

## THE SHALYA TANTRA AYURVEDIC SURGERY BRANCH EVALUATION

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### ABSTRACT

Ancient surgical science *Shalya Tantra* is in favour of any techniques that aim to get rid of the things that cause pain or suffering in the body or psyche. The period in which Sushruta underwent his wonderful surgery in mediaeval India is now known in ancient India as "the Golden Age of Surgery." The Association of Indian Plastic Surgeons welcomes this outstanding Ayurvedic physician by placing him in a prominent position within the Association's symbol. In this examination, an effort was made to draw attention to some of the traditional surgical principles from the *Sushruta Samhita* (Ayurvedic Medical Text) that are still used today mostly unaltered.

**KEYWORD:** Ayurved, *Shalya Tantra*, Surgery, Sushruta.

### INTRODUCTION

When discussing the history of medicine, written records are not taken into consideration. Pre-Vedic history would be regarded as beginning with the Indus Valley Civilization and ending with the Vedic period. At the period, illness was considered to be a result of magic and the supernatural. Ayurveda is a system that helps preserve a person's health by using nature's inherent values to bring the individual back into balance with his or her true self.<sup>[1]</sup> In essence, since the beginning of time, Ayurveda has existed because we have always been governed by the law of nature.

*Shalya Tantra* – The reach of this branch of Medical Science is to extract (from an ulcer) any extraneous material such as bits of straw, rock, dirt, iron or bone particles; splinters, nails, skin, clotted blood, or condensed pus (as the case may be) or to remove a dead uterine fetus,

or to induce healthy parturition in the event of a false presentation; and to deal with the principle and mode of using and handling surgical instruments in general, and with the application of heat (cautery) and alkaline (caustic) substances, together with the diagnosis and treatment of ulcers. When we list the first contributing in surgery, Sushruta's name is seen in all those first names, such as first describing dissection, absorbable suture material, instruments, specific disease operating procedure. Like this, the list appears to be almost so much that shows Indian science's contribution to the medical field. Sushruta Samhita, a systematic surgery study (General, Orthopedic, Plastic, Gynaecology, ENT, Ophthalmology, etc.) is the earliest treatment and also the best that deals with the surgery in particular in detail with the principles of surgery.

### Historic background

During the Vedic period, the Rigveda and Atharvaveda are the key sources of information about medicine. We note in Rigveda that legs have been amputated and replaced by iron replacements, wounded eyes have been taken out and arrow shafts cut from the Aryan warriors' arms. Healing spells and mantras preceded medicine in India,<sup>[2]</sup> and the first person of medicine in India was priest, a BhisagAtharvan, who held a top position to a surgeon in Society. Within Rigveda, there are sporadic occasional references to the diseases or their causes. Atharvaveda's Kaushika Sutra has references to Vrana (wound). If wound is open, and if wound is closed, jalasa (cow's urine) should be used to treat the patient with pepper corns to feed. The Sushruta Samhita, Charaka Samhita and AstangaSangraha provide a detailed description of Vrana. Earlier researchers follow the trilogy wording. Sushruta applied the idea of Vrana to many chapters. By mentioning the Great Ancient Surgeon, Sushruta, mentioning the AyurvedicShalya Tantra word does not full. It is safe to claim that Sushruta belonged to Vishwamitra race. He is described by the Mahabharata as a son of that royal sage. This fits with the description given by him in the Samhita's current recession. The Garuda purana places Divodasa as the fourth descendant of Dhanvantari, the earth's first profounder of medical science, while the Sushruta Samhita describes the two as identical individuals. There is no ground whatever to suppose that Sushruta borrowed his system of medicine from the Greeks. On the contrary, there is much to tell against such an idea - Weber's History of Indian Literature.<sup>[3]</sup> In his book 'Geschichte pharmzie,' Hermann Schelenz (1904) concludes that "Indians are one of the world's oldest civilized people. There are coincidences in science as in art and philosophy Gravitation and blood circulation have been known to the Indians long before the births of Newton and Harvey in Europe."<sup>[4]</sup> The Harita

