

**PROFICIENT CONTRIBUTION OF ACHARYA SUSHRUTA IN THE FIELD OF
SHALYA TANTRA – AN AYURVEDIC SURGICAL BRANCH – A LITERARY REVIEW****Dr. Prabhat Kumar Rai^{*1}, Dr. Anantkumar V. Shekokar² and Dr. Kanchan M. Borkar³**

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Article Received on 08/12/2019

Article Revised on 29/12/2019

Article Accepted on 19/01/2020

ABSTRACT

Shalya Tantra the ancient *Ayurvedic* surgical science is one of the most efficient branch in *Ashtang Ayurved* (among eight major branches) as mentioned in many texts. It is a vital branch of *Ayurved* deals with the removal of irritating factors causing pain to the body and mind. *Sushruta Samhita* written by the great *Acharya Sushruta*, is in-depth treasure-house of surgical knowledge. The contribution of *Acharya Sushruta* in ancient surgery is long lasting. The concepts and techniques used by *Acharya Sushruta* in past are even relevant in today's era with little amendments. There is no denying the fact that modern surgery has its roots or more precisely seeds in *Sushruta Samhita*. It was *Ayurved* of ancient India that pioneered the modern concepts of surgery. In this review an effort has been made to draw a special attention on ancient surgical concepts of *Sushruta Samhita* practicing today with few refinements.

KEYWORDS: *Shalya Tantra, Ayurved, Surgery, Acharya Sushruta, Yantra-Shastra.***INTRODUCTION**

It is considered that there are no written records available regarding the exact origin of medicine. In Pre-Vedic period disease was considered as magical or religious phenomenon. *Ayurved* is an ancient medical science which helps the individuals to maintain their health by using the inherent principles of nature and bring them in equilibrium.^[1] Ancient *Ayurvedic* texts available in the form of *Brihatrayee* (Three major texts) written by *Acharya Charaka, Acharya Sushruta & Acharya Vagbhatta* respectively. *Acharya Charaka & Acharya Vagbhatta* mostly focused on *Ayurvedic* knowledge of medicines in their texts but on the other hand *Sushruta Samhita* mainly centred on surgical line of treatment modality.

“*Shalya*” means a broken arrow or a sharp part of weapon and “*Tantra*” means manoeuvre. *Shalya Tantra* aims to remove (from an ulcer) any extraneous substance or foreign body such as hay, small particles of stone, dust, bust of iron or bone, hair, nails, splinters, blood clots, pus pockets or condensed pus or to expel out a dead foetus from the womb, and to deal with the principle of handling the surgical instruments (*Yantra & Shastra*), application of *Kshara* (Alkaline/Caustic) substance, heat (Thermal Cautery), along with the diagnosis and treatment of ulcers (*Vrana*). When we look over the history of surgery and previous scriptures of surgery we cannot deny the vast knowledge and

contribution of our great sage *Acharya Sushruta*. We can easily find knowledge and texts over various surgical ailments, pathology, equipment, techniques and procedures over there. *Sushruta Samhita* has detailed description on dissection (*shav-vichchedan*), instruments (*Yantra & Shastra*), types of sutures and suturing materials, pre-operative, operative and post-operative procedures for specific diseases, sterilization of instruments & OT, dressing materials, bandages & different types of bandaging techniques, wound managements and so on. Like this, uncountable lists of surgical evidences are present which shows the major contribution of ancient Indian sciences in medical field. *Sushruta Samhita* has details about General, Plastic, Orthopaedic, Gynaecology, ENT & Ophthalmology and this is the earliest & best treatise which deals with the principle of surgery in detail. Even followers of *Hippocrates* have no doubt about surgical supremacy of *Acharya Sushruta* and so he is universally accepted as “The father of Surgery”.

