques (bandha), fracture reductions, foreign body extraction techniques, etc. are contained in the Sushruta Samhita (about 600 BC). He also brought up the utilisation of reconstructive (Sandhana) surgery by Vaidyas even during the colonial era. Acharya gave a comprehensive explanation of ENT surgery procedures that are largely applicable and actual. Acharya Sushruta noticed that a number of fractures and dislocations connected to ENT can be treated. Today, many of the foreign body removal techniques he described are virtually same to those utilised then. Many conventional surgical techniques are still useful today. These interventions can be a tremendous help in learning new and cutting-edge practises with the help of contemporary advances. Our simple goal in</i></p>

<p>CC License CC-BY-NC-SA 4.0</p>	<p>writing this paper is to shed light on all the Shalaky Tantra subjects that are mentioned throughout Sushruta in various places.</p> <p>Keywords: Surgery, Yantras, Bandha, Susruta, ENT</p>
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1. Introduction

The oldest medical system, Ayurveda, often known as the science of life, has an extensive collection of detailed disease descriptions, prognosis, internal treatments, and surgical interventions that are being gradually accepted and studied by western medicine with the aid of cutting-edge technology. In terms of ENT treatment, surgery is a crucial component of Ayurvedic medicine. Our ancient Ayurvedic writings provide a thorough and organized overview of surgical treatments, including pre-operative, operative, and post-operative care as well as the management of complications after surgery. The most trustworthy and genuine Ayurvedic book for treating Shalaky Tantra disorders is Sushruta Samhita.

It contains a compendium of the most advanced and historically accurate surgical procedures of the time. In the context of treating ENT diseases when there were few diagnostic tools available, he has highlighted a variety of small as well as significant procedures like reconstruction surgeries. The same surgical procedures were used by many of the Acharyas who came before Acharya Sushruta. Even the western world explored and developed the sophisticated operations of today by following his path, thanks to Acharya Sushruta's surgical knowledge. Therefore, Acharya Sushruta is appropriately referred to as the "Father of Surgery" in both traditional and modern surgery.

Aims And Objectives

To research and combine the various ENT surgical methods and techniques outlined in the Sushruta Samhita.

Different Surgical techniques mentioned in Sushruta Samhita

1) Incisions

Acharya Susruta has suggested *Tiryaka* incision in places like eyebrows, cheeks, temples, forehead, lips etc in Susruta Samhita 5th chapter. ¹

2) Yantras

Sushruta Samhita 7 th chapter gives a detailed explanation about *Yantras* and their indications.

- Swasthika Yantra – mentioned for removal of foreign bodies from bones i.e *Asthi Vidhashta Shalyodharanartham*. ²
- Tala Yantra – mentioned for the removal of foreign bodies from Ear, Nose, Sinuses i.e *Karna nasa nadi shalyanam aharanartham*. ³
- Nadi Yantra- mentioned for the removal of foreign bodies from srotases i.e *Srotogatha shalyodharanartham*, to observe the disease inside i.e *Rogadarshanartham*, and to suck out the accumulated fluids like pus or blood i.e *Aachooshanartham*. ⁴
- Shalaka Yantra- mentioned for the removal of foreign bodies from srotases. i.e *Srotogatha Shalyodharanartham*, removal of polyps or tumours from nose i.e *Nasaarbuda aharanartham* and for application of kshara i.e *Ksharoushadha pranidhanartham*. ⁵

Reconstructive Surgeries

Acharya has mentioned 15 techniques of Karna Bandha or Otoplasty in Sushruta Samhita. ⁶

- **Nemisandhanaka:** When both the parts of the cut ear are thick, broad and even i.e regular or symmetrical.
- **Utpalabhedaka:** When both the parts are round, long, and even i.e symmetrical.
- **Valluraka:** When both the parts are small, round and even.
- **Asangima:** It is done when internal part only is long.
- **Gandakarna:** It is done when the external part only is long.

- **Aharya:** It is done when there is very small lobe or absence of lobe on both sides.
- **Nirvedhima:** It is to be done when the ear is well fixed at both side and the ear lobe is thin and adhering loosely or when the lobes are torn at the root.
- **Vyayojima:** It is done when one of the ear lobes is thick and the other one thin, or when one regular and other one irregular.
- **Kapatasandhika:** It is done when the internal lobe is long and other lobe is short.
- **Ardhakapata sandhika:** It is done when the external lobe only is long and other part of the lobe is short.