Samhita, which is older than the Sushruta Samhita according to some scholars, refers to blood circulation in the definition of Panduroga (Anaemia). The infection, he states, is caused by eating clay, thereby restricting the vein's lumen and preventing blood circulation. Bhavamishra, Bhavaprakasha's celebrated author and a century older than Harvey, has the above-mentioned couplets on the subject.<sup>[5]</sup> Frank McDowell's source book of Plastic Surgery aptly welcomes and defines "Sushruta as-through all the flowery language, incantations and irrelevancies of Sushruta, the unmistakable image of a great surgeon shines there."<sup>[6]</sup> Undaunted by his mistakes, unimpressed by his achievements, he actively searched for the truth and passed it on to the followers. Using rational and logical approaches, he certainly fought illness and deformity. He made one when the direction did not exist. "Therefore it was clear that Sushruta was the great plastic surgeon."<sup>[7]</sup>

### **Shalya Tantra's supremacy**

Sushruta has been a surgeon unequivocally, and Sushruta Samhita is only a full book that deals with practical surgery and midwifery issues. The glory of elevating surgical art can be traced to Sushruta as one of the top divisions in his era's medical field at its highest. Sushruta Samhita, Sushruta's medical treasure, is regarded as the Bible for learning Ayurveda's Shalya Tantra branch. Since this branch is all about surgery, a good knowledge of practical anatomy is required for practical surgery.

### **Anatomical knowledge in ancient times**

This quote from Somerset Maugham<sup>[8,9]</sup> "You'll have to learn a lot of tedious things that you'll forget when you've passed your final exam, but in anatomy it's better to have learned and lost than never to have learned at all." Ancient Egypt's Paruschittas (Dissector) may have learned their art from ancient India's Paruschittas (Dissector).

### **Dead Body Dissection in Ayurveda**

Sushruta identified the dissection of the body and also the method for preserving the dead body for the landmark and knowledge of anatomy.<sup>[10]</sup> For a surgeon, the core of his study is anatomical knowledge, without which his work will be like the work of slaughter. A sound anatomical knowledge is capable of achieving surgical art skills. Sushruta, an empirical thinker, minded researcher and man with in-depth knowledge quotes several verses on how to preserve the deceased, which will be used to gain anatomical knowledge in due course. Although it seems to be crude the age-old method of preservation, it is an important one. The dissection method has been so accurately stated in the texts that the same method has been

used in recent times in a modified manner. It is quite brilliant to start from the selection of the deceased body to its preparation for dissection. Ancient scholars had such a minute of study and a realistic orientation. He also states that anyone who wants to acquire a thorough knowledge of anatomy should prepare and carefully observe a dead body (by dissecting it) and examine various parts.

### **Ancient instruments used to perform surgery**

Without the use of instruments, surgery cannot be thought of. Surgical instruments are the means of removing the Shalya from its seat or position where it is trapped (any foreign or alien substances that affect the body and mind alike).<sup>[11]</sup> This definition describes the broader meaning of the term 'instruments' that does not limit it to physical materials. To further clarify, such as for example. Sorrow is also a Shalya because it harms the body; it is to be used to extract this sorrow (Shalya) from the joy of the body. 101 instruments are elucidated by Sushruta and Vagbhata mentions it is countless. The instruments' names are given according to their animal-like shapes, birds etc. e.g., Simhamukha (Lion Forceps), Shararimukha (like Sharari Bird-Scissor). Even now, this peculiar way of naming surgical tools is followed after the animals or birds.<sup>[12]</sup> The first uses of the spring forceps and dissection and dressing forceps of the traditional surgeon were his Samdamsa Yantras. Sushruta first laid down diagnostic instruments such as Nadiyantra and its concepts, which took many modifications with the advent of technology to achieve the present form of endoscopes.