Historical Background

Vedas are ultimate source of information regarding knowledge since a long time. *Rigveda* and *Atharvaveda* has many references regarding medicines and surgery. Amputated legs replaced by iron substitutes, removal of traumatized eyes, extraction of arrow shafts from the limbs of the warriors are few examples of surgical practices of that era. *Bhisag Atharvana* priest mentioned

as a first person of medicine and surgery in India. Information regarding *Vrana* (wound) is present in *Kaushika Sutra* of *Atharvaveda*. Consumption of pepper corns is indicated in the case of open wound where *jalasa* (cow's urine) used in closed wound.

Detailed description of *Vrana* is available in *Samhitas* (*Bruhatrayee*), especially in *Sushruta Samhita*. Acharya Sushruta has designed many chapters which are dedicated to the principles of *Vrana*. The word *Shalya Tantra* never be completed without mentioning The Great Ancient Surgeon, *Acharya Sushruta*. Ancient texts mentioned *Sushruta*, as son of priest *Vishwamitra*. The uncountable and vast contribution of legendary surgeon *Acharya Sushruta* has mentioned in many ancient and modern texts.

Predominance of *Shalya Tantra*

Sushruta Samhita is a complete book which comprises detail description about surgical disorders and their cure in very appropriate and organised manner. *Sushruta* has major contribution in the field of practical surgery and took the surgical skills on top in his era. *Sushruta Samhita* is the light bearer for all the scholars of *Shalya Tantra* for learning and practicing.

Education and Training of Surgery in Ancient Time

Gurukul system was the traditional Indian system of education in the past. In accordance to that, this system of medical science also has been handed over to the disciples from the great *Gurus* (*Acharyas*) to propagate and illuminate the long-lasting flame of knowledge regarding medical science for the betterment and sake of society and to create a nearly disease free environment.

(a) Selection of Students

The young student (*Taruna* stage) having good quality of physical and mental habits, cheerful attitude, grasping capacity, attentivity, humanity, longanimity, patience, fortitude, belonging to a good family background was selected on personal merits, irrespective of their caste^[2], *Upanayana Sanskara* (initiation ceremony) and oath ceremony conducted before starting the actual process of learning and education.^[3]

(b) Quality of Surgeon

Acharya Sushruta mentioned quality of a skilled surgeon. The surgeon have courage, quickness in action, should be non-shaking, non-sweating, (must have self confidence and command), having sharp instruments.^[4] Modern texts which mentioned Lion's Heart, Eagle's eyes, Horse's leg & Ladies finger etc as qualities of surgeons are resembles with the qualities as mentioned earlier by the great *Acharya*.

(c) *Yogya* (Practical Training of Surgical Techniques)

To attain surgical expertise the medicos of that time are asked to practice the surgical procedures repeatedly first on natural and artificial objects resembling the diseased

part of the body before undertaking and entering in an actual operation. *Sushruta* mentioned the importance of practical knowledge for a scholar. To obtain surgical proficiency, skill and speed, He devised various experimental modules. All surgical procedures involve one or more of the eight varieties of *Ashtavidha Shastra karma*,^[5] (interventions). *Chhedana* (excision) and *Bhedana* (incision) are to be practised on vegetables and mud filled leather bags. *Lekhana* (scraping) on hairy skin of animals. *Vedhana* (puncturing) on the veins of dead animals and lotus stalks. *Eshana* (probing) on bamboo or moth-eaten wood. *Aharana* (Extraction) are to be practiced by extraction of tooth of dead animals or by extraction of seeds from fruits. Scarification on wooden planks smeared with beeswax.^[6]

(d) Methods of Examination, Diagnosis & Management

After taking practical training scholars are exposed to bedside for examination of the patients clinically. This is called *Vishikha* or *Karma marga*. *Acharya Sushruta* has given six means for diagnosis of a disease called as *Shadvidh Pariksha* – *Shrota/Shabda* (auscultation), *Sparsha* (palpation), *Chakshu* (inspection), *Jihwa* (by tasting), *Ghrana* (by smelling) and *Prashna* (interrogation).^[7] Observations and interpretation based on all these tools directed the scholars to understand the *Dosha* (causative factors) and *Dushya* (cellular structure) responsible for a disease. They may assume the origin of disease either it is *Nija* (intrinsic) or *Aagantuja* (extrinsic) in origin, also they can know the exact *Kriyakala* (stage of disease) and management of the disease planned accordingly.