Acharya Sushruta has also mentioned 5 types of Asadhya Karnasandhana Techniques also ⁶

- **Sankshipta:** When the karnashashkuli or pinna of the ear is dry, one part of earlobe is elevated and the other part is very small.
- **Hinakarna:** When the earlobe is not fixed all around and its muscle is lost or absent.
- **Vallikarna:** When the earlobe is thin, irregular and small or short.
- **Yashtikarna:** When the earlobe has muscular nodules, static immovable, with network of veins and the lobe is small or short.
- **Kakaushataka:** When the lobe has no muscles has constricted tip and some blood in it.

Acharya has mentioned various suture techniques in different conditions as follows:

- Acharya has mentioned that when the *karnapali* (pinna) of both the ears are not present, then it should be repaired by cutting the skin at the back of ears.⁷
- When the *karnapali* (pinna) is damaged greatly, joining should be done medially, whereas when the damage is great medially then joining should be done posteriorly.⁸
- When the pinna only is present and is big, thick and static, then it should be cut into two and joined.⁹
- Cutting out a flap of the living muscles from the cheek retaining its connection intact, turning over to the site of the lobe after scrapping the area, thus making up the lobe.¹⁰

Nasa Sandhana Vidhi (Rhinoplasty) ¹¹

- A tree leaf should be taken, cut into the shape and size of the nose, placed on the cheek.
- Cheek muscle of same size is cut, by raising a flap out of it also maintaining the connection with the muscles.
- The flap is placed on the affected nose after scrapping it.
- Appropriate bandage should be applied, 2 tubes should be inserted into each nostril.
- Medicinal choorna should be sprinkled on the nose and cotton swab placed on it.
- Tilataila should be sprinkled on the operated site frequently.
- After the operative site has healed, the flap of muscles should be cut in its half letting the remaining part to be intact.
- If the nose is short efforts should be made to accelerate its growth and in case of excessive growth, it can be made even by using the methods of cutting or scraping.

Oshtha Sandhana Vidhi (Oroplasty) ¹²

Injured lips can be joined in the same way as Nasasandhana Vidhi except insertion of tubes.

Bandages (Bandha) – Types ¹³

Acharya Sushruta has mentioned various types of bandaging techniques in the 18th chapter.

- **Swasthika Bandha (cross mark or plus)**- Used in between eyebrows (Bhru) and ears (Karna).
- **Pratoli (broad):** for *griva* (neck).
- **Khatva bandha (Four tailed bandage):** for *hanu* (lower jaw), *shankha* (temples) and *ganda* (cheeks).

- **Vitana bandha (tent like):** for *murdhani* (scalp).
- **Gophana bandha (like horns of cow or T bandage):** for *chibuka* (chin), *nasa* (nose) and *oshtha* (lips).
- **Panchangi bandha (five tailed):** for parts or organs above the shoulder (*Urdhavajatrana*).

Other types of bandaging¹⁴

- **Gaadha bandha (Tight bandaging):** on head.
- **Sama bandha (Moderate bandaging):** on face, ears and throat.
- **Shithila bandha (Loose bandaging):** on the joints.

Ashtavidha Shastra Karma

In Susruta Samhita 25 th chapter, Acharya has explained *Ashtavidha Shastra karma* (Eight surgical procedures)

- **Chedyaroga** (diseases requiring excision)¹⁵: *Shleshmika granthi*, *Mamsa sanghata* (benign tumour of palate), *Galashundika* (enlargement of uvula), *Adhrusha* (swelling in palate).
- **Bhedyaroga** (diseases requiring incision)¹⁶: All abscesses (*Vidradhi*) except that produced by all the *doshas* together, *Vataj*, *Pittaj* and *kaphaj* tumours (*granthi*), two kinds of *Vrinda* (small tumours of throat), *Talupuppata* (tumours of the palate), *Tundikeri* (tonsillitis), *Gilayu* (Tonsillar abscess), *Kshudra roga* like *Khalitya*, *Palitya* etc.
- **Lekhya roga** (diseases requiring scrapping)¹⁷: *Vataj*, *Pittaj*, *Kaphaj* and *Sannipataja Rohini*, *Upajihvika* (swelling of tongue), *Adhijihvika* (Adenoids or epiglottitis) *dantavidharbha* etc.
- **Vedhyaroga**¹⁸ (diseases requiring puncturing): Vitiated veins (*Sira*).
- **Eshyaroga**¹⁹ (diseases requiring probing): *Sashalya vrana* (wound with foreign body inside), *Unmargi vrana* (sinus ulcer which spreads sideways).
- **Aharya roga**²⁰ (diseases requiring extraction): *Karnamala* (ear wax), three types of *sharkara* (salivary calculus), *shalya* (all kinds of foreign bodies).
- **Sravyaroga**²¹ (diseases requiring drainage): All kinds of *Vidradhi* (abscess) except *Tridoshaj Vidradhi*, *Ekadeshya shotha* (inflammatory oedema confined to one place), *Palyamaya* (diseases of the earlobe), all kinds of *arbuda* (malignant tumours), three kinds of *granthi* (benign tumours), *Galashaluka* (epiglottitis), *Jihvakantaka* (inflammation of tongue), *Talukantaka* (inflammation of palate), *Kshudra rogas* including *Khalitya*, *Palitya*, *Darunaka* etc.
- **Sivyaroga**²² (diseases requiring suturing): *Medasamuttha roga* (tumours etc. arising from fats), *Sadyovrana* (traumatic wounds), *Chalasanghivyapashrita vrana* (diseases localized on movable joints requiring suturing).