### **Sterilization & Antiseptic action**

Prior to their use, the instruments recommended for surgical procedures should be heated, otherwise there is a risk of pus formation.<sup>[13]</sup> Sharangadahara recommends that the fumes produced by burning the following substances with ghee will disinfect a sick room: peacocks feather, Neem leaves (Azadirachta indica), salt, asafoetida, jatamansi (Nardostachys jatamansi), shalmali seeds (Bombax malabaricum), and goat skin.<sup>[14]</sup> Sushruta advises a surgical patient to fumigate a sick room for ten days, morning and evening after surgery.<sup>[15]</sup> The surgeon should cut off his hair, nails, and wear sterilized white clothing.<sup>[16]</sup>

### **Yogya-The practice of practicing surgery**

To achieve efficiency in surgical procedures, Dhanvantari's doctors are asked to repeatedly first test their knives on natural and artificial artifacts resembling the body's diseased parts before performing an actual surgery. Eg: Incision was performed on Alabu (Longenaris

vulgaris) pushpaphala (Cucurbeta maxima), venesection was performed on dead animal vessels and on water-lily stalks.<sup>[17]</sup>

### Trividha Karma-Three operating procedures

'Trividha' means three forms and operating procedure means the term 'Karma.' The three types of operation are nothing more than pre-operative, surgical and post-operative operations, a standardized description of surgery.<sup>[18]</sup> Whatever the surgical procedure may be, there are three sections that have been listed above. Pre-operational implies not only relevant to patient readiness. Sushruta stresses the importance of gathering all the necessary materials for post-operative treatment during the operational procedure.

### Purvakarma (Pre-Operative)

Sushruta provides us with a list of devices needed for surgery: <sup>[19]</sup> Blunt Instruments, Sharp Instruments, Potential Cautery, Actual Cautery, Shalaka or Rods, Horns, Leeches, Hollow Bottle Gourd, Jambav-Oushta (A Bougie of Blackstone, extremity of which is shaped like the fruit of Jambul Tree (Urgineajambolana), Cotton, Pieces of Cloth, Thread, Leaves, Materials of Bandaging, Honey, Ghee or Clarified Butter, Suet, Milk, Oils, Tarpan- Flour of any perched Grain or Condensed Milk Etc. Mixed with water to mitigate thirst. Decoctions, Liniments, Plasters, Fan, Cold and Hot Water, Iron Pans and other Earthen Vessels; Beddings and Seats, Obedient, Steady and Strong Servants should be kept ready before surgery.

### Pradhana Karma (Main Operative procedure)

This mainly includes Ashtavidha Shastra karma [eight surgical procedures] and Ayurved surgeon needs to be familiar with these eight surgical procedures. Almost all surgeries performed today are conducted by modern surgeon with these eight techniques of Sushruta.<sup>[20]</sup>

### Ashtavidha Shastra karma - Eight surgical procedures

Sr. no.	Ashtavidha Shastra karma	Eight surgical procedures
1.	Chedana	Incision, Amputation or Excision
2.	Bhedana	Incision for opening a cavity or Taping of cavity
3.	Lekhana	Scraping
4.	Vyadhana	Paracentesis or Puncturing
5.	Eshana	Probing
6.	Aharana	Extraction
7.	Visravana	Bloodletting or drainage of pus
8.	Seevana	Suturing

### Suturing

The threads used may consist of silk, cotton, jute, human hair, horse hair, snayu (tendon), internal tree bark, tendril, etc.<sup>[21]</sup> The needles may be flat, round body, straight triangular, curved, half curved, triangular, etc. The types of suturing are: Rujugranthi (Simple interrupted), Anuvellita (Simple continuous), Gophanika (Blanket sutures), Tunnasevani (Lambart, Subcuticular) etc.<sup>[22]</sup> In surgery how skin suturing should be done to avoid the complication is most important. It should not too long from margin otherwise may be painful and should not be too close from margins otherwise they will cut through (Su. Su. 25/26).

### Paschat Karma (Post-Operative measures)

The patient must be assured after the surgical procedure. It is necessary to clean and dress the operative wound with Vikeshika (medicine impregnated pad) or proper medicinal oil, emulsion, paste or dusting powder etc.<sup>[23]</sup> To stop the creation of pus, the operative wound section should be fumigated with germicidal or air purifier medicines. The patient is to be held in the post-operative ward of Vranitagara for ten days.

### Bandhana (Bandaging)

Also noteworthy is a detailed account of the use of bandages in post-operative wound care as well as in fracture management.<sup>[24]</sup> Medicos were told to learn fourteen varieties of bandaging methods on dummies.

