



SHALYA TANTRA: A COMPREHENSIVE REVIEW OF THE AYURVEDIC SURGICAL HERITAGE

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Abstract

Shalya Tantra, one of Ayurveda's six classical branches, encompasses surgical procedures aimed at eliminating causes of pain or disease from the body and mind. The discipline achieved remarkable advancement under the legendary surgeon Sushruta, whose seminal text, the *Sushruta Samhita*, marked the "Golden Age of Surgery" in ancient India. His comprehensive work covered general surgery, orthopedics, ophthalmology, gynecology, ENT, and plastic surgery, representing a holistic and advanced surgical science.

The *Sushruta Samhita* systematically details surgical instruments, dissection, wound management, anesthesia, sterilization, and post-operative care. Sushruta pioneered absorbable sutures, innovative incisions, fracture and dislocation management, bloodletting, and reconstructive procedures like rhinoplasty, earning him the titles "Father of Surgery" and "Father of Plastic Surgery." His focus on practical training through models, cadavers, and simulations demonstrates an early system of hands-on education. Concepts of asepsis, ethics, and structured operative protocols continue to parallel modern surgical principles.

This review highlights the enduring relevance of Sushruta's surgical wisdom, showing how Shalya Tantra remains a living, guiding tradition in contemporary surgical practice.

Keywords: Ayurveda, Shalya Tantra, Surgery, Sushruta

Introduction

The history of medicine in India is among the oldest in the world and reflects a deep connection between nature, health, and spirituality¹. Its roots can be traced to the Indus Valley Civilization, where evidence of surgical instruments, trephination, dentistry, and well-planned sanitation systems has been discovered². These findings indicate that early communities had considerable knowledge of disease prevention and health practices. During the Vedic period (1500–600 BCE), diseases were often linked to supernatural or divine causes. Healing practices included hymns, rituals, and herbal remedies³. The *Atharvaveda*, one of the earliest texts, described various illnesses and the medicinal properties of plants, laying the groundwork for systematic medical thought³.

Gradually, this knowledge evolved into Ayurveda, a comprehensive system of medicine emphasizing balance in body, mind, and spirit. Two major texts became the foundation of Ayurveda: the *Charaka Samhita*, focusing on internal medicine, pathology, and preventive healthcare, and the *Sushruta Samhita*, devoted to surgery.

Sushruta, known as the “Father of Surgery,” described over 300 surgical operations and 120 surgical instruments⁴. His contributions included techniques of rhinoplasty, fracture management, wound care, and even methods of anesthesia and sterilization. He also promoted anatomical dissection and practical training on models and cadavers, highlighting a scientific approach that parallels modern surgical education.

In the Buddhist and Gupta periods, Ayurveda reached new heights. Hospitals and dispensaries (*Arogya Shalas*) were established, and Buddhist monks carried Indian medical knowledge to China, Tibet, and Southeast Asia, influencing regional systems⁵.

During the medieval period, Islamic influence introduced Unani medicine to India⁶. While Ayurveda continued to be practiced, surgery declined due to cultural and religious restrictions. Still, progress was made in pharmacology, Rasashastra (alchemy), and mineral-based medicines.

The colonial period brought Western medicine, which began to dominate due to state patronage and modern hospitals. However, Ayurveda survived through traditional practitioners and reform movements in the 19th and 20th centuries.

After independence, India recognized its traditional systems, establishing the AYUSH ministry to promote Ayurveda, Yoga, Unani, Siddha, and Homeopathy. Today, Ayurveda is practiced worldwide, gaining renewed importance in integrative healthcare and wellness.

Core Surgical Principles in Sushruta Samhita

1. Definition of Shalya Tantra⁷

Sushruta defines Shalya Tantra (surgery) as a discipline that encompasses all interventions meant to remove *shalya* – any foreign or harmful entity, whether physical (stone, thorn, tumor) or endogenous (diseased tissue, obstruction). The objective is to relieve pain and restore normalcy to body and mind. Unlike modern definitions restricted to operative techniques, this holistic perspective includes both the physical and psychological domains of suffering.

2. Qualities of a Surgeon⁸

A surgeon must possess not only technical skills but also moral and mental qualities. Sushruta highlights:

- Dexterity and steadiness of hands – to perform delicate procedures without tremor.
- Sharp intellect and presence of mind – for rapid decision-making.
- Practical experience and training – repeated practice to master procedures.
- Compassion and humility – placing patient’s welfare above personal gain.
- Fearlessness and courage – to face surgical challenges without hesitation.

