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Acharya Sushruta's contribution in the field of Surgery

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ABSTRACT

As a text-book, it is unrivalled in respect of composite teaching of the subject of surgery with reference to all allied branches of medical learning required by a surgeon. The *Samhita* is thus an encyclopedia of medical learning with special emphasis on *Shalya* and *Shalakya*. It still retains the land mark position in the field of surgical texts. The contributions of *Sushruta* are not only limited to surgical field but also extended up to the different branches of anatomy, embryology, gynecology, obstetrics, pediatrics, toxicology, medicine etc. In this article, an attempt has been made to highlight the salient features and basic surgical foundation principles he has laid upon, which serves as very basic rules even till today for any surgical procedure we take, for which, till date we consider Acharya Sushruta as Father of Surgery.

Key words: *Sushruta Samhita, Shalya Tantra, Surgery, Surgical techniques in Ayurveda*

INTRODUCTION

The *Sushruta Samhita* is an Ayurvedic text, by the legendary *Sushruta*, foundational to Ayurvedic medicine with innovative chapters mainly on surgery. There is a general impression that *Sushruta Samhita* is only an ancient Indian *Ayurvedic* text book of surgery. *Sushruta Samhita* contains 184 chapters & description of 1120 illnesses, 700 medicinal plants, a detailed study on anatomy, 64 preparations from mineral sources, 57

preparations based on animal sources. It still retains the land mark position in the field of surgical texts. In addition to his worldwide known work of historical significance on plastic surgery, he also made similar unique contributions on numerous aspects of medicine, such as fracture and dislocations, urinary stones, skin diseases including leprosy, *Panchakarma*, toxicology, pediatrics, eye diseases, psychiatry, obstetrics and gynecology. In fact, *Sushruta* emphasizes in his text that unless one possesses enough knowledge of relevant sister branches of learning, one cannot attain proficiency in one's own subject of study. In this article, an attempt has been made to highlight the salient features and basic surgical foundation principles he has laid upon, which serves as very basic rules even till today for any surgical procedure we take, for which, till date we consider Acharya Sushruta as Father of Surgery.

Some of the examples of surgical techniques performed by him and other contributions to the surgical fields are narrated in brief here:

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A. Contribution to the field of Plastic (Reconstructive Surgery)

Nasa Sandhana (Rhinoplasty): The Rhinoplasty and other reconstructive surgeries were first mentioned by the *Sushruta* in his text, and established as a remarkable mile stone in the field of plastic surgery.^[1]

Karna Sandhana (Lobuloplasty): The *Sushruta* had advised to perform the reconstructive surgeries of ear lobules in the various defects either caused by congenital reasons or traumatic reasons. 15 techniques of repair of torn ear lobules (lobuloplasty) had been given by the *Sushruta* even though in the absence of ear lobe by the flap of cheek. The surgeon should tailor the reconstructive technique to suit the specific deformity. For example, when the ear lobe flaps are congenitally absent, a lobe can be created by incising above the level of tragus and turning down the incised flap.^[1]

Ostha Sandhana (Repair of Hare lip): The description of repair of deformed lip is given in the same chapter as such as given for the *Nasa-Sandhana*. A surgeon who is expert in the *Nasa-Sandhana* can perform the *Ostha-Sandhana*. The detailed procedure of repair is not clearly quoted or missing in the text.^[1]

Karna Vedhana (Ear puncture): The *Sushruta* had described the piercing of the children's ear lobe with a needle or awl on the auspicious day and time with hymn is known as *Karna-Vedhana Samskara* (custom).^[1]

B. Parasurgical measures Agni, Ksara, Jalouka

Sushruta is the person to give the importance to *Agni* & *Kshara* for therapeutical purposes in the form of a separate modality. For various disorders of mainly involving musculoskeletal system (*Asthi-Sandhigata*) *Ghridraasi*, *Arbuda*, *Arsha* etc. *Sushruta* advocated the utility of several forms of thermal cauterization by using *Dahana Upakaranas*. He had also elaborated the depth and intensity of burn in his classifications of burn as *Plusta Dagdha* (singeing), *Durdagdha* (blister formation), *Samyaka Dagdha* (therapeutic) and *Atidagdha* (severe or deep) with their management &

even it holds good in modern medicine.^[2] *Kshara* (Caustic Alkali) utility in therapeutics is a unique kind of its own. As *Sushruta* had discussed various usage forms of *Kshara* for different ailments, like to stop the bleeding & in wound management, to necrose the hemorrhoids, for healing an ulcer, for cutting the tract in fistula in ano without injuring the other structures^[3] etc. Like-wise *Jaulokavacharana* (Leeches) are also used as para-surgical procedure especially to king, people of sophistication, children, old aged, coward, weak, females, and delicate people.^[4]