### Fourteen types of bandages

Sr. no.	Bandhana / Bandage	Utility
1.	Kosha ( Sheath)	Around thumb and fingers
2.	Dama ( Long roll)	Sling around straight parts of small width
3.	Svastika (Cross- like)	Spica around joints
4.	Anuvellita ( Spiral )	Around upper and lower limbs
5.	Mutoli ( Winding)	Circular – around neck, penis
6.	Mandala (Ring)	Circular – around stumps
7.	Sthagika (Betel box type)	Amputation stumps, tips of penis or fingers
8.	Yamaka (Two- tailed )	Around limbs to treat ulcers
9.	Khatva ( Four- tailed)	For jaw, cheeks, temples
10.	Cheena ( Ribbon-like)	Outer angles of eyes - temples
11.	Vibandha (Loosely knotted noose like)	Over back, abdomen and chest
12.	Vitana (Canopy-like)	Protective cover over head wound
13.	Gophna (Cow-horn)	Over chin, nose, lips, anorectal region
14.	Panchangi (Five-tailed	Head and neck above the level of clavicles

### **Specification of the Surgical Unit**

Sushruta directs that there should be a particular room provided for patients who have undergone surgical operation.<sup>[25]</sup> This room should be a clean house in a healthy place, free from draughts and not exposed to the sun's glare. Patients' bed should be soft, spacious, and smooth. In the room morning and evening, pastils made of Sinapisnigra and Azadirachta indica with clarified butter and salt should be continuously burned for ten days. The sick-room fumigation with antiseptic preparations such as Ashtangadhupas is no less than the traditional OT Fumigation implementation.

As far as dispensaries are concerned, Sushruta advises the doctor to build his dispensary in a clean location, and the building should face some auspicious direction such as the east or the north. The medicines should be kept on stakes or pins in burnt earthen pots arranged on planks.

### **Anaesthetics in the Indian Medicinal System**

There were many signs that earlier surgeons felt such an agent's need to create insensitivity to pain. The use of wine to produce the desired effect is stated by Sushruta. He says: "Wine should be prescribed to her after a dead fetus has been removed before the full term, which will improve her uterus condition, make her happy and alleviate the pain of the operation." There is no literature on anesthesia that precedes this procedure anywhere in the world. Until surgery, Sushruta says-wine should be used to create insensitivity to pain those with drinking wine addiction. He remarks again; it is ideal for the patient to be fed before being operated on wine-free. Those who are addicted to drink and those who cannot bear pain, should be made to drink some strong beverage.<sup>[26]</sup> The patient who has been fed is not fainting, and the patient who becomes intoxicated is not feeling the surgery's pain.

### **Quality of the Surgeon**

Courage, quick acting, non-shaking, non-sweating, sharp instruments, self-confidence and self-control are what a surgeon should possess.<sup>[27]</sup> The qualities are the same as the Lion's Heart, the Ladies' finger of Eagle's eyes, etc., as described in modern times.

### **Importance of written consent to the following**

In case of surgery in Ashmari before planning the surgery on urinary bladder Sushruta advised to take prior permission of king before surgery on the patient.<sup>[28]</sup> The surgery mentioned is the perineal cystostomy of today that was practiced at the time and may be fatal

in some individuals, so written consent needs that time that is relevant to the surgical ethics of today and the importance of written consent before all surgeries.

### **Types of incision**

Circular incision at arm & leg is preferred, while semi-circular incision is preferred in the anal region.<sup>[29]</sup> The definition of incisions in Bhangdara (Fistula in ano), Langlaka (Curvilinear), Ardha-langlaka (half curvilinear), Gothirthaka (Longitudinal) etc.<sup>[30]</sup>

### **Plastic and rhinoplasty operations**

The Ayurvedic community was proud to say that Sushruta was the first successful demonstration of plastic surgery,<sup>[31]</sup> showing the feasibility of mending a clip earlobe with a patch of sensitive skin-flap scraped from the neck or adjacent part. In nasasandhan (Plastic surgery –Rhinoplasty) excised part of nose is measured & same part is taken from cheek then graft at nose with some part connected for circulation which helps early healing (Su. Su. 16/50). This contribution made Sushruta the Father of Plastic surgery.