(e) Importance of Written Consent before Surgery

It has been mentioned that before planning for a surgery, medicos must obtain the permission of the King, as the head of state and satisfying them that the particular practitioner had been fully trained and qualified to do so. *Acharya Sushruta* given information about written consent in the management of *Ashmari Chikitsa*, it is relevant to today's surgical ethics.^[8]

Anatomical Knowledge and Dissection of Dead Body (Cadaver)

A surgeon without ample knowledge of anatomy is nothing but like a slaughterer. Anatomical knowledge is the key of his study and profession. For the enhancement of anatomical skills of scholars *Acharya Sushruta* described the dissection of the dead body along with its preservation in detail.^[9] A person may add great surgical proficiency in his personality with the help of sound knowledge of anatomy. *Sushruta*, a pioneer surgeon, brilliant scholar of *Shalya Tantra*, logical thinker given several verses on how to preserve the dead body, for how much time it can be used for study, how to perform dissection on dead body, by which substance we can do dissection. No doubt the method of preservation and dissection of dead body mentioned in ancient text seems to be crude yet it has its own importance. Methods of

dissection stated in the past are practiced in today's era with little modification. *Acharya Sushruta* stated that anyone desirous to obtain the holistic knowledge of anatomy should prepare a dead body and carefully observe and examine different parts by dissecting it.

Instruments Used For Surgery

None can imagine the concept of surgery without the use of instruments. The equipments used for extracting the *Shalya* (any foreign body or extraneous substance which troubles the body and mind) from its place where it is embedded.^[10] Surgical instruments classified as *Yantra* and *Shastra*. *Yantras* are blunt instruments, not causing any trauma to the body, helped other instruments for extraction of *shalya*, diagnosis and therapeutic use. *Shastras* are the sharp instruments causing trauma to the body parts and used for surgical purpose. *Acharya Sushruta* mentioned 101 *Yantra*, divided in to 6 types- 24- *Swastika Yantra* (cruciform instruments), 2- *Samdamsha Yantra* (pincers, forceps), 2- *Tala Yantra* (retractors), 20- *Nadi Yantra* (tubular instruments), 28- *Shalaka Yantra* (rod like instruments/ ophthalmic scoopes) and 25- *Upayantras* (accessory instruments). Instruments are named as per their shapes resembling to the animals and birds etc. e.g., *Simhamukha* (Lion Forceps), *Kankamukha*, *Kakmukha*, *Shringalmukha*.

Apart from these *Yantra*, *Sushruta* described 20 *Shastra* employed for *Shastra Karma* (main operative procedure), e.g., *Mandalagra Shastra* (round knife, sharp curette), *Karapatra* (surgical saw), *Vridhipatra* (bistuar), *Nakha* (Nail), *Utpalapatra* (lancet) etc. The shapes of *Yantra* and *Shastra* are further modified according to its surgical need in modern era but the basic concept of their functions and use remains same.^[11]

Sterilisation Procedures & Antiseptic Measures

Each and every desired instrument for any surgical procedures should be exposed to heat/flame prior to their use otherwise there may be danger of pus formation.^[12] *Sushruta* advises ten days, morning and evening fumigation of a sick room for a surgical patient.^[13] The surgeon should cut short his hair, nails and should wear white sterilized clothes.^[14]

Sangyahan (Anaesthesia)

For the alcohol addicted patients *Sushruta* advocates for alcohol (wine) intake before operation for insensitivity and alleviation of pain. Patients non-addicted to wine should be fed before operative. Patients who have addiction of drink but who cannot bear pain should be advised to drink some strong beverage. The patients who has been fed, does not faint, and who is rendered intoxicated, does not feel the pain of the operation.^[15]

Vranitagar (Surgical Ward)^[16]

Sushruta advocates for a separate room for surgical operations. This room should be a clean house, situated in a wholesome locality, free from dust, direct exposure of sunlight and wind. Patient's bed should be soft,

spacious and well arranged. Fumigation of the sick-room with antiseptic preparations such as *Ashtanga dhupas*. As regards dispensaries, *Sushruta* stated that clinics should be in a clean locality and building should faces towards east or north direction. The medicines should be kept in burnt earthen pots arranged on planks supported by stakes or pins.