C. Contribution to Orthopedics & Marma Vijnana

Sushruta also gives classification of the bones and their reaction to injuries. Varieties of dislocation of joints (*Sandhimukta*) and fractures of the shaft (*Kandabhagna*) are given systematically. Acharya *Sushruta* classifies and gives the details of the six types of dislocations and twelve varieties of fractures.^[5] Acharya *Sushruta* gives the principles of fracture treatment, viz., traction, manipulation, appositions and stabilization the same method is still practiced in the modern orthopedics.^[6]

Marma Vijnan

Sushruta has described 107 numbers of *Marmas* (Vital spots) in the body which causes fatal result on injury, either sudden death or subsequent deformity of organ or body. The anatomical landmark of each and every *Marma* had their degree of fatality is the unique feature of *Sushruta* of its own kind.

The Ayurvedic science of *Marma* is itself a treatise on Surgico-anatomical learning. The concept of *Marma* is a great contribution of *Sushruta* and should be treated as mirror of surgery, which should be carefully dealt during surgical operations & should always be protected from injury, as the component of life or vital energy (*prana*) rest in them. There-fore surgical procedures to be performed very carefully or vigilantly after considering the measurement of the *Marma's* area, sign-symptoms and consequence, prognosis, as injured even on margin of *Marma* leads to deformity or death.^[7]

D. Contribution to Medical Training

Yogya Sutriya

Before proceeding to surgery on the human being the surgical demonstrations technique of making incisions, probing, extraction of foreign bodies, cauterization either by *Ksara* or *Agni*, tooth extraction, scarification, excisions, trocars for draining abscesses, saws for amputations on various natural fruits, dead woods and clay models had been established by the *Sushruta*. To obtain proficiency and acquiring skill and speed in these different types of surgical manipulations, *Sushruta* had devised various experimental modules for trying each procedure. For example, incision and excision are to be practiced on vegetables and leather bags filled with mud of different densities; scraping on hairy skin of animals; puncturing on the vein of dead animals and lotus stalks; probing on moth-eaten wood or bamboo; scarification on wooden planks smeared with beeswax etc.^[8]

Anatomical Dissection

This dissection was very first gift to the entire medical fraternity and mankind because nowhere in history we find reference for dissection. This has served as a basis for start of a new branch in medical science – Anatomy – which has evolved in today's era. The study of anatomy is dealt with in the *Sarirasthana* of the *Susruta Samhita* in its ten chapters. *Sushruta* was a strong upholder of human dissection as evident from his texts.^[9] His texts include a systematic method for the dissection of the human cadaver. Acharya Sushruta had given considerable thought to anatomical structure and function. Acharya Sushruta considered that aspiring surgeons must first be an anatomist for skillful and successful practice. To quote the appropriate translation, "Any-one, who wishes to acquire a thorough knowledge of anatomy, must prepare a dead body and carefully observe and examine all its parts".^[9] The method of selection & preparation of dead body that *Sushruta* developed which enabled him to work within the confines of religious interference. The human body could be visually examined in detail, Interestingly, the *Susruta Samhita* mentions the role of a student in the

dissection: 'A pupil, otherwise well-read, but uninitiated, in the practice (of medicine or surgery) is not competent to take in hand the medical and surgical treatment of disease.'^[9]

Examination & Different Diagnostic Methods

Trividha & *Shadvidha Pareeksha*, different methods of examination, diagnosis of diseases with the help of *Pramanas*, Especially *Upamana Pramana* is his contribution.^[10]

E. Contribution to Trauma Care

Management of *Sadyo-Vrana* (traumatic wounds)