### **Midwifery**

In the Sushruta Samhita, the use of forceps in cases of difficult labour and other obstetric operations involving the destruction and mutilation of the infant, such as craniotomy,<sup>[32]</sup> was first systematically mentioned long before fillets and forceps in Europe were thought of. His direction of managing the puerperal state, lactation and child management and choosing a nurse is substantially the same as that found in European authors' modern scientific works.

### **Arbuda (Neoplasms /Malignant Lesions)**

Arbuda's literal meaning is a lump, a mass, or a polyp. According to Sushruta, Arbuda is gradually growing, big, globular, slightly painful, fixed, deep-seated, fleshy masses that are not typically supportive.<sup>[33]</sup> They can arise from any part of the body surface. They are caused by tridosha-viciated mamsa and rakta derangement. Ancient Hindu doctors and surgeons were well known about the phenomenon of tumor spread or metastasis (dwirarbuda). There are several links to local and distal tumor distribution (dwirarbuda) and its recurrence (adhyarbuda). While explaining tumor treatment, Sushruta noted that all attempts must be made to complete tumor removal as incomplete removal causes recurrence and eventually destroys the individual. He gave an example to explain the gravity of recurrence that a small remaining tumor could destroy the body just as a small fire spark could destroy a house. The role of detoxification therapies (Shodhana procedures) in cancer patients as pre-treatment to

conventional treatment line showed that these procedures increased body weight, improved serum immunoglobulins,<sup>[34]</sup> increased levels of haemoglobin and normalized liver functions, and also helped to minimize the adverse effects of chemotherapy agents.

### **Dagdha (Burns)**

Thermal trauma, whether caused by extreme cold or heat, wet or dry,<sup>[35]</sup> chemical or inert fluid, causes nearly similar damage and must therefore be managed as one entity. This great classification value could be realized by the fact that in recent times this concept has gained validity in modern surgery.

### **Bloodletting**

In the western world, bloodletting is the contribution of great Sushruta.<sup>[36]</sup> In patients with blood vitiation disorders, two separate chapters (Jalaukavacharan and Siravedha) were devoted to bloodletting.<sup>[37,38]</sup> Because Sushruta gave the Rakta more importance as a dosha since Rakta is the body's main stream, any effort should be made during bloodletting not to extract more blood as Rakta is pran.<sup>[39]</sup> Jalauka [Leech (Hirudinamedicinalis)] is now routinely used by plastic surgeons a day for proper graft acceptance. Many surgeons reported very useful leech application in post-trauma hematomas and in ischemic cases.<sup>[40,41]</sup> A review article on medicinal uses of Leeches was published by USA scientist but in historical review they did not refer to Sushruta or SushrutaSamhita.<sup>[42]</sup> In this context one of our Ayurved Scholar written to editor of Journal of Postgraduate medicine about the original medicinal uses of Leeches (Jalaukavacharan) since Sushruta.<sup>[43]</sup>

### **Ophthalmic Surgery**

Fifty-one of the seventy-six eye disorders was surgical. In each case, the mode of operation to be performed has been described in detail. The glory of discovering the technique of cataract-crouching that was unknown to the ancient Greek and Egyptian surgeons is credited to Sushruta.

### **Fractures & Dislocations**

Trauma and its management were indeed the major part of the surgery. Sushruta clearly distinguished and classified fractures differently from dislocations.<sup>[44]</sup> It was known that fractures were associated with swelling, touch intolerance, severe pain, loss of movement, crepitus, and limb flaccidity. The twelve types of fractures included a wide range from greenstick and hairline to compound and shared fractures, while six dislocation numbers were

described as well. The basic manipulations recommended for treating fractures and dislocations are Anchana (Traction), Pidana (Compression), Samskespha (immobilisation) and Bandhana (bandaging) is nowhere less than the contemporary orthopaedic practice. The application of medicinal plasters using herbs like Vata (*Ficus bengalensis* Linn.), Udumbara (*Ficus glomerata* Roxb.), Ashwattha (*Ficus religiosa* Linn.), Palasha (*Ficus lacor* Buch-Ham.) etc were advocated. In compound fractures local treatment of wound was specified and many formulations cleansing and for the promotion of healing is recommended. Appropriate diet is recommended for the patient for early healing of the fracture. Sushruta's approach to fracture and dislocation care was logical, pragmatic, and even unconventional, as he was not opposed to breaking and resetting a weakened and malunited fracture.

