

Acharya Sushruta - The Patron Saint of Dentistry

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Abstract

India has a rich legacy of surgical treatment and Sushruta Samhita stands testimony to that fact. It is a comprehensive treatise which deals with a multitude of topics ranging from education of health professionals to ethical behavior of clinicians, human anatomy, pathological basis of diseases and elaborate treatment processes. Oral and facial diseases, their treatment and descriptions of surgical instruments have astonishing comparisons to modern scientific literature. Sushruta Samhita has six sections containing 184 chapters, descriptions of 1120 diseases, 121 surgical instruments and 700 drugs.

Keywords: Acharya Sushruta; Sushruta Samhita; Rhinopasty; Father of Surgery; Patron Saint of Dentistry

Introduction

Sushruta (600 B.C.) is considered as the father of surgery and who was believed to have lived in the Kingdom of Kashi. Indian dentistry is greatly indebted to Sushruta and considers him as the 'patron saint'. Sushruta learned the science from the King Divodasa of Kasi. Sushruta prepared many monographs on different health related techniques and later they were compiled into a treatise which is known as Sushruta Samhita. Sushruta's teachings were passed down verbally by his disciples over a long period of two centuries, possibly revised and edited by various authors. Sushruta Samhita in its present form is believed to be made by Nagarjuna. Little is known on Sushruta's life from his work because it focuses mainly on the application of medical techniques. Even the name Sushruta is considered as an epithet meaning 'the renowned' [1] (Figure 1).

Figure 1: Acharya Sushruta.
<https://ispub.com/IJPS/4/2/8232>

Sushruta Samhita - documented history

In 1835, the Asiatic Society of Bengal published a complete version (almost) of Sushruta samhita. In 1890 a version of the monumental textbook written in Sanskrit verses was discovered from Kuchar, Chinese Turkestan and was named after the man to whom it was sold - Hamilton Bower. The Bower manuscript was written on birch bark (inner layer of birch bark was commonly used for writing before the production of paper) and is currently housed in the Bodleian Library in Oxford (Figure 2).

Figure 2: The Bower manuscript.

<http://balkhandshambhala.blogspot.com/2015/05/sushruta-1000-600-bc-bower-manuscript.html>

The origin of Sushruta samhita is placed around the fifth or sixth century B.C. The compilation has two parts named Purva-tantra and Uttara-tantra. These two parts together cover all the specialties such as the medicine, geriatrics, pediatrics, dental diseases, diseases of the ear, nose, throat, eye, aphrodisiacs, toxicology, and psychiatry. Sushruta samhita can be considered as an encyclopedia of medical learning with special emphasis on Salya and Salakya. Shalya refers to general surgery and Shalakya is related to surgeries of the eyes, ears, nose, throat and teeth. There are five books belonging to the Purvat Tantra which are Sutra Sthanam (definitive aphorisms), Nidana Sthanam (aetiology), Sarira sthanam (anatomy and physiology), Chikitsa Sthanam (therapeutics), and Kalpa Sthanam (poisons and antidotes) having 120 chapters in total. Uttara Tantrum (diseases of eyes, ears, nose and head) was rephrased by Nagarjuna, a Buddhist philosopher. The masterly text contains descriptions of 1,120 illnesses, 300 surgical procedures, classification of human surgery in 8 categories, over 121 surgical instruments, and around 700 drugs of animal, plant, and mineral origin.

Sushruta Samhita had a smooth passage to the Arab countries through Arab traders who came to the sea coasts of India and carried Indian goods to Europe through Egypt and Syria. The trade relations paved the way to cultural transmission which had its impact on language and literature including scientific literature [2]. The way in which Sushruta Samhita reached the Arab world can be logically concluded like this. Translation of 'Sushruta Samhita' from Sanskrit to Arabic was ordered by the Caliph Mansur of Baghdad (A.D. 753-774) and was known as Kitab-Shaw Shoon-al Hindi or Kitab of Susrud. Another translation into Arabic was made by Ibn Abi Usaybia (1203-1269 A.D.). It is believed that Arabic medicine was founded on translations of Sanskrit treatises. In turn, European medicine was based on the Latin version of the Arabian translations up to seventh century AD. The first European translation of Sushruta Samhita was published by Hessler in Latin and by Muller in German in the early 19th century [3,4].

An English translation of the *Sushruta Samhita* was first published by the scholar Kaviraj Kunja Lal Bhishagratna in three volumes between 1907 and 1916 CE. By this time, the world had accepted Hippocrates as the Father of Medicine. Bhishagratna's translation did not receive international recognition it deserved during the time of its publication. Sushruta got recognized mainly in post independent India for his enormous contributions to the field of medicine and Dentistry in general and surgical practices in particular [5,6] (Figure 3).

