

Sushruta and Development of Ancient Indian Surgery

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Abstract: Sushruta, known as the “Father of Surgery,” was a pioneering figure in ancient Indian medicine whose contributions have influenced the field of surgery, especially cosmetic surgery and medical practices within the global community. His systematized approach to surgery, with the use of herbal anaesthetics and postoperative care, laid the foundation for surgical practices. Sushruta’s emphasis on practical experience, dissection of cadavers, and detailed documentation established standards that continue to underpin surgical education today. The influence of his detailing surgical techniques and surgical instruments extended beyond ancient India, spreading to other parts of the world and shaping the development of reconstructive surgery, orthopedics, ophthalmology, and many more fields. His work *Sushruta Samhita* is one of the oldest surgical texts, compiled around 600 BCE or earlier, including detailed anatomy via cadaver dissection, over 300 surgical procedures, 121 surgical instruments, herbal anesthesia, wound care, and ethical/practical training methods. These predated many Western advances and influenced global medicine.

Keywords: Sushruta, Ayurveda, Shalya Chikitsa, Surgery.

Introduction

Ayurveda¹, the science of life or the ancient Indian medical system, is believed to have formed a part of Veda, the Atharva Veda. It is one such ancient text that is providing information on health-related principles. The people of that time were conscious of their longevity and health. By accumulating their experiences and principles, they have created texts that have proven beneficial to human health. They not only promoted medicine but also advised physicians to adopt specific approaches and procedures. These procedures required physicians to be solely concerned with treating the patient and to care for them as if they were their own children. Physicians had to determine the effectiveness of medicines through direct observation.

It is said that the science of life has always been in existence, and there have always been people who understood it in their own way; it is only with reference to its first systematized comprehension or instruction that it may be said to have a beginning. Brahma, or the first member of the Hindu triad, was the first to propound the Science of Life. He composed the Ayurveda consisting of one hundred sections (*adhyayas*) of one hundred stanzas (*shlokas*) each. This sacred medical work treats of the subject of life, describes the conditions tending to prolong or shorten life, dwells on the nature of diseases, their causes and methods of treatment. It is the oldest Indian medical book and is divided into eight parts or *tantras*. These are:²

1. Shalya- Surgery. This includes the methods of removing foreign bodies, of using surgical instruments, of applying bandages, and of treating various surgical diseases.
2. Shalaky- Treatment of diseases of parts situated above the clavicles, such as the diseases of the eyes, nose, mouth, ears, etc.

3. Kaya-chikitsa- General diseases affecting the whole body, such as fever, diabetes, etc.
4. Bhoot-vidya- Demoniactal diseases. This chapter describes the means of restoring by prayers, offerings, medicines, etc., deranged faculties of the mind supposed to be produced by demoniactal possession.

During the ancient period, diagnosis and prognosis were made directly by looking, listening, smelling, touching the patient's body parts, and indirectly by checking the pulse. Similarly, physicians had to look for intestinal rumbling, joint cracking, changes in speech, and other symptoms. In addition to direct observation, physicians also based their diagnosis on the patient's home, caste, lifestyle, diet, and medical history. In ancient times, experienced physicians would personally prepare medicines, perform surgeries, and diagnose diseases. Such great physicians and medical scholars were Maharishi Charaka and Sushruta.

Shalya Chikitsa or Surgery

Salya is the name applied to the art of surgery in Indian medicine and is derived from the root *Sal* or *Sval* meaning to move quickly. Foreign bodies of every kind are denoted as Shalya but it specially refers to the arrow, which was the commonest and most dangerous foreign body causing wounds and requiring surgical treatment. A Shalya usually acts as an impeding or obstructing agent to the entire organism and hence the science which deals with its nature and characteristics is called Shalya- Tantra or Shastra (surgery). A primitive sort of surgery is as old as warfare. The Aryan invaders of India had to wage fierce war with the inhabitants of the Indus valley before they conquered them. During the wars surgeons were frequently requisitioned to attend on the wounded. Early warfare was conducted with such weapons as bow and arrow, sword, mace, etc. Thus, in every war the services of bold and skillful surgeons were always in requisition for extracting arrows, amputating limbs, arresting hemorrhage, and dressing wounds. The constant wars and internecine strife afforded ample opportunities to the surgeons to distinguish themselves in their profession and acquire considerable dexterity in their work.³