Trividha Karma (Three Operative Procedures)

As from the word *Trividha* which means three types and *Karma* i.e. operative procedures. *Trividha Karma* is nothing but the pre-operative, operative & post-operative procedures and a systematic pillar of surgery.^[17] Each and every surgical procedure comprises these three procedures.

(a) Purvakarma (Pre-Operative)

It is not only related with preparation of patients before procedures. *Acharya Sushruta* advocates for the collection of all the materials required for operative and post-operative care. According to Him, appliances required and kept ready before any surgical operations^[18] e.g. Blunt Instruments, Sharp Instruments, Leeches, Cotton, threads, leaves, pieces of cloth, Bandaging Materials, *Ghrita*, *Madhu* (Honey), Milk, Oils, Decoctions, Hot and Cold Water, Iron Pans and other Earthen Vessels; seats and beddings along with skilled, obedient, honest and steady servants etc.

(b) Pradhana Karma (Main Operative Procedure)

It comprises mainly *Ashtavidha Shastra Karma* (eight surgical procedures, Table – 1). Every *Ayurvedic Surgeon* must have sound knowledge of these eight surgical procedures. They must aware with the ethics related with these procedures. All the surgeries performed in today's era are conducted with the help of these eight techniques mentioned by *Acharya Sushruta*.^[19]

Seevana Karma (Suturing)

Acharya Sushruta mentioned *seevana karma* in detail. They clearly mentioned about types of sutures, suturing material and suturing techniques. Silk, cotton, jute, human hair, horse hair, *snayu* (tendon), inner bark of tree, tendrils etc can be used as a suturing material.^[20] Needles may be straight, round body, straight triangular, curved, half curved, curved triangular etc. Types of suturing mentioned in texts are; *Rujugranthi* (simple interrupted), *Anuvellita* (simple continuous), *Gophanika* (blanket suture), *Tunna sevani* (lambart, subcuticular) etc.^[21] In surgery how skin suturing should be done to avoid the complication is most important. It should not be too long from margin otherwise may be painful and should not be too close from margins otherwise they will cut through.

(c) Paschat Karma (Post Operative Procedures)

Patient is well assured after operative procedures. Operative wound is to be cleaned with *pichu* (medicated swab) and dressed with the help of *Vikeshika* (medicine

impregnated pad) or medicated oil, emulsion, ointment, lotion or powder etc.^[22] *Raksha Karma* (protective measures) for patient has been given. The operative wound is to be fumigated with antimicrobial and germicidal medicines to avoid the chances of pus formation. Patient is to be kept in *Vranitagar* (post operative ward) for post operative management and recovery.

Vrana (Wound)

Vrana is very important part of surgical practice. Ancient surgical science known as *Shalya Tantra* has detailed description about *Vrana*. *Acharya Sushruta* has given very much stress upon *Vrana* and clearly mentioned the etio-pathogenesis, types & management of various types of wounds in his *Samhita*. He has mentioned two types of wounds i.e. *Nija* and *Aagantuja* (accidental injuries). They have their own subtypes, pathology, healing stature and management techniques. Fresh wounds if neglected become *Dushta Vrana* (contaminated wound) and fail to heal. Profound knowledge about nature of *Vrana* can help surgeons to avoid contamination and early healing of wound. *Acharya Sushruta* dedicated three chapters of *Sutrasthana* (chapter 21 to 23) and two chapters of

Chikitsasthana (chapter 1 & 2) to *Vrana*. Each and every information related with *Vrana* is classically elaborated in these chapters.