On the subject of trauma, *Sushruta* speaks of six varieties of accidental injuries naming (i) *Chinna* (excised), (ii) *Bhinna* (incised), (iii) *Viddha* (punctured), (iv) *Ksata* (lacerated), (v) *Picchita* (crushed) and (vi) *Ghrista* (abrasion) encompassing almost all parts of the body and their probable causative agent or weapons.^[11] For the first time the signs and symptoms along with treatment of *Dhoomopahata* (dyspnoea by smoke) is also described by the *Sushruta*.^[12] As war was the major cause of injury in the past, the name *Shalya-Tantra* for this branch of medical science is derived from the *Shala* (arrow), which in fights is used to be lodged in the body of the enemy soldiers. Acharya Sushruta emphasizes that removal of foreign bodies is fraught with certain complications, if the seat of the *Shala* or *Shalya* be a *Marma* (vital spots). It is very clear evident that, during warfare *Sushruta* was a battle field surgeon from the chapters like *Pranashta Shalya*, *Shalyapanayaneeya Adhyaya* and *Yuktaseniya Adhyaya*.

Management of Hemorrhage

The bleeding occurs just after giving the incision or performing any surgical procedure by sharp instruments or by accidental injuries, either it may be minor or major. To stop or arrest the bleeding *Sushruta* has pointed out four methods to stop the bleeding naming as (i) *Sandhana* (ii) *Skandana* (iii) *Dahana* (iv) *Pachana*. In the *Sandhana* steps he had advised to make the of apposition of the cut edges with stitches, in the *Skandana* to use cold things like snow or ice which causes thickening of blood by coagulation, in the

Dahana by cauterization of vessels with *Kshara* (chemicals) or *Agni* (heat), in *Pachana*, application of styptic decoctions to contract the vessels locally by application of styptic decoctions. For hemorrhage he had also advised to use the drugs or diet by which we can increase the blood.^[13]

We get direct reference of responsibility & execution of skills, like in critical condition one need not have to follow the measures of preoperative procedure, but instead one should handle it as an emergency just like extinguishing of the fire of a burning house.^[14]

F. Idea of Anesthesiology: Patients were advised to take food before undergoing surgical procedure in order to withstand the pain during operation. Food advised to sustain the life & *Madhya* to tolerate the pain.^[15] In the old era there were no well-established anesthetic drugs to alleviate the pain during surgery. The *Sushruta* was the first person had used the alcohol to alleviate the pain during surgery. He had also used the *Bhaanga* (*Cannabis sativa*) during the surgery. Although the use of Henbane (*Hyoscyamus niger*) and of *Mohani Churna* (powder) are reported at a later period.

Principles of NBM (Nil orally)

In the conditions like Fetal malpresentation, Ascites, Piles, Renal calculi, Fistula in ano, Diseases of mouth should be carried out in empty stomach.^[16]

G. Surgical Instruments and their fabrication with maintenance of edges

The *Sushruta* was the first person who had described the 101 types of blunt (*Yantras*) and 20 types of sharp (*Shastras*) instruments and their fabrication by different metallic element chiefly by iron and bronze. The unique classification of surgical instruments like the instruments used to facilitate the surgery known as *Yantra* and while the instruments used directly for the surgical procedures, known as *Shastras*. He had also considered the importance of hand as the most important (*Pradhana*) *Yantra*, for without it, no operation can be performed. He has not only described the types of *Shastras* but also had given the emphasis on the necessity to maintain the sharpness of edges.

So, he had advised to make the *Dhara-Sansthapana* (sharpening) and *Payana* (tempering) at regular interval to perform the surgery hassle free, even though he was very aware regarding the storage and safety of *Shastras* and had developed the *Shastrakosh* (instrument box or pocket), either of leather or bark.^[17]

H. Principles of sterilization & antiseptic measure's:

Sushruta was very aware of preventing the spread of infections to *Vranita* (patient) and *Vranitagara* (operation theater & post-operation recovery rooms). The concept of sterilization was only *Sushruta's* idea still following in today's practice. He used to do *Dhupana* by drugs like *Guggulu*, *Agaru*, *Sarjarasa*, *Gouarasarsapa* etc.^[18] On other hand he has also explained *Raksha Karma* as one among the *Shastiupakrama* with *Dhupana*. *Dhara-Sansthapana* & *Shastra-Payana* can also be taken as a part of antiseptic measures. Infrastructure of *Vranitagara*, timely *Dhupana* of *Vranitagara* and its maintenance with *Raksha Karma* etc. contributes to sterilization.