In classical times surgery (*Shalya*) was regarded as the most important branch of medicine. In the mythical Ayurveda itself it is accorded the first place and heads the eight divisions of medicine. From the very beginning, as we have seen, two schools of medicine have been recognized, that of Atreya of medicine proper, and that of Dhanvantari of surgery; and all subsequent development kept to this division. Dhanvantari, introducing Sushruta to the, art of surgery, says: "This Shalya-tantra is considered the most important of the eight divisions, on account of the cures effected by it being rapid and striking, on account of its teaching the use of blunt instruments, cutting instruments, caustics, cautery, etc., and its principles being applicable to all other sections. Hence this portion of the Ayurveda is eternal and holy, and the means of attaining heaven, fame, longevity and wealth."⁴

Shalya- Tantra or Shastra (Surgery) was divided into two divisions, *Shalya* and *Shalakya*. Their scope is defined as follows: Shalya treats of the extraction of external substances accidentally introduced into the body, such as grass, wood, stones, earth, iron, fragments of bricks, bones, hair, nails, and arrows; of pus and retained secretions, and of the foetus from within the womb. It teaches also the use of blunt instruments, cutting instruments, caustics and the actual cautery, together with the diagnosis and treatment of inflammation. Shalakya treats of diseases of the ears, eyes, mouth, nose, and other parts of the body above the clavicle.⁵

Acharya Sushruta

Acharya Sushruta was the son of Vishvamitra, a contemporary of Lord Rama. With his father's permission Sushruta and his seven brothers went to Devdasa, the king of Benaras, to study medicine. Devdasa was believed to be incarnation of Dhanvantri, a divine physician. Dalhana, the commentator of Sushruta Samhita, mentions that Dhanwantari Devdasa, the King of Kashi, taught the subject of surgery to twelve of his pupils. To seven of them, of whom one was Sushruta, he taught special surgery, Shalya-tantra; and he taught special surgery and the medical treatment of the part above the clavicle, including the ear, eye, mouth, nose, etc. Having learnt Ayurveda from Devdasa or Kashiraja, as he is otherwise called, Sushruta and his companions returned home and wrote independent works on Medicine and Surgery. But Sushruta excelled them all.⁶

Sushruta is known as the father of surgery. Based on his knowledge and experiences, he wrote a treatise on surgery, Sushruta Samhita. Sushruta elaborates on various aspects of surgery in his treatise. In ancient times, wars were frequent, in which soldiers lost their arms and legs, or were wounded by arrows and spears. These wounds were treated by incision and were extremely painful. Therefore, this system of treatment was called surgery (Shalya Chikitsa), because *Shalya* itself means pain.

Along with surgery, Sushruta also provided information on other aspects of Ayurveda such as anatomy, physiotherapy, pediatrics, gynecology, psychiatry, etc. Apart from this, Sushruta also had special knowledge about diabetes and obesity. Sushruta also performed eye surgery. The Samhita describes in detail the procedure for performing cataract surgery. He also possessed knowledge of caesarean section. Sushruta specialized in diagnosing and realigning broken bones. He would administer alcohol or special medications to reduce pain during surgery. Acharya Sushruta had also acquired proficiency in botany. He studied plants and described their medicinal use. He also described the effects of weather on humans and animals. According to Sushruta, health is not only physical but also mental. For this, a happy life, good nutritious food, proper disposal of waste materials, better coordination between body and mind are necessary.

Sushruta mentions three stages in the treatment of diseases: the preliminary measures (Purva-karma), the principal therapeutical or surgical appliances (Pradhana-karma), and the after measures (Paschat-karma). Great emphasis is laid on the after treatment.