Types of Incision

Circular incision is preferred at arm & leg, while semi circular incision at anal region.^[23] [*Acharya Sushruta* mentioned another four types of incision in case of *Bhagandara* (Fistula in Ano) i.e. *Langalaka* (Curvilinear), *Ardhalangalaka* (Half curvilinear), *Gothirthaka* (Longitudinal), & *Sarvatobhadra*.^[24]

Bandhana (Bandaging)^[25]

In the management of fracture and post operative care of wounds bandaging is of utmost importance. After *Pradhana Karma*, the affected area has to be bandaged with or without medicated dressing. It protects the *Vrana* from flies, dust, cold, wind and other foreign adulterants and prevents the contamination of wound. *Acharya Sushruta* has mentioned 14 types of bandaging (Table-2). He has explained various aspect of bandaging like where to bandage, why to bandage, how to bandage, how much pressure it should exert, when to change a bandage and which type of wounds not to be bandaged.

Table 1: Ashtavidha Shastra Karma (Eight types of surgical procedures).

Sr. No.	Ashtavidha Shastra Karma	Eight surgical procedures
1	<i>Chhedana</i>	Excision/ Amputation
2	<i>Bhedana</i>	Incision (for opening a cavity)
3	<i>Lekhana</i>	Scrapping
4	<i>Vyadhana</i>	Puncturing or Paracentesis
5	<i>Eshana</i>	Probing
6	<i>Aharana</i>	Extraction
7	<i>Visravana</i>	Bloodletting or drainage of pus
8	<i>Seevana</i>	Suturing

Table 2: Fourteen types of Bandhana (Bandages).

Sr. No.	Bandhana (Bandages)	Utility
1	<i>Kosha</i> (Sheath)	Around thumb and fingers
2	<i>Dama</i> (Long roll)	Sling around straight parts of small width
3	<i>Swastika</i> (Cross-like/ eight shape)	Around joints, clavicle
4	<i>Anuvellita</i> (Spiral)	Around upper and lower limbs
5	<i>Pratoli/ Mutoli</i> (Circular bandage/ winding)	Around neck and penis
6	<i>Mandala</i> (Ring)	Abdominal blinders, around stumps, buttocks
7	<i>Sthagika</i> (Betel box type)	Tips of penis or fingers, amputation stumps
8	<i>Yamaka</i> (Twin Bandage)	Two tailed, Bandage of two wounds, around limbs to treat ulcers
9	<i>Khatva</i> (four tailed)	For jaw, cheeks, temples
10	<i>Cheena</i> (Ribbon like, many tailed bandage)	Outer angles of eyes- temples
11	<i>Vibandha</i> (Loosely knotted)	Over back, abdomen and chest region
12	<i>Vitana</i> (Cap like)	Protective cover over wounds of head region
13	<i>Gophana</i> (Cow horn)	Over chin, nose, lips, anorectal region
14	<i>Panchangi</i> (Five tailed)	Above the level of clavicle, on head and neck

Para Surgical Procedures

(a) *Raktamokshana* (Bloodletting)

Acharya Sushruta given more importance to *Rakta* and mentioned it as a *dosha*. *Raktamokshana* comprises as a major treatment modality in the management of surgical disorders. Bloodletting practiced in today's life is the contribution of great *Sushruta* to the modern world. Detailed description of bloodletting like its indication, operative procedure, post operative measures are mentioned by *Acharya Sushruta* in his text. Two chapters namely *Jalaukavacharana* & *Siravedha* are dedicated to it.^[26] Now a day's, Plastic Surgeons are using *Jalaukavacharana* (Leech Therapy) proper acceptance of graft. Leech application has reported very fruitful results in post traumatic wound, haematoma, non healing wound, Diabetic wounds and ischemic conditions.^[27]

(b) *Kshara Karma* (Chemical/ Alkaline Cauterization)^[28]

According to *Acharya Sushruta*, *Kshara* is significantly important amongst all *Shastra* & *Anushastra*. It alleviates all the three *dosha* (causative factors) and performs excision, incision and scrapping simultaneously. Two types of *Kshara* are mentioned in the classical texts i.e. *Paniya* (for internal use), *Pratisarniya* (for external use). Preparation methods, properties, indications, contraindication, utilization techniques, of *Kshara Karma* has clearly explained in the texts.