Types of sutures:²⁴

- Vellitaka
- Gophanika
- Tunnasevani
- Rijugranthi

Types of needles:²⁵

- **Vritta Anguladvayam** (Round and around 4cm long)- for body parts which have *Alpa mamsa* (less muscles) and for (Sandhi) joints.
- **Ayata trayangula trayasra** (three edges and around 6cm long)- for body parts which have more muscle mass ie. *Mamsala*.
- **Dhanurvakra** (curved like bow)- It is ideal for *Marma pradesha* (Vital points).

Foreign body extraction – Different methods

27 th chapter of Susruta Samhita Sutrasthana, Shalyapanayaniya contains knowledge regarding removal of foreign bodies and explains various methods of foreign body extraction in detail.

- **Foreign bodies from the eyes and other body parts** come out spontaneously through the actions of crying (Ashru), sneezing (Kshavathu), belching (Udgara), coughing (Kasa), and other respiratory movements.
- **Mamsaavagada shalya avidahyamana i.e** A foreign body that has become lodged inside the muscles but isn't causing burning should be forced to erupt with blood and pus by inducing suppuration; if this doesn't work, it should be ripped out or struck with tools (Pachana, Bhedana, Darana, and Peedana).
- **Indriya shalya i.e** Using Parishechana (pouring water), Adhamapana (blowing air), and Parimarjana (sweeping with hands, cloth, or hair), little foreign bodies that have become trapped in the sense organs should be expelled.
- **Aharashesha shleshmahina anu shalya i.e.** By triggering shwasana (breathing), kasana (coughing), and prathamana (blowing air), foreign materials such as food particles, mucus, and minute should be expelled.
- **Annashalya i.e.** Food fragments can be removed by causing vomiting by putting fingers or other objects in the mouth.
- **Vrana dosha** – Pus should be flushed out of the wound cavity by washing with water.²⁶
- **Sirasnayu vilagnama shalya i.e** Foreign objects that have become lodged in veins and ligaments need to be removed using shalaka (metal rods), etc..²⁷
- **Svayathugrasta i.e.** Foreign bodies lodged in oedema- should be removed by squeezing.
- **Asthivivara pravishtha shalya i.e.** When a foreign body is found inside a bone, a doctor should either hold the patient by the legs and use a blunt instrument to pull the arrow out, or the patient should be held by strong people. The arrow's shaft should then be bent with the aid of an instrument and fastened with a five-tailed bandage to the string of a bow at one end and the horse's reins at the other end. The horse should then be whipped so that it lifts its head suddenly and forcefully pulling the arrow out. Or else the arrow can be tied to tree branch after bending it downwards, then leave it so that it will be removed by force.²⁸
- **Jatushe kanthasakte i.e.** When a foreign object formed of shell lac is discovered stuck up in the throat, a hollow tube should be implanted first, and a heated metal rod should then be pushed through it until it meets the foreign object. Cold water should be applied to the foreign body when it sticks to the hot rod, and once it becomes stable, it should be removed.²⁹
- **Ajatusha shalya** – If a foreign object is not formed of shell lac, it should be removed using a rod covered with beeswax or lac, as previously mentioned.³⁰
- **Asthishalya tiryaka kanthasakta i.e.** If a bony foreign body is discovered horizontally stuck up in the throat, the patient is forced to swallow a clump of hair strung on a long, strong thread together with liquid food. He is then forced to eat more liquid food until his stomach is completely full before being forced to vomit. When a foreign body is found adhered to a ball of hair during vomiting, the thread should be abruptly removed, or a soft tooth brush made from plant twigs can be utilised. If these actions result in it not coming out, it should be buried deep inside.³¹
- **Graasashalya kanthasakte i.e.** If a food bolus becomes lodged in the throat as a foreign body, the person should be forced to bend and hit hard over the neck with the fist without his awareness. Alternatively, he may be forced to drink oil, ghee, wine, or water to force the food bolus into the stomach.³²