He was not only a great surgeon but also a great medical teacher. He taught his disciples the principles of surgery and had them practice operations. In the early stages, he used fruits, vegetables, and wax figures to practice surgery. To explain the internal structure of the human body, Sushruta would perform surgery on dead bodies and teach them to his disciples. Sushruta would cover healthy dead bodies with straw and place them in river water. Due to this the skin of the body would separate. After this he used to make his students study the muscles, bones, internal organs, etc. of the body. He also introduced them to the vital points of the body so that surgery and treatment could be done easily.

Plastic Surgery

Sushruta was a specialist in plastic surgery. Many people consider plastic surgery to be a relatively new field. This is a misconception, as plastic surgery refers to correcting the structure of a body part. Plastic surgery does not use plastic. The word “plastic” comes from the Greek word “plastikos,” which means “to make, to graft, or to prepare.” In plastic surgery, the surgeon takes tissue from one part of the body and attaches it to another. Sushruta is considered the first plastic surgeon in India.

Sushruta made the practice of removing flesh from one part of the body and placing it at another place more effective. He had developed methods to correct deformities on the face, etc., and to replace a cut nose with a new one. For this he started taking skin from the forehead. He would take skin from one place and apply it to another. Sushruta had acquired special expertise in plastic surgery. Once, at midnight, a patient arrived at Sushruta’s home with a severed nose and bleeding profusely. Acharya Sushruta washed the man’s face with medicinal juice, asked him to drink a glass of wine, and began preparing for the surgery himself. Using a knife and tweezers, he cut a piece of flesh from the man’s cheek and implanted it on his nose. The alcohol prevented the man from feeling the pain. He then stitched the nose and applied a medicinal ointment. Instructing the man to take the medicine regularly, and then Sushruta sent him to his home.⁷

Surgeons were advised to give patients alcohol before surgery to prevent them from fainting from the pain and to prevent them from feeling the sting of the instruments. This reveals the scientific approach and techniques adopted in the medical system of Iron Age India. Sushruta emphasized the need for instruments to be made from the finest steel. He also emphasized the need for sharp edges, sharp enough to cut even a hair. He emphasized the need for an

antiseptic atmosphere before and after surgery. He also described the method and necessity of anesthesia before surgery.

Sushruta Samhita

Sushruta Samhita, composed in pre-Buddhist time, was one of the major foundational texts of Ayurveda. This book describes the ancient tradition of surgery in Indian medicine. It is considered one of the most brilliant gems of Indian medical literature. In Sushruta Samhita, surgery achieved a leading position as an indispensable element of general medical training. The surgeon in seeking a thoroughly reliable knowledge must duly prepare a dead body and carefully ascertain its parts. For by putting together what he perceives with his own eyes with what he has learned from valid tradition through text-books, he will increase his wisdom.”⁸

Sushruta Samhita contains a detailed account of the teachings and practice of the great ancient surgeon Sushruta. Sushruta Samhita is still important and relevant surgical knowledge today. In this text, various aspects of surgery have been explained in detail. The Sushruta Samhita has 184 chapters, covering 1120 diseases, 700 medicinal plants, 64 procedures based on mineral sources, and 57 procedures based on animal sources. And eight types of surgical operations are mentioned. Sushruta Samhita is divided into two parts- Purva Tantra and Uttar Tantra as follows:

Poorva Tantra- The Poorva Tantra has five parts: Sutrasthan, Nidanasthan, Sharirasthan, Kalpasthan, and Chikitsasthan. It contains 120 chapters, which provide detailed discussions of the first four branches of Ayurveda (Surgical, Agada Tantra, Rasayana Tantra, and Vajikarana). **Uttar Tantra-** This Tantra has 64 chapters which contain detailed discussion of the remaining four parts of Ayurveda (Salakya, Kaumaryabhritya, Kayachikitsa and Bhutvidya). Uttar Tantra is called Upadravika. It is also called surgical procedure because it involves the removal of complications caused by surgery. Along with this, fever, dysentery, hiccups, cough, worm infestation, jaundice etc. are described. Shalaky Tantra is a part of Uttartantra in which diseases of eyes, ears, nose and head are described.