(c) *Agni Karma* (Thermal Cauterization)^[29]

Diseases and conditions resistant to medication, *Shastra* & *Kshara Karma* are cure by *Agni Karma*. Precisely carried out *Agni Karma* obviates the recurrence of disease. *Sushruta* has given full details about *Agni Karma* in his *Samhita*.

Rakta Sandhana (Haemostasis)^[30]

Acharya Sushruta has given utmost importance to *Rakta*. They stated that vitality of any individual is solely depended on *Rakta* and given different measures to check the blood loss from the body. *Sushruta* mentioned four techniques to stop excessive bleeding from the body.

1. ***Sandhana*** Joining the wound edges by use of astringent drugs is called as *Sandhana*. *Kashaya* (Astringent) unites the wound edges.
2. ***Skandana*** Promoting clotting by the use of cold is called as *Skandana*. *Himma* (cold) makes the blood clot.
3. ***Pachana*** It can be achieved by the use of Ash or alkali. *Bhasma* (Ash) adheres at that site and closes the wound.
4. ***Dahana*** It means thermal cauterization of the affected part. *Daha* stop the bleeding from the affected part by constricting the vessels present over there.

Brief Look over Various Surgical Procedures Used In Ancient Time

(A) Anorectal Disorders

Sushruta mentioned various anorectal diseases, their etiopathogenesis and management in detail i.e. *Arsha* (Haemorrhoids), *Bhagandara* (fistula in ano), *charmakeela* (ano-genital warts), *Sannirudha guda* (anal stricture), *Guda bhramsas* (rectal prolapsed), *Parikartika* (fissure in ano) etc.

- A. In *Arsha*, non-chronic, non complicating, disease with mildly vitiated *dosha* is treated with medication; soft, broad, deep and bulge piles are treated with *Kshara*; rough, immovable, big and hard pile mass is treated with the help of *Agni Karma*; In pedunculated, broad and bleeding pile mass they advocates excision.^[31] That means haemorrhoidectomy was practiced in ancient time.
- B. In *Bhagandara* (fistula in ano) after probing in the tract it should be elevated and total tract is removed i.e. fistulectomy was in practice in *Sushruta's* era. *Sushruta* also mentioned to do *Ksharasutra* in comparatively weak patients like child, old and females.^[32]
- C. In *Sannirudha guda*, gradual dilatation has been advised.^[33]
- D. In *Guda bhramsas* digital repositioning has been mentioned.

(B) Ophthalmic Disorders

Acharya Sushruta mentioned total seventy six ophthalmic diseases in which fifty one are surgical. They elaborately mentioned the surgical management of each and every disorder.

In *Kaphaja Linganasha* (Cataract), incision must be taken exactly on *daivyakrita chhidra* (Limbal region), not below, above or laterally. It is same as today's cataract couching. He has mentioned *Chhedana* (excision) for *Vartamarsha* (a form of trachoma), *Shuskarsha* (polyp of palpebral conjunctiva), *Vartma arbuda* (lid tumour), *Siraja pidika* (scleritis), *Arma* (pterygium) and *Parvanika* (phlyctenular conjunctivitis).

