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## 'Sushruta'- The life and legacy of a genius surgeon

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### **Abstract:**

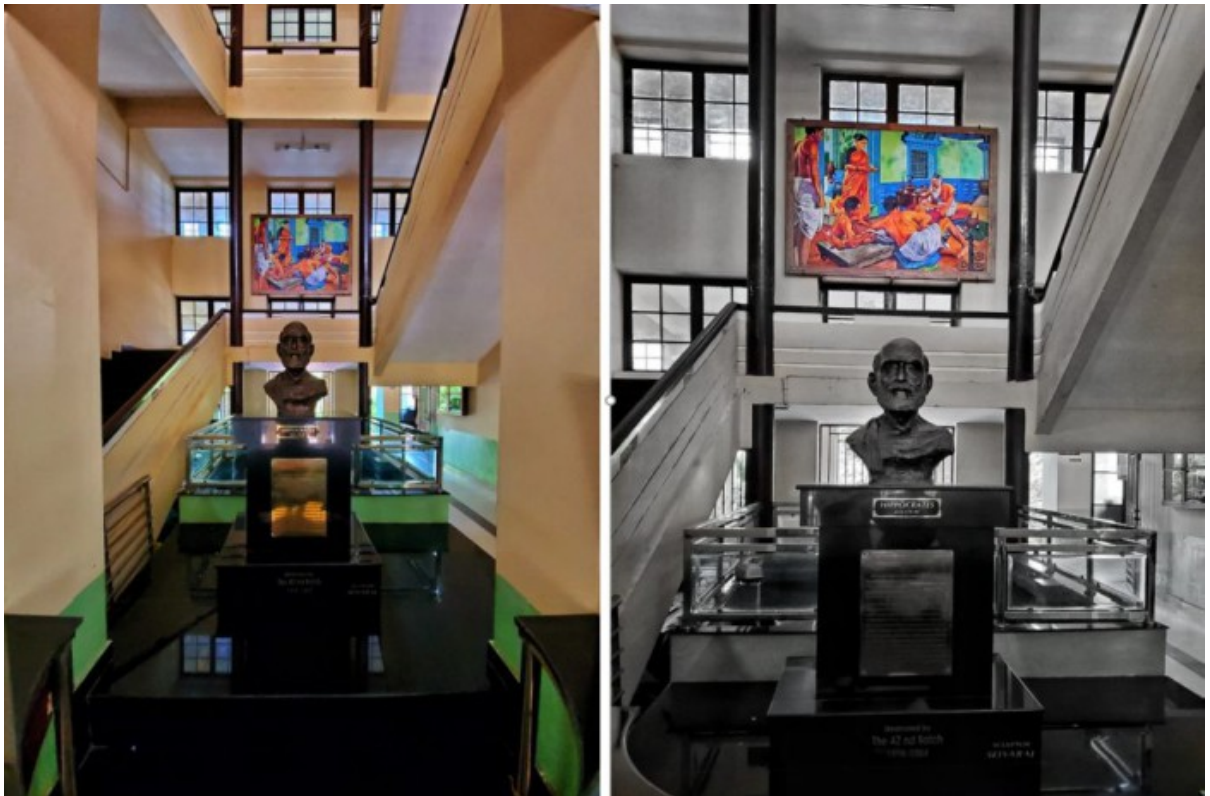
A huge painting of Sushruta, that greets visitors in the foyer of Government Medical College, Kozhikode prompted a review into the legacy of the great surgeon and teacher. His surgical treatise gives a detailed account of practice of surgery in ancient India. The collection of surgical and allied knowledge, covers most of the procedures performed today. Even perioperative care and anaesthesia for surgeries were described by Sushruta. Apart from honing the surgical knowledge and skills of his disciples, this dedicated teacher seems to have insisted on developing the right attitude and ethics to create ideal surgeons in pre medieval India. It is a shame that the treasure house of knowledge in Sushruta Samhita was obscured by the mists of time and India had to depend on the Western world for surgical education. This article aims to illustrate why this genius surgeon is righteously called the Father of Surgery.