Sites of venupuncture in different diseases

Vyadhana sthana (place of puncturing) is mentioned by Acharya Sushruta. ³³

- In *Galaganda* (tumour in the neck)- vein present in *uroomoola* (base/root of the thigh) should be punctured.
- In *Jihvaroga* (diseases of tongue)- Adhojihva (base of the tongue) should be punctured during siravedhana.
- In *Taluroga* (diseases of palate)- *talū* (palate) should be punctured.
- In *Karnapeeda and Karnaroga* (otalgia and ear diseases)- *Siravedhana* should be done around the ears (*karnyopari samantata*).
- *Gandhagrahana & Nasaroga* It should be performed at the Nasagra (tip of the nose) in cases of loss of smell sense and nose disorders.
- In *Shiroroga* (diseases of the head)- veins of the same place should be punctured.

Management of fractures and dislocations

In this chapter, named, *Bhagna Chikitsa*, treatment of different types of *bhagna* (fractures) and *chyuti* (dislocations) is given.

- ***Akshakasthi chyuti*** (dislocation of clavicle): A tight bandage should then be applied after the region has been fomented, pulled up with a wooden pestle, or pushed down if it is bursting up.³⁴
- ***Grivavivriti*** (twisting of the neck): When the neck is found to be twisted or sunk into the chest, the doctor should hold the head at the lower jaw and avatu (nape of the neck) and pull the neck upward. The neck should then be bandaged with cloth bands and the patient is told to sleep with his face up for seven days without any laxity.³⁵
- ***Hanusandhi chyuti (dislocation of lower jaw)***: The doctor should apply Panchangi bandha (five-tailed bandage), anoint the area, administer fomentation, and physically realign the lower jaw into its proper position. Injecting droplets of oil infused with vata-mitigating and sweet medications into the nose has significant positive effects.³⁶
- ***Nasabhanga (fracture of nose)***: When the nose is crooked or distorted, it should be straightened with the aid of an iron rod. Hollow tubes with openings on both ends are then inserted into the nostrils, one into each, and then bandaged before being anointed with ghee and bathed in it.³⁷
- ***Karnabhanga(fracture of ear)***: When the ear is broken, it must be put back in its proper position, bathed in ghee, and bandaged with ghee-soaked cloth before being treated as a fresh lesion.³⁸
- ***Sira kapala bhagna (fracture of skull bones)***: When the kapala asthi (flat bones of the skull) are found to be broken without the mastulunga (brain matter) protruding, the area should be soaked in a honey-and-ghee mixture and wrapped. The patient is then told to only consume ghee (medicated) as food for the following seven days.³⁹

References related to Management of different ENT diseases

- ***Indralupta Chikitsa (Alopecia areata)***- After anointing and fomentation, the vein of the scalp should be punctured. Then the skin should be incised, and medication paste should be placed.⁴⁰
- ***Arunshika Chikitsa*** - The lesions should be cleaned with a decoction after letting the blood out.⁴¹
- ***Darunaka Chikitsa*** - The scalp should be anointed and fomented before the vein is pierced. .⁴²
- ***Mukhroga Chikitsa*** or treatment of diseases of the mouth is given in this chapter.
- ***Pittaj, Raktaj and Abhigataj Oshtha roga*** (swelling of the lips) can be treated by Rakthamokshana.⁴³
- In ***kaphaj oshtha roga***, Bloodletting should be done.⁴⁴