The Sushruta Samhita describes eight types of surgical procedures:⁹

- (1) Chhedya or Incision (for piercing)
- (2) Bhedya or Excision (to be penetrated)
- (3) Lekhya or Scarification (to be separated)
- (4) Vedhya or Puncture (puncturing)
- (5) Aishya or Probing (to find lesions in the nerves)
- (6) Aharya or Extraction (to remove harmful substances or extracting solid bodies)
- (7) Vishravaya or Drainage or Evacuation of fluids (evacuating fluid)
- (8) Sivya or suturing (for stitching wounds)

The eight types of surgical procedures mentioned above were performed using various Surgical Instruments. Sushruta describes two kinds of surgical instrument, Blunt (*Yantra*) and Sharp (*Shastra*). The yantras or blunt instruments number a hundred and one and are divided into six groups:¹⁰

- (1) Svastika (curved or hooked instruments); (2) Sandamsa (forceps); (3) Tala (with ends like the mouth of a fish); (4) Nadi (tubular instruments); (5) Salaka (probes and sounds); (6) Upayantras (accessory instruments).

There are 20 sorts of cutting or sharp instruments. They are:¹¹

- (1) Mandalagra or round-headed; (2) Karapatra or saw; (3) Viddhipatra or razor of two varieties; (4) Nakhasastra or instrument for cutting nails; (5) Mudrika, a cutting instrument of the size of the last phalanx of the index finger; (6) Utpalapatra having the shape of the petal of the water lily; (7) Arddhadhara, a knife or lancet with a single edge, the blade 2 inches long, the handle 6 inches; (8) Suchi, needles; (9) Kusapatra, resembling a blade of kusa grass; (10) Dumukha, shaped like the beak of the sardli bird; (11) Sararimukha or scissors; (12) Antarmukha, half-moon shaped, with the cutting edge inside; (13) Trikurchaka, a small trocar with three cutting surfaces; (14) kutharika, a small axe-

shaped instrument; (15) Vrihimukha, a small trocar with the head shaped like a grain of paddy; (16) Ara, a long instrument with the sharp end the size of a sesamum seed; (17) Vethasapatra, a cutting instrument like the leaf of the rattan; (18) Vadisa, or hook; (19) Dantasanka, pincers for extracting teeth; (20) Esani, or probes.

These instruments should be made of good iron and have a fine edge and shape. They should be moderate in size and capable of being firmly grasped, and their ends should not be fearful to look at. Instruments used in surgical operations should be sharp enough to divide the hairs of the skin. Besides blunt (*Yantra*) and sharp (*Shastra*) instruments, Sushruta mentions also accessory cutting instruments (*Anushastras*). These may be made of bamboo-bark, glass or *Kurvinda*, a sort of ruby or stone which can be given a fine edge. Leeches, fire, caustics, nails, goji, sephalika, saka (kinds of leaves), young shoots or roots, hairs and fingers are also used as accessory instruments. Bamboo-bark, crystal, glass and ruby should be used in incising and dividing parts in the case of infants, of persons too fearful of surgical instruments, or when these last are not available. Extraction and puncturing, if capable of being done by nails, should be performed with them.¹²

In the Surgery the bandages are more important. When a bandage is properly applied according to rules, it relieves pain, purifies the blood, and softens the part. When bones are comminuted, smashed, broken, dislocated or put out of place, and when nerves and veins are torn, they rapidly get well under the application of bandages and the patient sleeps, sits and moves about comfortably. The indications and contra-indications for the use of bandages are discussed fully by Sushruta. Sushruta describes 14 varieties of bandages (bandha):¹³