As one sets foot into the foyer of Government Medical College, Kozhikode, a brightly hued painting captivates our eyes above the silhouette of a bust of Hippocrates, the father of medicine. It is a huge acrylic on canvas impression of Sage Sushruta and his retinue, operating. When artistically captured by the photographic lens of a senior colleague (**Figures 1&2**), the brilliance of the savant surgeon and genius teacher of medieval India seemed to speak volumes to all who gazed up at him, prompting this review into the legacy of Sushruta.

India is regarded as the cradle of civilization and the seat of ancient learning. Even though the highest standards of education that existed in ancient India were obscured by the mists of time, the brilliance of one shining gem has been accepted all over the world as the 'Father of Surgery' and author of the treatise 'Sushruta Samhita'. A lesser known fact is that Sushruta is also regarded as the Father of ancient Plastic Surgery, such that, he decorates the logo of the Association of Plastic Surgeons of India.

There is much obscurity and controversy regarding the life and times of Sushruta, which roughly dates to 600 BC-1000BC in the Vedic times, placing him on the time line, a millennium before Hippocrates and two millennia before Galen and Celsius [1]. Sushruta is believed to be the son of a sage Vishwamitra and disciple of guru Divodas or Dhanvantari, the King of Kashi [1,2]. Sushruta taught and practiced his art in the city of Varanasi where he compiled the knowledge and teachings of his guru into a treatise known as Sushruta Samhita.

It is argued whether Sushruta is a single person or if the Samhita is actually a compendium with multiple contributors [2]. There remains no doubt about the exceptional genius of ‘Sushruta’ through the detailed account of his teachings and practice of surgery in ancient India. It was then akin to the Bailey and Love textbook of modern surgery for all aspirants of surgery. Written in Sanskrit in the form of Shlokas, verses and incantations, gilded by the flowery language and metaphors characteristic to Sushruta, the Samhita was not an easy text to decipher [3,4]. It is regarded to be a part of Atharva Veda and the access to the Vedic knowledge was restricted to select few scholars of the ancient times. Such social factors may have contributed to the lack of dissemination of this ancient knowledge in India leading ultimately to our dependence on the Western world for our surgical know-how.



**Figures 1 & 2:** Acrylic on Canvas painting of Sushruta in the foyer of Government Medical College, Kozhikode

(Photo courtesy: Prof. Sunilkumar KP, HOD, Department of ENT)

The original manuscript of Sushruta Samhita was lost over time and the present text is a revised version by the Buddhist scholar Vasubandhu in circa AD 360-350 [2]. Following the Arabic trade route, in eighth century A.D, ‘Sushruta Samhita’ was translated into Arabic as Kitab-Shaw Shoon-a-Hindi and Kitab-i-Susrud, by the orders of Caliph Mansur [5]. The Bower Manuscript is a Sanskrit-language manuscript written in the Brahmi Script on birch bark. Lieutenant H. Bower discovered the manuscript in 1890, from Kuchar, Eastern Turkestan and sent it to Colonel J. Waterhouse, the President of Asiatic Society of Bengal. Subsequently, Augustus Hoernle deciphered the manuscript [6]. The first European translation of ‘Sushruta Samhita’ was published by Hessler in Latin and by Muller into German in the early 19th century. The first complete English translation was done by Kaviraj Kunja Lal Bhishagratna in 1907 at Calcutta, in three volumes [2,3,4,7].

Sushruta Samhita gives insight into the organized system of medical science and surgical practice of ancient India. In 2019, a new undergraduate curriculum was introduced in India, with emphasis on competence in skills, ethics and attitude, along with theoretical knowledge of medical education. That Sushruta had realised the importance of balance in knowledge and skill, is revealed in his quote, “a physician, well-versed in the principles of science of medicine

but incompetent in his art because of want of practice, as well as the physician, experienced in his art but short on the knowledge of Ayurveda, is like a one-winged bird that is incapable of soaring high in the sky” [3]. The followers of Sushruta were called as ‘Saushrutas’ [2]. A new student of surgery was expected to study for at least 6 years, after taking a solemn oath, much akin to the Hippocratic oath. He made his disciples practice their surgical skills on various experimental models, like incising on watermelon, gourd, clay pots and reeds, probing on worm eaten wood, just like in present day skills workshops. Sushruta insisted on a sound knowledge of anatomy (Sharirasthana) and embryology in surgical practise and studies were conducted on decomposing cadavers and dead fetuses towards this aim [1,2].