Figure 3: English translation of Sushruta Samhita.

Dissection and an ideal surgeon

Sushruta was the first surgeon who was convinced that dissection of dead body is a learning tool of utmost importance in acquiring surgical skills. Great precision was exercised during dissection in the time of Sushruta. Sareera sthana of the Samhita deals with anatomy.

Sushruta has defined the characteristics of an ideal surgeon as follows

- Surgeon should be courageous and should be daring to perform surgery (Shourya)
- Surgeon should be deft, fast acting and alert (Aashukriya)
- Surgeon should possess sharp instruments (Shastra thaikshnyam)
- Surgeon's hand should not have tremors and should be free from sweat (Swedavepadhu)
- Surgeon should not get easily confused and bewildered (Asammohascha)
- Sushruta suggests that the surgeon should deal with situations of emergencies with equanimity [7] (Figure 4).

शौर्यमाशुक्रिया शस्त्रतैक्षण्यं स्वेदवेपथु ।
 असम्मोहश्च वैद्यस्य शस्त्रकर्माणि शस्यते ॥
 आचार्य सुश्रुत

Figure 4: Ideal qualities of a surgeon.

Sushruta's contributions to plastic surgery

Even in ancient times, plastic surgery and dental surgery were practiced in India. The ancient practice of punishment of amputating the nose of convicted criminals produced so many patients requiring surgical intervention. The convicted were deprived of enjoying social status. Such individuals were treated to restore the social status by exclusive rhinoplasty developed by Sushruta. He used a flap of skin raised from the forehead and still now the technique is known as 'Indian forehead flap rhinoplasty'. In 1793, two British surgeons observed the procedure being performed on a cart driver who was taken as prisoner by the sultan in the Anglo-Mysore war,

and an acquaintance of the surgeons published an account of the surgery in London's *Gentleman's Magazine* the following year. On reading the article a British surgeon - Joseph Constantine Car-pue practiced it on cadavers for 20 years before performing the operation (successfully) on a patient in 1814. He published on this technique and it got popular in Europe and in 1830 in the United States. A variant of this technique described in Sushruta Samhita is as follows.

"To measure the part of the nose to be covered, a template was made in a leaf. Then a piece of skin of the required size is dissected from the cheek and rotated to cover the nose keeping a small pedicle attached to the cheek. The nose stump to which the skin graft is attached, is made raw by cutting with a knife and the graft is stitched. Two tubes made of castor-oil plant were inserted to form the nostrils so that the new nose gets proper shape. Powder of liquorice, red sandal-wood and sesame oil were used as an adjunct to the surgery" [8].

Students who have undergone six years of education were admitted to the surgical training. Students were required to take a solemn oath before the starting of the course. For teaching, Sushruta used various experimental models viz. watermelon and cucumber to teach incisions and worm-eaten wood for probing. It is amazing to note that advanced training methods were used in Sushruta's time. But unfortunately, the popularity of surgery and dissection of dead bodies seems to be discontinued in the later period (Figure 5,6).

Figure 5: Gentleman's magazine 1794.
<https://www.skinnerinc.com/auctions/2658B/lots/327>



Figure 6: Rhinoplasty reported in Gentleman's magazine. <https://www.skinnerinc.com/auctions/2658B/lots/327>

Surgical instruments

Sushruta Samhita describes 20 sharp and 101 blunt surgical instruments. Making of the instruments were also described by him. Many instruments were designed similar to beasts and birds and named as crocodile forceps and hawk's bill. The instruments were classified as Sasthra (cutting instruments), Yanthra (blunt instrument), Upayanthras (accessories) and Anusasthra (minor instruments). According to Sushruta the best instrument is the surgeon's hand without which other instruments cannot be functional (Figure 7) [9].

Anaesthesia

In Sushruta's time, the popular anaesthetic used was wine. Sushruta wrote "Wine should be used before the operation to produce insensibility to pain. The patient is rendered intoxicated and does not feel the pain of the operation." Alcohol and cannabis were also used to induce sleep or to dull the senses to a stupor during surgical procedures such as rhinoplasty. Nearly fifteen drugs were used in Ayurveda to control pain, induce tranquility and to control inflammation associated with surgery [10,11].

Suturing of surgical wound

Claws of giant ants like *Oecophylla smaragdina* (found in tropical Asia and Australia) and *Eciton burchelli* (army ant) were used as suturing devices by ancient people in many parts of the world. The ants were held close to the open wound, and they would bite and hold the edges of the gap closer. The ant would then be decapitated so that the head, with its claws, will remain at the wound keeping the edges together. Use of the ant claws was mentioned in the Sushruta Samhita, and later in the medieval Arabic medical literature ¹. Sushruta advised against putting sutures too close or too far apart. He is supposed to have used hemp fibers to ligate the vessels to control bleeding. This fibre of plant origin was used to make clothes in very ancient times (Figure 8,9).