I. Classification & Nomenclature of diseases: When going through *Samhita* we find several references showing the different ways of classifications and different ways of naming diseases like *Snehadi Sadhya* & *Chedyadi Sadhya*, *Sadhya-Asadhyata*, types according to *Dosha* predominance^[19] etc. The idea of nomenclature and classifying diseases was very well known by *Sushruta* thousands of years ago, which is still in practice now.

J. Contribution to Gross Anatomy: The knowledge of circulation of vital fluids through the body was known to *Sushruta* in 6th century BC itself, also he seems to have possessed knowledge of the arteries, which were described as "channels". *Sushruta* was well aware of the urinary stones, their varieties; the anatomy of urinary bladder along with its relations is well recorded in the chapter on urinary stones. He concluded - "The surgeon who is not well cognizant of the nature and position of the vulnerable parts in the 8 *Srotas* (ducts) namely the perineal raphe, spermatic cords, ducts of the testes, *Yoni*, the rectum, the

urethra, urine carrying ducts or ureters and the urinary bladder and is not practiced in the art of surgery, brings about the death of many innocent victims".^[20] *Sushruta* was a strong upholder of human dissection as evident from his texts. His texts include a systematic method for the dissection of the human cadaver.^[9] Acharya Sushruta had given considerable thought to anatomical structure and function. Vital details of the minute organs were understood & thoroughly studied by *Sushruta* that indicates a depth of anatomical knowledge a surgeon should have. *Sushruta* had an in depth understanding about various procedures which represents the equivalent of modern techniques used in plastic and reconstructive techniques and thus implies a good knowledge of human facial anatomy.

- K. Contributions to Embryology:** *Sushruta* proposed first to deal with embryology and then anatomy of human body; which is an extension of the embryo. Acharya Sushruta dealt rudiments of embryology and anatomy of human body together with obstetrics to interpret their clinical relevance. Evidence from *Sushruta Samhita* indicates that *Hindu* surgeons of prehistoric India not only had considerable knowledge about various congenital diseases, but also their treatment. The *Samhita* describes the sequential development of the structures of the foetus. Acharya Sushruta was also aware of diseases by genetic inheritance. Acharya Sushruta mentions many congenital defects acquired from parents and those resulting from indulgences of the mother during pregnancy. There-fore he advises pregnant women to avoid exertion for the perfect development of the foetus. He also attaches importance to neuroembryology in the *Sarira-sthana* section.^[21] What astonishes much more is the proficiency he accomplished just by mere observation, which is possible in present day only with the aid of investigations and ultrasonography.
- L. Contribution to Skeletal Anatomy:** *Sushruta* deserves the credit of classifying skeletal injuries into groups in respect of their anatomical variation,

prognostic values and ensured proper management even before discovery of Roentgen X rays. He classified bones based on dissections as flat bones, small cubical bones, cartilages, thin curved bones and long bones.^[22] Classification of this accuracy shows he was a keen observer and could apply anatomical knowledge gathered into practice. He had a thorough knowledge on types of fractures, dislocation, sprain, their healing process which helped in successful management with proper rehabilitation. Various devices were also designed by him in management of bone injuries.^[23]

- M. Contribution to Neuro-Anatomy:** This gifted surgeon has included elementary neurosurgery in his conspectus: "Ten nerves maintain the functions of the body by carrying impulses of sound, touch, vision, taste, smell, respiration, sighing, yawning, hunger, laughing, speech, and crying." "A pair of nerve each responds to sound, touch, vision, taste, and smell." "Two nerves lower down at the back of ear (*Vidhura*) which if cut produce deafness; a pair of nerves inside the two nostrils which if cut cause anosmia; a pair of nerves below the end of the eyebrow which if cut causes blindness."^[24] *Sushruta* considered the head as the center of all functions. Through exquisite dissections, he described the cranial nerves in detail and envisaged their physiologic importance. Acharya Sushruta has also explained in various chapters of his book on neurological disorders like hemiplegia, epilepsy, fainting, stiff neck and many more.
- N. Contribution to Cosmetology:** *Vaikrutapahara Chikitsa* as one among the *Saptopakrama* of *Vrana & Krishna Karma, Pandu Karma, Loma Harana*, etc. of *Shashti-Upakrama* contributes to Cosmetology.^[25] There also mentioned Rhinoplasty, Labiloplasty, Otoplasty using autologous grafts serves as the basis for modern branch of plastic surgery.
- O. Contribution to Anorectal surgery:** Acharya Sushruta emphasized different chapters on *Arshas & Bhagandhara*, etc. He has explained different