Lekhana (scrapping) for *Utsangini* (chalazion cyst in lower lid), *Bahala Vartma* (multiple chalazion cyst), *Kardamvartma* (mucopurulent conjunctivitis), *Shyava Vartma* (inflammatory condition of eyelid), *Baddha Vartma* (angio-neurotic oedema), *Klishhta Vartma* (allergic conjunctivitis), *Pothaki* (Trachoma), *Kumbhika Vartma* (meibomian cyst) and *Vartmasharkara* (lithiasis conjunctiva); *Bhedana* (incision) in *Shleshma Upnaha* (lacrimal cyst), *Lagana* (chalazion cyst), *Krimi Granthi* (Blepharitis), *Anjanamika* (external hordeolum); *Vedhana* (puncturing) in *Sirotpata* (allergic conjunctivitis), *Siraharsha* (acute orbital cellulitis), *Anyatovata* (referred pain in eye, sphenoidal sinusitis), *Puyalasa* (Acute Dacryocystitis), *Adhimantha* (glaucoma) and *Abhishyanda* (conjunctivitis).^[34]

(C) Gynaecology and Obstetrics

In *Mudhagarbha* i.e. in case of intra uterine death (IUD) for survival of mother *Acharya Sushruta* advised to remove dead part of foetus which can be correlated with removal of dead foetus i.e. craniotomy. When woman is dead but there is throbbing movements in abdomen at that time the physician should immediately open the abdomen of the woman and save the child. This resembles caesarean section performed today.

(D) Swellings

- *Vedhana Karma* (Tapping) is performed in case of *Jalodara* (Ascitis). It is performed in abdomen below and left lateral to umbilicus with the help of trocher and cannula is fixed for removal of some fluids. Abdomen is tightly bandaged after the aspiration of fluid. All fluids should not be drained in one day otherwise it may cause complications is clearly mentioned by *Sushruta*.^[35]
- Tapping of fluid collected in tunica vaginalis layer is indicated in case of *Mutraj Vriddhi* (vaginal hydrocele). Tapping is done on lateral side of *sevani* of scrotum to avoid injury to the testis.^[36]
- In *Baddha-gudodar* (Intestinal obstruction) left para median incision taken (four angula apart from midline) on abdomen below umbilicus, after that peritoneum is incised and remove obstruction as possible. Intestine four *angula* from the obstruction is thoroughly inspected and after that whole bowel is kept in the abdomen and closure of abdomen done.
- In *Chhidrodara* (Intestinal perforation) application of *pipilika* (Big ants) should be done at perforated part of intestine. It resembles with today's staple method of suturing of intestine. After that layer wise abdominal closure is done.^[37]
- *Arbuda* (Tumour) are gradually increasing, big, globular, deep-seated, fixed, slightly painful, fleshy masses. Usually non suppurative in nature and they can arise from any part of the body. They are evolved by vitiation of *Tridosha* along with *Rakta* and *Mamsa dhatu*. *Acharya Sushruta* stated *Kshara* and *Ksharasutra* therapy in its management.^[38]

(E) Vidradhi (Abscess)^[39]

Ripe and bulged abscess should be cut open. The knife should be inserted in the direction of hairs avoiding the injury to the vital parts of the body and goes deep till the pus is seen. Knife is pulled out at once and let the pus come out freely. After determining the route (channel of pus) and site of bulging (most prominent part), incision may be given so that vitiated material (pus and debris) do not remain inside. After incision all the affected area is cleaned properly and massaged mildly to remove all the pus.

(F) Dagdha Vrana (Burns)^[40]

Thermal trauma, whether due to extreme cold or heat, wet or dry, chemical or inert fluid produces damage almost similar and hence has to be managed as one entity. *Acharya Sushruta* mentioned various types of

burns and their management in detail. Mainly four types of burns stated by him i.e. *Plushta* (1st degree burn), *Durdagdha* (2nd degree burn), *Samyak dagdha* (3rd degree burn), *Atidagdha* (4th degree burn).