Sushruta Samhita is a collection of surgical and allied knowledge, written in two parts, the Purva-tantra and Uttara-tantra [1-4]. Purva-tantra has 120 chapters in five sections - Sutra-sthana, Sarira-sthana, Nidana-sthana, Chikitsa-sthana and Kalpa-sthana. The Chikitsa-sthana deals with surgical conditions including obstetrical emergencies, geriatrics and aphrodisiacs. The Kalpa sthana contains visha tantra which describes the nature of poisons and their management. Uttara-tantra covers Salakya, Kaya-chikitsa, Kaumarabhetya and Bhutavidya and Aupadravika, the description of many complications of surgical procedures like hiccough, fever, krmiroga, pandu, dysentery, cough, kamala, etc. The Salakyatantra has description of the various diseases of eye, ear, nose and head. The two parts together cover, apart from surgery, other specialities like medicine, paediatrics, geriatrics, diseases of the ear, nose, throat and eye, toxicology and psychiatry. The Sushruta Samhita describes over 300 surgical procedures and classifies human surgery under eight heads - Chedya (excision), Lekhya (scarification), Vedhya (puncturing), Esya (exploration), Ahrya (extraction), Vsraya (evacuation) and Sivya (Suturing). There are detailed descriptions on methods of haemostasis and leech therapy [1].

Contents include surgical demonstration of incisions, probing, extraction of foreign bodies, alkali and thermal cauterization, tooth extraction, draining abscess, hydrocele and ascitic fluid, removal of the prostate gland, urethral stricture dilatation, vesiculo-lithotomy, hernia surgery, caesarian section, anorectal surgery including management of haemorrhoids, fistulae, laparotomy and management of intestinal obstruction, perforations and management of traumatic perforation of the abdomen with protrusion of omentum [5-8]. Orthopaedic surgery including management of dislocation of joints (sandhimukta) and fractures of the shaft (kanda-bhagna) bones and their reaction to the injuries, principles of fracture management, viz., traction, manipulation, appositions and stabilization including some measures of rehabilitation and fitting of prosthetics are all described [8-11]. Ophthalmic surgery for various eye diseases, medical or surgical interventions including cataract surgery have also seen included [12].

In order to treat the many war wounds of the times, there are detailed descriptions on trauma management under ‘Salya-tantra’ aimed at the holistic removal of all factors responsible for producing pain or misery to the body or mind [3,4]. ‘Salya’ literally denotes broken parts of an arrow or other sharp weapons while ‘tantra’ denotes manoeuvre. Injuries inflicted by arrows or similar pointed weapons were common and their management is described in detail. There are detailed descriptions of over 20 varieties of sharp instruments and 101 types of blunt instruments in the chapter VII ‘Yantra-Vidhimadhyayam’ (surgical appliances, their uses and construction) show that these complex prototypes with rivulets, shaped like animals and birds are fore runners of many of the surgical instruments we use today [1,13,14,15].

Treatment was not confined to surgery alone but there are descriptions on comprehensive perioperative care. Sushruta remarks: “the patient who has been fed, does not faint, and he who is rendered intoxicated, does not feel the pain of the operation.” There is evidence of usage of wine and cannabis incense for inducing anaesthesia before surgery [1,3,4]. His “paschat-karman” or post-operative schedule included the scar management protocols, rehabilitation

and removal of complications [1]. Fourteen types of bandaging capable of covering almost all the regions of the body and different methods of dressings with various medicaments. Evidence points to a knowledge of Medhumeha (diabetes) and other co morbid conditions that can influence surgery [1].