### **Lithotomic operations**

The surgical procedure (Shastra Karma) depicted in Ashmari Chikitsa (Management of Vesical /Renal calculus).<sup>[45]</sup> First, the vitiated doses should be cleaned from the patient. Then the patient, who is strong enough and not nervous, should be positioned flat with the upper part of his body lying on the lap of another person sitting on a knee-high board facing east; the waist of the patients should be lifted by cushions and his knees and ankles flexed and bound together by straps (position of lithotomy). The pressure of the well-oiled umbilical region should be applied first under the navel after massaging the left side until the stone comes down. Put the lubricated index and middle fingers under the perineal raphe into the rectum. So put the stone down between the rectum and the penis with manipulation and pressure. Keeping the bladder tense and distended so as to obliterate the folds, the stone is pressed hard by fingers so that it becomes prominent like a tumour. An incision of about the size of the stone is then made just a few millimetres away from the perineal raphe on the left side. Some surgeons prefer the incision on the right side for the sake of technical convenience. Precautions should be taken so that the stone does not get broken or crushed. Even a small particle left behind can increase in size. Then the stone is extracted by means of an agrvaktra instrument (small-tipped forceps such as mosquito forceps). The procedure, perineal cystolithotomy described by Sushruta, was conducted both in Arab countries and in Europe in ancient times and was known as "cutting for rock."<sup>[46]</sup>

### **Glimpses of ancient surgical procedures**

Surgery was advised by Sushruta at the ancient time which is practicing today in following diseases which are quoted with classical references. Jalodar (Ascitis), Mutrajvrudhi (vaginal

Hydrocele), Baddhagudodar (Intestinal obstruction), Cchidrodar (Intestinal perforation), Arsha (Hemorrhoids), Bhangandar (Fistula-in-Ano), Mudhagarbha (IUD-intrauterine death) and Kaphaj-lingnas (Cataract).

In **Jalodar (Ascitis)** vedhankarm i.e. tapping is to be performed. Vedhan is done in abdomen below & left lateral to umbilicus with the help of trocher & canula for removing some fluid (Su. Su. 25/10 and Su. Ch. 14/18). Vedhankarm i.e. tapping of fluid collected in tunica vaginalis layer was advised in Mutraj-vradhi (Vaginal hydrocele). The site of tapping is lateral side of sevani of scrotum to avoid injury to testis & then remove the fluid with the help of vrihimukhnadiyantra (trocher and canula). (Su. Ch. 19/19).

In **baddha-gudodar** (Intestinal obstruction) incision should be taken like left para-median (four angul apart from midline) then open peritonium and remove obstruction as possible; lastly see four angul intestine from obstruction site & kept all intestine in abdomen as it is. Then udarsivan (abdomen closer) is to be done (Su. Ch. 14/17). In **chhidrodar** (Intestinal perforation) application of pipilika (big ants) should be done in the perforated part of intestine is resemble today's advanced staple method for intestinal suturing. Then Sushruta told to close the abdomen layer wise (Su. Ch. 14/17).

In **Arsha (Haemorrhoids)** shastra-karma i.e. excision of piles was described by Sushruta in pedunculated, broad & bleeding piles. That means haemorrhoidectomy was performed in ancient time (Su. Ch. 6/3). In **Bhangadar** (Fistula - in- Ano) after probing in fistula tract it should be elevated & total tract is removed i.e. fistulectomy was practiced during Sushruta's time. Sushruta also stated to do Ksharsutra in child, old and female patients as these patients are comparatively weak (Su. Ch. 17/29).

In **Mudhagarbha** i.e. in case of intra uterine death (IUD) to survive mother Sushruta advised to remove dead part of foetus which can be correlate with removal of dead foetus i.e. craniotomy (Su. Ch. 15/11). In **kaphajlinganasha** (Cataract) the incision is taken not below, not above, not laterally i.e. exactly at daivyakritacchidra (limbal region) which is today's cataract-crouching (Sushruta Ut. 17/59).

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