types of *Arshas*, along with anatomy of *Guda* & *Guda Vali's*. Use of *Ksara*, *Agni*, *Bhesaja* and *Raktamokshana* for treatment of *Arshas*.^[26] There is an elaborative classification of *Bhagandhar* and different types of incisions for fistulectomy as *Langalaka* (T-shaped), *Ardhalangalaka* (L-shaped), *Sarvatobhadra* (circular), *Gothirthaka* (half-moon) and *Kharjurapatraka* (serrated) are described^[27] for adoption according to the type of fistula which are valid even today in modified techniques. Use of *Ksara Sutra* for *Nadivrana*, management of *Parikartika* etc. are the contributions to Anorectal surgery.

P. Contribution to Oncology: We get several references of benign & malignant tumors mentioned by *Sushruta* with their *Nidana*, *Rupa-Purvarupa*, treatment etc. and even *Chedana* procedure for *Arbuda*.^[28]

Q. Contribution to General Surgery

Concept of *Vrana* (Ulcer)

The *Vrana* or injury, says *Sushruta*, involves breakdown of body - components and may have one or more of the following seats for occurrence, viz., skin, flesh, blood-vessels, sinus, bones and joints, internal organs of chest and abdomen and vital structures. Classically *Vrana* (wound) is the ultimate explosion of the underlying pathological structure. It is, in *Sushruta's* words, the sixth stage of a continuous process, which starts with *Shotha* (inflammation). *Sushruta* says that in the first stage, the ulcer is unclean and hence it is called as *Dusta-Vrana* (un-healthy wound). By proper management it becomes a clean wound, a *Shuddha-Vrana* (clean or healthy wound). Then there is an attempt at healing and is called *Ruhyamana-Vrana* (healing wound) and when the ulcer is completely healed, it is a *Rudha-Vrana* (healed wound).^[29] Under management aspect he had elaborated the *Saptopakramas* as *Shastiupakramas* in *Chikitsa Sthana*, and *Saptopakarama* as *Sutras* for ulcer management in *Sutra Sthana*, which are used judiciously according to the stage of ulcer in a sequence for *Vrana Pachana*, *Sodhana*, *Ropana* etc. and finally *Vaikrutapahara Chikitsa* for scar mark. These all shows that principles

seeds of cosmetology were already been told by *Sushruta*, even now modern science using the same fundamentals.

Eight types of Basic Surgical Procedures (*Ashtavidha Shastra-Karma*)

Sushruta describes eight types of surgical procedures: Excision (*Chedana*) is a procedure whereby a part or whole of the limb is cut off from the parent. Incision (*Bhedana*) is made to achieve effective drainage or exposure of underlying structures to let the content out. Scraping (*Lekhana*) or scooping is carried out to remove a growth or flesh of an ulcer. The extraction (*Aharana*) is carried out to remove the foreign body or tartar of teeth etc. The veins, hydrocele and ascitic fluid in the abdomen are drained by *Vyadhana* (puncturing) with special instrument. The sinuses and cavities with foreign bodies are probed (*Esana*) for establishing their size, site, number, shape, position, situation, etc. *Sravana* (blood-letting) is to be carried out in skin diseases, *Vidradhis* (abscesses), localized swelling, etc. in case of accidental injuries and in intentional incisions, the lips of the wound are opposed and united by *Sivana* (suturing).^[30]

Suture Materials

The suture materials of absorbable / non-absorbable and synthetic / natural were described first time by the *Sushruta*. According to *Sushruta* the bark of *Asmantaka* (*Bauhinia racemosa*) trees, thread of *Shana* (*Corchorus capsularis*), silk thread, tendon, hair or fibers of *Murva* (*Marsdenia tenacissima*) and *Guduchi* (*Tinospora cardifolia*) are the suture materials.^[31] The *Sushruta* had also used the black ants (*Lasius niger*) during the suturing of intestinal anastomosis in the case of *Chidrodara* (intestinal perforation) under *Parisravi Udara Chikitsa*^[32], is probably the first reference of absorbable type of suture material in history of medicine.