Sushruta's explicit and accurate details of the surgical descriptions are the most impressive [1,4,9,13]. For example, in describing the method of nose reconstruction or Rhino-plasty (Nasikasandhana) using a cheek flap, Sushruta writes: “The portion of the nose to be covered should be first measured with a leaf. Then a piece of skin of the required size should be dissected from the living skin of the cheek, and turned back to cover the nose, keeping a small pedicle attached to the cheek. The part of the nose to which the skin is to be attached should be made raw by cutting the nasal stump with a knife. The physician then should place the skin on the nose and stitch the two parts swiftly, keeping the skin properly elevated by inserting two tubes of eranda (the castor-oil plant) in the position of the nostrils, so that the new nose gets proper shape. The skin thus properly adjusted, it should then be sprinkled with a powder of liquorice, red sandal-wood and barberry plant. Finally, it should be covered with cotton, and clean sesame oil should be constantly applied. When the skin has united and granulated, if the nose is too short or too long, the middle of the flap should be divided and an endeavour made to enlarge or shorten it.” [3-5] Many Plastic surgeons believe that nasal reconstruction by cheek flap is the surgery depicted in the popular paintings of Sushruta's operating suite.

Sushruta also described other Plastic surgical procedures like skin grafting, mutilated ear reconstruction and 15 different types of otoplasties, aesthetic repair of lip injuries and congenital cleft lip, classified burns into four degrees and explained the effect of heat stroke, frostbite, and lightning injuries [1,2,8]. His surgical finesse is evident from the insistence on hairline scars, use of suture materials of bark, tendon, hair and silk with fine needles of bronze or bone (circular, two finger-breadths wide and straight, triangular bodied, three finger - breadths wide etc). Sushrita described various reconstructive methods for covering small defects, rotation of the flaps and fore runners of ‘pedicled flaps’ for covering complete loss of skin and tissues from the body. The surgical know how of pedicled flaps spread from India to Europe where the likes of Tagliacozzi and Branca family in Italy mastered it [7]. The modern practice of pedicled flaps was popularised by Otolaryngologist turned Plastic surgeon, Sir Harold Delf Gillies by his facial reconstruction surgeries of mutilated veterans of World war II [6]. Sir Gillies is therefore known as father of modern Plastic surgery.

At this juncture, it is worth noting that the ‘forehead pedicled flap method’ for nose reconstruction, popularly known as “Indian flap” was not described by Sushruta. Nor is Sushruta a ‘potter surgeon’ as erroneously described in some textbooks and journals [13,17]. This factual error stems from a popular article in Gentleman's magazine of London in October in 1794 [18]. The British were not aware of the Indian Rhinoplasty technique till when two surgeons of the East India company, Mr. James Findlay and Mr. Thomas Crusoe, happened to witness the operation on British army's bullock cart driver named Cowasjee whose nose was amputated by Tipu Sultan's soldiers during Mysore war. The surgery was performed by a family of Koomhas (potters) in Pune, who reconstructed a nose for Cowasjee using a flap of tissue raised from his forehead. The astounded British surgeons reported the details of the operation in the Madras Gazette and later in the Gentleman's magazine, much to the surprise of the global medical community.

Apart from his surgical prowess, Sushruta was also a staunch proponent of good ethics, attitude and communication skills in surgical aspirants. According to him, “He is a good surgeon, who possesses courage and presence of mind, a hand free from perspiration, tremorless grip of sharp and good instruments and who carries his operations to success and the advantage of his patient who has entrusted his life to the surgeon. The surgeon should respect this absolute surrender and treat his patient as his own son.” Sushruta lays down the pre

requisites for a qualifying surgeon as “A physician who has set out on this path should have witnessed operations. He must be licensed by the king. He should be clean and keep his nails and hair short. He should be cheerful, well-spoken and honest“. He warns that improper intervention with surgical manoeuvre due either to ignorance of the progress of the disease process, greed for money or lack of judgment, lead only to complications. With such high standards set by the master surgeon and teacher, this era was regarded as the golden age of surgery in ancient India. As the eminent surgeon Whipple stated: “All in all, Sushruta must be considered the greatest surgeon of the pre-medieval period” [19].

In "The source book of plastic surgery", Frank McDowell aptly described Sushruta as “through all of Sushruta's flowery language, incantations and irrelevancies, there shines the unmistakable picture of a great surgeon [20]. Undaunted by his failures, unimpressed by his successes, he sought the truth unceasingly and passed it on to those who followed. He attacked disease and deformity definitively, with reasoned and logical methods. When the path did not exist, he made one.” Sushruta was indeed, way beyond his times and a trail blazer for all surgeons to emulate. From his rightful place on the facade of our medical college, this great guru will continue to shower blessings on many more future generations of medical students and teachers who enter the institution.

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