(1) Kosa (egg-shaped) is applied to the joints of the thumb and fingers; (2) Dama (tail of a quadruped) is tied round a part for the relief of pain; (3) Swastika (portico shaped) is applied to the joints, to the spaces between the tendons of the great and second toe, to the eyebrows and the breasts, to the soles, palms, and the ear; (4) Anuvellita (encircling) is applied to the limbs; (5) Pratoli (broad) is a broad bandage for the neck and penis; (6) mandala (circular) is applied to round parts; (7) Sthagika, (giving firmness), a bandage filled with pastes, is applied to the end of the thumb, fingers and penis; (8) Yamaka (double) is applied to ulcers; (9) Khatva (four tailed bandage) is for the cheeks, temples and lower jaw; (10) China (banner) is a bandage for the inner angles of the eyes; (11) Vihhandha (a firm bandage) is for the back, abdomen and chest; (12) Vitana (canopy) is a large bandage for the head; (13) Gophana (a sling for throwing stones) is a concave bandage for the chin, nose, lips, shoulders and pelvis; (14) Panchangi (or bandage with, five tails) is for the parts above the clavicles.

The Sushruta Samhita contains the details of the surgical removal of harmful tissues from the human intestine caused by cancer. Methods for caesarean delivery are described. In Sushruta Samhita, there is mention of surgery on the nerves (Neurosurgery) for getting rid of diseases and the Plastic Surgery, the most complicated procedure of modern times. The detailed description is given in the Sushruta Samhita. Sushruta wrote detailed methods for bone fractures, artificial organ implantation, plastic surgery, dentistry, ophthalmology, cataract surgery, removal of stones, birth of a child by cutting the mother's abdomen, etc. are described in the Sushruta Samhita. There are many methods about which even today's medical science is unaware.

The great Buddhist scholar Nagarjuna revised the old Sushruta Samhita, and added to it the supplementary section (*Uttara-tantra*). Nagarjuna was a leading director of Kaniska's Council that was held about 78 CE. He salutes Sushruta in the beginning of the work (Sushruta I) with Brahma, Prajapati, the Asvins, Indra, and Dhanvantari.¹⁴ It is no exaggeration to say that if works written on Hindu Medicine since the days of Charaka and Sushruta could be collected, the entire volume of Indo-Sanskrit Medical Literature would by no means be less than that of the medical literature of any civilized country of modern times.

Conclusion: Sushruta's remarkable contributions to surgery and medicine laid a foundation that continues to influence modern practice. His unparalleled skill and accuracy in techniques such as rhinoplasty, cataract surgery, and bone setting revolutionized medical practice. Despite the limitations of his era- rudimentary tools and lack of anaesthesia- Sushruta's emphasis on anatomy and comprehensive patient care through autopsy showcased his forward-thinking approach. His principles of precision and cleanliness have endured for centuries, shaping medical traditions

worldwide. His pioneering techniques, ethical principles, and emphasis on holistic healing set a high standard for medical practice, inspiring generations of surgeons and physicians. The enduring relevance of the Sushruta Samhita underscores the timeless nature of his insights, bridging the gap between ancient wisdom and modern science. He was not only a great surgeon but also a sage, teacher, and philosopher.

REFERENCES:

1. Ayurveda (medical science) claims to be a branch of the Atharva Veda, but the Atharva Veda contains many of the oldest superstitions of the Indo-Dravidian masses. The ancient evidence of medicine in India is a story recounted in the Vedas. According to that story, once upon a time, several epidemics struck the earth. Concerned, all the sages convened a meeting in the foothills of the Himalayas. Bharadwaj was unanimously chosen as the leader and sent to Indra, the king of medical knowledge, to seek relief from the diseases. Indra imparted all the knowledge of Ayurveda to Sage Bharadwaj. Bharadwaj imparted this knowledge acquired from Indra to his disciple Punarvasu Atreya. Atreya, along with his six disciples, researched medical knowledge. Maharishi Agnivesh was the most prominent among these disciples. In this way, medical knowledge continued to grow on earth. (Bhagwat Singh (1896). *A Short History of Aryan Medical Science*, New York, pp. 30-32)
2. Bhagwat Singh, *op. cit.*, p. 25.
3. In the Rigveda we read of the amputations of legs and the fitting with artificial limbs, enucleation of eyes, and extraction of arrow shafts from the limbs of the wounded. We read of the famous surgeons to the gods, the Asvini Kumaras. Dhanvantari recites an incident which occurred in one of the wars of the gods. Rudra cut off the head of Daksha. Then the gods called on the twins to repair the damage and they successfully united the head to the trunk and restored Daksha to life. (P. Kutumbiah (1962). *Ancient Indian Medicine*, Calcutta, p. 144.
4. Kutumbiah, *op. cit.*, p. 144.
5. *Ibid*, p. 145.
6. Bhagwat Singh, *op. cit.*, pp. 33-34.; Kutumbiah, *op. cit.*, p. 171.
7. Kutumbiah, *op. cit.*, pp. 168-69.
8. *Ibid*, p. 144.
9. *Ibid*, p. 156.
10. *Ibid*, pp. 159-61., (1) Svastika yantras should, as a rule, be made of iron, 18 fingers long, three ends shaped like the heads of beasts and birds of prey, the arms of the pair held together by a pin, the head of which is as big as a lentil and their ends for grasping the foreign bodies should be hooked or curved. There are 24 instruments in this class, 9 shaped at the end like the heads of the lion, tiger, wolf and other beasts of prey and 15 like those of the crow, heron, vulture, falcon, and other birds of prey. They serve to extract foreign bodies that are prominent and are easily handled. (2) Sandamsa yantras or forceps are of 2 kinds, with or without arms, 16 fingers long, and are especially useful to extract Shalya or foreign bodies from the skin, flesh, veins, or sinews. (3) Tala yantras are 12 fingers in length. Their extremities are single or double and curved like the mouth of a fish. They are used in extracting foreign bodies from the nose, ears and other canals. (4) Nadi yantras or tubular instruments of various sorts are used for various purposes. They have openings at one or both ends and are employed for extracting foreign bodies from the outer canals of the body, for the inspection of diseases in them, for sucking out fluids or helping in other ways in the treatment of diseases. Their diameters are adapted to the size of the canals or passages into which they are introduced, or to the purposes for which they are employed. The varieties of tubular instruments are: those used in the treatment of fistula-in-and piles, tumours, abscess, hydrocele, ascites, stricture of the urethra, stricture of the rectum, those used for enemata, injections into the bladder and inhalations, and horns and gourds used for cupping. (5) Salaka yantras or probes and sounds of different sorts are used for various purposes, their diameters and lengths varying accordingly. There are two varieties of them with their ends shaped like earth-worms, two shaped like the wing of an arrow, two like the hood of a serpent and two with hook-shaped ends. They are used for exploring abscesses and sinuses, for bringing, together divided internal parts, displacing any material from one part to another within the flesh or bones and extracting any substances from them. Two varieties of probes have their ends-shaped like the half of a pea and are slightly bent. These are used for extracting foreign bodies from the outer canals of the body. Six varieties have their

heads covered with cotton and are used in wiping or cleaning abscesses, etc. Three varieties, have their ends spoon-shaped, with beaked mouths and are used for applying caustic solutions. Three sorts of Salakas have their ends shaped like the end of Jarnbava fruit. Three have their ends-hooked. These six varieties are used for applying the actual cautery. There is one variety used for extracting tumours from the interior of the nose. There is a variety for applying collyria to the eyes. One variety, used in clearing the urethra, has a diameter the size of the stalk of the malathi flower. (6) Upayantras or accessory instruments are: cord, braided hair, bandages, leather, bark of trees, twining plants, cloth, pebbles, stones, hammer, hands, feet, fingers, tongue, teeth, nails, mouth, hair, iron shoes, branches of trees, spittle, streams of water, objects exciting pleasure, loadstone, caustics, fire and medicines. These various instruments are used or applied to the body or parts of the body, to the joints, veins, etc., according to the requirements of each part.

11. Kutumbiah, *op. cit.*, pp. 159-61.

12. *Ibid*, p. 161.

13. *Ibid*, pp. 163-64.

14. Chandra Chakraberty (1923). *An Interpretation of Ancient Hindu Medicine*, Calcutta, p. xvii.