- In *medoj oshtha roga*-. Following fomentation, a sharp instrument should be used to make incision which should be later cleaned, and cauterised. ⁴⁵
- In *pittaj and kaphaj Jihvakantaka* (inflammation of tongue), bloodletting should be done. ⁴⁶
- In *Upjihva* (swelling of tongue), tongue should be scrapped (*Lekhana karma*).⁴⁷
- *Galashundika* (enlargement of uvula), The uvula should be pulled using a forceps held by the thumb and finger, and then it should be cut with mandalagra shastra. one-third of its length should be cut, pulling too much causes bleeding and eventually leads to the patient's death. Inadequate cutting causes swelling and increases salivation etc. ⁴⁸
- In *Tundikeri* (tonsillitis), *Adhrusha* (swelling in palate), *Kurma, Talu sanghata* (benign tumour of palate) and *Talupuppata* (tumour of palate), *Shastra karma (Surgical treatment) should be done.* ⁴⁹
- In *Vataj, Pittaj, Kaphaj and Raktaj Rohini*, bloodletting should be done.⁵⁰
- *Adhijihvika* (adenoids or epiglottitis) *should be treated like upjihvika ie.lekhana karma (Scrapping) should be done.* ⁵¹
- In *Ekavrinda* (small tumour of throat), bloodletting should be done.⁵²
- In *Gilayu* (tonsillar abscess), *Shastra karma* or surgical intervention is required.
- In *Amarmastha Galavidradhi* (abscess in non-vital spots), when well ripe should be excised just like other abscesses.
- In *karnapali* (earlobe) treatment, *Asrigamokshana* (bloodletting) should be done.⁵³
- *Karnakita (insects, wax or fluids present in ear)*- These are removed by using either a *Shringa* (horn) or *Shalaka* (rod like instrument).⁵⁴
- *Nasapaka Chikitsa*- Bloodletting should be done. ⁵⁵
- *Anantavata Chikitsa- Siravyadha* (Venupuncture) should be done.⁵⁶
- *Shiroroga chikitsa*. - The doctor should use *Siramokshana*⁵⁷ (Venupuncture) if the disease does not improve after trying every remedy listed in the context of shiroroga. After coming out, the area should be washed in a honey-and-ghee mixture, bandaged, and the patient should only consume therapeutic ghee as meals for seven days. ³⁹

Discussion

The preoperative, operational, postoperative, and treatment protocols for a variety of surgical techniques have all been covered by Acharya Susruta. Incisions on the face should match creases or wrinkle lines⁵⁸, according to modern science⁵⁸, and this fact is identical to what is indicated in the Sushruta Samhita. Various *yantras* mentioned in *Sushruta Samhita* is almost similar to the instruments of modern science like *Svastika yantra* can be compared to forceps like Crocodile forceps⁵⁹, tilley's forceps⁶⁰, hartman's forceps⁶¹ etc. *Tala yantra* (with discs or scoops) can be compared to Wullstein cupped forceps⁶², Blakeslay forceps⁶³, Rosen curved microcurette ⁶⁴ etc. *Nadi yantra* (with one opening or openings at both ends) can be compared to Ear speculum, Otoscope, Endoscopes, Endoscopic suction tips etc. *Shalaka yantras* (rod like instruments or probes) are similar to Jobson's horne probe ⁶⁵, Bowman lacrimal probe ⁶⁶etc.

Different types of surgical procedures like *Lekhana* (Scrapping), *Chhedana* (Excision), *Bhedana* (Incision), *Vyadhana* (Puncturing), *Seevya* (Suturing) etc. are being used till now. • Modern reconstruction procedures like otoplasty, which also uses skin grafts,⁶⁷etc., and rhinoplasty, or nasal reconstruction (using skin from the cheek to rebuild the columella or nasal ala), ⁶⁸etc., are somewhat modified versions of the procedures listed in the Sushruta Samhita.

Different bandaging techniques mentioned in *Sushruta Samhita* has similarity with present day techniques like:

- ❖ *Svastika Bandha*- Cross bandage.
- ❖ *Khatva bandha* ⁶⁹ – Four tailed bandage of jaw, side of the temple bandage.
- ❖ *Vitana bandha* ⁷⁰ - Recurrent bandage of head with two bandages or Cap bandage.
- ❖ *Gophana bandha*- Nasal sling bandage.
- Suture techniques given by Acharya Sushruta are also being used till today, like ⁷¹
 - ❖ *Vellitaka*- Continuous suture.
 - ❖ *Gophanika seevana*- Blanket suture.
 - ❖ *Tunnasevani*- Subcuticular suture.
 - ❖ *Rijugranthi*- Interrupted suture.
- (*Suchi*) The surgical needles used back then and the ones used today can be compared as follows:
 - ❖ *Vritta Anguldvayama* – Straight needle (Round).
 - ❖ *Ayata trayangula trayasra*- Straight needle (Three edged).
 - ❖ *Dhanurvakra* – Curved needle.

Many of the foreign body removal techniques described by Acharya are essentially identical to those used today. Acharya Sushruta noted that a variety of fractures and dislocations associated with ENT can be treated. With rod-like devices, the Sushruta Samhita describes a method for removing insects, wax, fluids, etc. that is analogous to what is currently done in modern science with jobson's horne probes, cerumen hooks, etc. ⁷²

4. Conclusion

It Acharya provided a thorough overview of ENT surgery procedures that are, to a large degree, real and applicable. Numerous traditional surgical procedures are still applicable today. With the aid of modern developments, these interventions can be a huge assistance in learning new and cutting-edge practises.

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