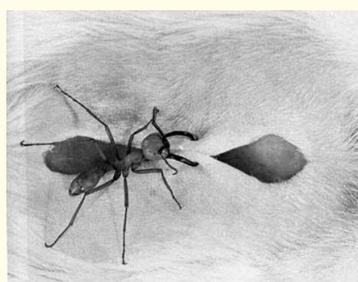


Figure 8: Ants used for suturing the wound.

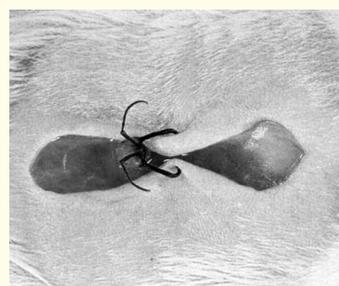


Figure 9: Decapitated ant at the wound.

J. Schiappa, R. Van Hee., From Ants to Staples: History and Ideas Concerning Suturing Techniques, *Acta Chir Belg*, 2012, 112, 395-402

Figure 7: Surgical instruments used at the time of Sushruta. https://www.researchgate.net/publication/339789459_The_Principles_of_Surgical_Practice_Sushruta_Samhita

Oral diseases

In Sushruta Samhita, oral diseases appear in two separate sections viz. Nidana sthanam and Chikitsa sthanam. Diseases affecting seven anatomic locations - the lips, gums, teeth, tongue, palate, throat and oral cavity - are listed separately with clinical features. Sixty-five oral diseases are listed of which eight belong to lips, fifteen to gums, eight to teeth, five to tongue, nine to palate, seventeen to throat and three to oral cavity. Diseases affecting the gums and teeth are described here specifically.

Diseases affecting the periodontium

Fifteen diseases belong to this group and Sushruta designated them as diseases affecting the roots of teeth. However, we find descriptions of only ten (gum) diseases in this group in detail and five belong to five different types of sinuses (Nadi Vrana). The conditions described here cannot be clearly related to the conditions identified by the modern dentistry. The signs of these conditions can slightly be overriding (Figure 10).

Figure 10: Advanced periodontal disease.

Periodontitis- <https://www.sciencedirect.com/science/article/pii/S2214624517300138>

- **Sitadam:** The gums of the teeth are dark, bleed and produces bad odour. They become soft and gradually slough off. In ayurvedic terms the disease has its origin from deranged kapham and blood.
- **Danta pupputaka (Gum boil):** Two or three teeth at a time are affected by painful swelling or abscess. This also is caused by derangement of Kapham and blood (Figure 11).
- **Danta-veshtam:** The teeth become mobile and there is bleeding and pus discharge from the gums. This condition is due to deranged blood.

Figure 11: Gumboil.

<https://medical-dictionary.thefreedictionary.com/>

- **Saushiram:** Painful swelling of gums which cause itching. Excessive salivation is associated with this abscess formation. This is also caused by the deranged blood and Kapham.
- **Maha Saushiram:** The teeth become loose associated with sinuses or fissures in the palate, pus discharge from gums and generalized inflammation of the mouth. It is attributed to deranged *doshas* of the body. (Ayurveda recognizes three basic types of energy, or functional principles by name *Vata*, *pitta* and *kapha*. *Vata* is the energy of movement. *Pitta* is the energy of digestion or metabolism and the chemical transformations. *Kapha* is the energy of lubrication and structural integrity).
- **Paridaram:** The gums bleed and slowly disintegrate. The disease is due to the deranged blood, Kapham and Pittham.
- **Upakusam:** Burning sensation of gums, bleeding, pus discharge, swelling, bad odour and mobile teeth. This is due to unfavourable conditions of the blood and Pittham.
- **Danta-Vaidarbham:** This is consequent to friction, impact or hit on the jaw. Swelling is found at the site of impact and teeth become mobile.
- **Vardhanam:** This is associated with tooth eruption (possibly the last molar). It causes pain which subsides on completion of eruption of the tooth. Deranged Vayu is the reason.
- **Adhimamsam:** Additional growth of the gum, inflammatory or traumatic swelling possibly in relation to the last molar (pericoronitis). It is due to the derangement of Kapham (Figure 12).

Figure 12: Pericoronitis.

<https://www.paramountdentalsydney.com.au/blog/pericoronitis>

Five types of sinuses (Nadi), identical in nature and related to teeth are grouped together. According to the cause they are named as Vataja, Pittaja, Kaphaja, Sannipataja or Abhighataja.