Use of Suturing Needles

The *Sushruta* had used the suturing needles of different caliber for different purposes. These suturing needles were circular, two finger breadths wide and straight, and triangular bodied three-breadths wide.

The circular needles which have round body are used at the places where the tissues are thin and in the joints. These needles can be compared to atraumatic needles of contemporary science. Where the tissues are thicker, it should be straight, triangular bodied (cutting) and three finger breadths long. The semi-circular needles are used for the vital spots like testicles and abdominal viscera.^[33]

Different types of Dressing & Dressing Schedule: The *Sushruta* had described the various types of dressing and dressing materials for the first time to cover the wound at different sites of the body. The 14 types of bandages and their applications are the unique features of *Samhita*. They are named either on the basis of their shape or use. Indications & contraindications for bandaging and selection of type of bandage acc to *Doshic* involvement & season is also explained. During the bandaging the use of cotton to secure the wound from friction is the original theme of *Sushruta* and it is still in practice. The change of dressing at regular interval is the prime thought of *Sushruta* to protect the wound from infection. The period for change of dressing in winter on every 3rd day and in summer season on daily basis, was the idea of *Sushruta*.^[34]

Concept of NBM & Trividha Karma

Sushruta clearly advised nil orally for several conditions, before the surgery is going to be performed, and also before the *Agnikarma* is performed. The concept of preoperative, operative, postoperative is in practice from *Sushruta's* era, he has dedicated a special chapter on this as *Agropaharaniya Adhyaya* in *Sutra-Sthana*.^[35]

Establishment of various Surgical Techniques

Acharya Sushruta had given various suggestions to make incision. As per him the incision line should be preferred in the line of hair which heals quickly. The incision should be made in a single stroke and with applying appropriate pressure on the knife to keep the edges sharp of incised tissue. The counter incision or multiple incisions are required where the pus is not properly drained in a single incision.^[36]

Sushruta was well aware of the urinary stones, their varieties; the anatomy of urinary bladder along with its relations is well recorded in the chapter '*Ashmari Chikitsitopakramah*' (Chapter on urinary stones). Varieties of stones, their signs and symptoms, the method of extraction (by perineal lithotomy), and operative complication were given in detail,^[37] which may be the first reference of surgical management of calculus in the history of surgery.

Apart from the above, surgery (intestinal sutures) for *Baddha-Gudodara* (intestinal obstruction), *Chidrodara* (perforated intestines), accidental injuries to *Aasaya* (abdomen) in which protrusion of omentum occurs are also described along with their management. The operations like couching for cataract, caesarian section to save a baby's life and if the mother dies in the labour and other surgical procedures are established by the *Sushruta* for the first time.

We get reference of amputation for gangrenous limb, medical termination of pregnancy for *Mudhagarbha*, Paracentesis (Ascitic tapping) for *Jalodara*, Medicine and surgery at war field etc. special entities are also advocated.

R. Contribution to Surgical Ethics for Students as well as Teachers/Surgeons

The model code for the practice of surgery was established by *Sushruta* and he had advised to take the permission from the king before initiating the medical practice^[38] which can be correlated to registration of medicos in today's era. This can be correlated to Hippocrates Oath of modern science. For the first time the ethics for student and teacher were also described by the *Sushruta* in his text. Few most important among them are enlisted as below.

- 1) Principles of knowing both textual & practical understanding - Su.Su.3rd chap.
- 2) Principles of Professional competence and Practical training - Su.Su 9th & 10th chap.
- 3) Principles of regulation of surgical practice - *Raja Anujna* etc. Su.Su. 10th chap & *Kuvaitya, Nrupadoshat*. Su.Su 3rd chap.