(G) Bhagna (Fractures & dislocation)

Surgical practice mainly focused on trauma and its management. *Acharya Sushruta* clearly distinguished fractures from dislocations and stated about two types of *Asthi Bhagna* namely *Kanda Bhagna* (Fracture, 12 subtypes), *Sandhimukta* (Dislocation, 6 subtypes).^[41] Fractures are associated with swelling, intolerance to touch, loss of movement, severe pain, crepitus and flaccidity of the limbs. Fractures in its twelve types include a wide range from greenstick and hairline to compound and comminuted fractures. The basic measures recommended for treating fractures and dislocations are *Anchana* (Traction), *Pidana* (Compression/ manipulation), *Sankshepa* (optimum position for fixation) and *Bandhana* (immobilization by splints and bandages) which is nowhere less than the contemporary orthopaedic practice. They have described the management of each and every bone fracture and dislocation separately in detail. The application of medicinal plasters using herbs like *Vata*, *Udumbara*, *Ashwattha*, *Palasha* etc were advocated. Local treatment of wound was specified and many formulations were recommended for promotion of healing in compound fractures. For early healing of fracture appropriate diet is suggested for patients. *Sushruta's* approach to the treatment of fractures and dislocations was rational, radical and more practical. Signs of healing, delayed healing, non healing, Union, mal-union and non-union is clearly mentioned and they also mentioned about treatment of complications.

(H) Sandhana Karma (Plastic Surgery)^[42]

In *Sushruta Samhita* we can find the references of reconstruction surgery of ear lobule and nose. *Sushruta* mentioned techniques and types of otoplasty (reconstructive surgery of ear lobule) in detailed. He also stated about Rhinoplasty (reconstructive surgery of nose) and Oroplasty (reconstructive surgery of mouth).

(I) Miscellaneous

- *Antravriddhi* (Inguinal hernia) Etio-pathogenesis of hernia is clearly mentioned by *Acharya Sushruta*. *Agni karma* & *Siravedha* were recommended for its management.^[43]
- *Medaj Vriddhi* (Sebaceous cyst of scrotum) Swelling is wrapped with cloth bands, incision is taken with the help of sharp instrument (*Vridhipatra*) protecting the *Phala* (testis) and *Sevani* (raphe); fat removed by scrapping.
- *Nirudhaprakash* (Phimosi) A tube with opening at both ends (*Nadi Yantra*) smeared with *Ghrita* are introduce in urethra, thicker tube inserted after every three days thereby widening the urethral passage. If it fails then *Shastra Karma* is done i.e. *Sevani* (raphe) is cut open and treated like a wound. It resembles

dorsal slit in today's practice.^[44]

- **Parivartika (Paraphimosis)** *Sushruta* has mentioned slow manual replacement of the foreskin after lubricating it with *Ghrta* (ghee). Prepuce is pulled forward slowly and glans penis is pushed in, after that warm poultice is tied for 3-5 days.
- **Kadara (corn)** Excision of corn is stated and after that operative part is burnt with hot oil.
- **Chippa (Whitlow) and Kunakha (Paronychia)** The bad muscle are excised and pus along with debris drained out and treated as wound.
- **Shira Shalya (foreign body of skull)** after removal of foreign body from the skull, wicks made of hairs are inserted into the wound otherwise *Mastulunga* (brain matters) may flow out from the wound and it may cost the life of the patient.^[45]
- **Ashmari (Urinary Calculus)** *Sushruta* has given special attention towards *Ashmari* and has given each and every aspects of it in detail. He has also mentioned its classical surgical technique.^[46]

CONCLUSION

India has great history of medical knowledge and healthcare system. Our country produces many great sages and physicians. They architected their work and practical knowledge in various texts. *Sushruta Samhita* is one of them and contributed by our great sage *Acharya Sushruta*.

Acharya Sushruta has elaborated each and every branch of medical science but given more stress over surgery. He has covered all the topics related to surgery like dissection, anatomical knowledge, pathology, complications and management of diseases along with preventive measures. *Sushruta* approach to tackle a disease is more practical and treatment measures used by him are also relevant in today's era with some modifications & amendments. Instead of research done till date there are many hidden facts in the text which can be further explored.

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