Diseases of the teeth

Diseases affecting the teeth are Dalanam, Krimi-dantakam, Danta harsham, Bhanjanakam, Danta Sarkara, Kapalika, Syava-dantakam and Hanu-moksham.

- **Dalanam:** This is characterized by severe excruciating pain and due to aggravated state of the bodily Vayu.
- **Krimi-dantakam:** This is dental caries which causes black cavities on teeth accompanied by copious flow of saliva. Pain and swelling will follow this. This also is caused due to aggravated state of vayu (Figure 13).

Figure 13: Dental Caries. Wikipedia

- **Danta-harsham:** Teeth become so sensitive and cannot bear cold, heat or touch. It is due to the deranged condition of Vayu.
- **Bhanjanakam:** This is due to fracture of jawbone causing distortion of face, fracture of teeth and severe pain. This results in derangement of the Vata and Kapha.
- **Danta Sarkara:** Calculus deposited on teeth predominantly over the roots. This affects the health and functions of teeth (Figure 14).

Figure 14: Dental Calculus.

<https://www.dentalcare.ca/en-ca/patient-education/patient-material/what-is-tartar>

- **Kapalika:** Calcified calculus deposits get separated from the teeth. This may destroy the enamel and cause wear of teeth.
- **Syava-dantakam:** Teeth become dark - smoky or dark blue in colour due to non-vitality. This is due to derangement of raktha and pittha.
- **Hanu-moksham:** Dislocation of the jawbone caused due to loud talking, chewing of hard substances or immoderate yawning. It is identical to Arditam (facial palsy) resulting in facial asymmetry and disfunction [13] (Figure 15).

General treatment methods

Treatment methods popularly used in Ayurveda, for treating the diseases affecting the periodontal tissues and teeth, are described in Sushruta Samhita, Chikitsa Sthanam, Chapter 22, Verses 40 to 43.

Figure 15: Dislocation of mandibular joint.
<https://www.nature.com/articles/4801587>

- **Raktha mokshanam:** Letting the blood from the affected tissue is known as raktha mokshanam. Sharp needle like instruments is used for this purpose.
- **Gandusha and Kavala:** Gandusha is filling the mouth with oil or medicated water and holding it for a few minutes without moving. Oil pulling (*Gandusha*) prevents decay, halitosis, bleeding from gums and strengthens the teeth. This is considered as a routine practice similar to brushing. *Kavala* is holding the liquid in the mouth to fill partially and doing gargling for a few minutes. This removes halitosis.
- **Nasyam:** This is administering medicated oil through the nose and is efficient in cleansing the body.
- **Uddhaaram:** Decayed teeth beyond treatment are to be extracted. Mobile and fractured teeth are usually advised to be extracted. If they are not extracted, Sushruta says that sinuses will be resulted. However, Sushruta forbids extraction of maxillary teeth. Extraction site is advised to be burned with heated metal rod, possibly in an attempt to control infection.
- **Chedam:** This is excision of soft tissue swellings [13].

Sushruta has suggested a number of treatment methods and all those might have been followed in his time. He should be credited for his vast and detailed understanding of diseases related to gums and teeth. Some of the treatment methods may not be followed at present because of the vast popularity of modern science and technology.

Dental health care

In the daily routine, cleaning or brushing the teeth is given prime importance. Twigs of medicinal plants are used for this purpose. Dentifrice in powder form containing many ayurvedic medicines is described by Sushruta in the 24th chapter of Chikitsa Sthanam. This has to be followed by Jihwa nirlekhanam (tongue cleaning) preferably using flexible strips of noble metals. Holding medicated lukewarm oil in the mouth can improve the oral health. Breathing the smoke generated after burning medicinal plants is known as Dhooma panam and helps in improving olfaction. Administering medicines through nose is also included in the morning activities to be followed routinely to maintain oral and dental health. These health practices have slowly disappeared from our culture disregarding the fact that our ancient predecessors-maintained health through practices meticulously described by masters like Sushruta.

Grooming of the surgeon

Sushruta insisted that before operating, the surgeons should shave off their beard, clip their nails, take a bath and wear clean, white clothes and he stressed antiseptics by fumigating the operating room with mustard, butter, and salt [14]. The Indian traditions followed centuries ago are still in practice though we are not fully aware of it.

Conclusion

Acharya Sushruta practiced surgery in an ancient time when diagnostic systems were not developed. The *Sushruta Samhita* describes surgical techniques, surgical instruments, diseases, conditions, and their treatments were categorically listed. 700 medicinal herbs and their application with characteristic features like taste, and efficacy were also described in detail. *Sushruta Samhita* is unique because of its contributions to different branches of surgery and especially to Dentistry.

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