- 4) Principles of informed consent- consent should be taken from patient/relatives/from a king – Su.Chi. *Mudhagarbha & Ashmari Chikitsa Adhyaya*.
- 5) Qualities of a good surgeon - *Shouryam Asammhoah* etc. Su.Su. 5th chap.
- 6) Principle of responsibility & Execution of full professional skill - Su.Su. 22nd chap - accepting or rejecting patients, 4 types *Vyadhi / Vrana Sadhya-Asadhyata*. Su.Su. 33rd *Ashtamahagada & Varjaniya* conditions from treatment aspect. Su.Su. 25th chap lack of concentration/responsibility leads to 4 *vyapats* of *Ashtavidha Shastra Karma*.
- 7) Principles of convertasim – Su.Su, 24th selection of treatment modality should be acc. to disease condition - *Shastra Sadhya & Snehadi Kriya Sadhya*.
- 8) Principles of appropriate timing of surgery - Su.Su. 17th chap i.e., 4 stages of *Vrana Sopha* with their management, effects of mismanagement (*Kshatvidradhi, Nadivrana*)
- 9) Principles of emergency management - Su.Su. 5th chap i.e., *Atipateshu Rogeshu.....*
- 10) To teach in accordance with standards of intellectual & moral excellence- *Tantrayukti's, Yogyasutriya Adhyaya* etc.
- 11) Principles of NBM, preoperative, operative, postoperative concepts - Su.Su. 5th chap.
- 12) Principles of studying allied sciences, referrals & limitations of practice - Su.Su. 4th chap, *Ekam Shastram Adhiyano....*
- 13) Principles of Professional virtues- *Chikitsa Chatuspada, Self-effacement- Su.Su. 10th Sumanasa, Bhandhubhutena* etc.
- 14) Others, qualities of *Sisya* for selection of studying (*Suchirguru.....*) after study (*Vakasoushtave....*) Su.Su. *Sisyopanayaniya Adhyaya*, Rules to be followed by teacher (*Enobhagbhavyam Adharm Aphalashchvidhya.....*) etc.

The *Vaidya* (surgeon) is only said to be best who knows very well about the *Yantra, Shastra, Vranasopha, Vidradhi, Pranashtashalya*, who practices regularly the

procedures of *Shastra* etc. having abundant knowledge of theory & practical's.

S. Miscellaneous

- Description of *Pramana's* especially *Upamana Pramana* for examination & diagnosis.
- *Sira-Vyadha* as a *Shalya-Chikitsardha*.
- Used word *Upasarga* for *Upadrava*.
- Description of *Taila Droni & Ghrita Droni*.
- Use of *Navayasa Loha & Louharishta* in *Prameha Pidaka*.
- Description of *Vishakanya, Garavisha, Dushivisha, Dushyodara, Jalasantra* etc.
- Preparation of pharmaceuticals like different *Churna, Lepa, Kashaya* with their standard method of preparation.
- Given much importance to *Rakta* in the pathology, manifestation and treatment of several diseases. Maintenance and preservation of body *Rakta* is important and *Raktamokshana* is *Chikitsaardhya* of *Shalya Tantra*.

DISCUSSION

"A good surgeon knows to suture first then to open next" like that this is again a major contribution to field of plastic or reconstructive surgery, as Acharya Sushruta had mentioned in detail about the methods wound management along with the complications during management and their treatment in detail, which is nowhere told till date in that way. Acharya Sushruta also explained Intestinal obstruction with its treatment, concept of laparotomy, Extraction of bladder stones, Suprapubic cystolithotomy, and concept of biodegradable suture material which can be considered now as absorbable suture material.

From his works it is evident that there is no area of medicine not ventured by *Sushruta*. No wonder he has been glorified as Father of Surgery, Plastic Surgery, and Urology etc. The writings of many great eminent scholars passed from ancient India to Arabians after the invasion by Alexander. From them it passed on to Greeks and Romans. Hence the ancient India deserves

the credit of origin of modern medicine rather than to Greece and Arabia. The paradox still persists why the achievements of this ancient Indian legendary was not in limelight, also we boldly can affirm the need to uphold cadaver dissection to gain knowledge in Anatomy, thus to become skilled surgeons.

CONCLUSION

Acharya Sushruta had performed many surgeries in that period covering all fields of surgical branches like general surgery, ophthalmology, E. N. T., Oro-Dental, pediatrics, obstetrics, urology, orthopedics etc. The contributions of *Sushruta* are not only limited to surgical field but also extended up to the different branches of anatomy, embryology, gynecology, obstetrics, pediatrics, toxicology, medicine etc. & even the concepts of pathology was explained in *su.su (Kriyakalas) Vranaprashna Adhyaya*. It shows that, he tried to make his *Samhita* as a complete book on anatomy and surgery with available source of knowledge (*Pramanas*), which is required by the surgeon. Most of his ideas are only used in modern surgery till today in a sophisticated way, as the available other branches of science & technology made it possible. But the basic fundamentals are of his own.

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