These qualities remain timeless and align with modern surgical ethics and professionalism.

3. Importance of Anatomy (Sharir Rachna)⁹

Sushruta gives extensive emphasis on anatomical knowledge. He describes bones, muscles, ligaments, vessels, nerves, and the *marma sthānas* (vital points) with remarkable precision. He recommends dissection of cadavers by immersing them in water and peeling layer by layer for firsthand learning³. This insistence on dissection anticipates modern anatomical education and underlines surgery’s reliance on sound structural knowledge.

4. Training and Simulation

To develop hand skills, apprentices practiced on models before attempting human operations like; incision practice on watermelons or animal bladders filled with fluid, scraping on lotus stalks or leather bags, suturing on cloth or animal hide¹⁰.

This ancient system of simulation-based training is analogous to today’s surgical skill labs and mannequins, highlighting Sushruta’s foresight in medical education.

5. Surgical Instruments (Yantra & Shastra)

Sushruta describes more than 120 surgical instruments, many still resembling modern counterparts⁵ like to include scalpels, forceps, probes, needles, scissors, and cautery devices. He emphasizes on instrument selection for specific procedures, maintenance and sterilization (through fire or alkali), proper grip and handling technique¹¹.

This systemization laid the foundation of surgical armamentarium in India.

6. Types of Surgical Procedures (Aṣṭavidha Shastra Karma)

Sushruta categorizes operations into eight fundamental types¹¹:

1. Chedana – excision/removal.
2. Bhedana – incision/opening.
3. Lekhana – scraping of unwanted tissue.
4. Eshana – probing/sinus exploration.
5. Aharana – extraction of foreign bodies.
6. Vedhana – drainage of pus or fluid.
7. Visravana – evacuating secretions.
8. Sivana – suturing/approximation.

This classification represents the earliest surgical taxonomy, covering almost all fundamental operative maneuvers.

7. Pre-operative Principles¹²

Preparation was considered crucial for success:

- Patient selection – considering strength, constitution, disease prognosis.
- urificatory measures – cleansing the body with emesis, purgation, or enema if needed.
- Fasting and rest – to reduce peri-operative risks.
- Anaesthetic measures – sedative use of wine, bhang (cannabis), or medicated preparations to dull pain.

Sushruta emphasizes readiness of both patient and surgeon, paralleling modern preoperative protocols.

Sushruta insists that the surgeon be truthful, disciplined, and compassionate. Surgery should never be attempted for mere curiosity or greed. Patient's welfare is supreme, and unnecessary interventions should be avoided. Though the concept of formal "consent" is modern, Sushruta's text advises informing and preparing patients, showing respect for autonomy.

8. Asepsis and Hygiene

Sushruta prescribes thorough cleanliness¹²:

- Surgical theatres should be airy, well-lit, and free of contamination.
- Instruments sterilized by fire, alkali, or boiling.
- Surgeon must bathe, wear clean clothes, and maintain trimmed nails.
- Wounds should be dressed with fresh, sterilized materials.

These principles reflect awareness of infection control centuries before the germ theory of disease.

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9. Haemostasis

Bleeding control methods included: Direct pressure and bandaging, Application of styptic herbs and mineral powders., Cauterization with fire (*agni karma*) or alkali (*kṣhara*), Ligature of bleeding vessels¹³.

10. Wound Management (Vrana Chikitsa)

Comprehensive wound-care system remains a cornerstone in Shalya Tantra. Wound healing is given supreme importance. Sushruta describes sixty therapeutic measures (*Shaṣṭi Upakrama*) for wound care, covering cleaning, suturing, bandaging, irrigation, and use of medicinal pastes like honey, ghee, oils, and herbal decoctions to promote healing and prevent infection and drainage of pus and removal of slough for faster recovery¹⁴.

11. Fracture and Dislocation Management (*Bhagna & Sandhimukta*)

Sushruta classifies fractures into 12 types and dislocations into 6. Management principles include reduction by traction and manipulation, immobilization with splints and bandages and massage and medicated oils for rehabilitation¹⁵.

-His approach is comparable to the modern "reduction-immobilization-rehabilitation" principle in orthopaedics.

12. Shalya Tantra in Midwifery and Obstetrics

Sushruta provides clear guidelines for the application of instruments in cases of obstructed or difficult labour. Long before the invention of forceps in Europe, he had already described procedures employing specialized instruments for extraction of the fetus in complicated deliveries. These included techniques resembling traction and assisted delivery. In cases where the life of the mother was at risk, he even described operative interventions such as craniotomy, which, though destructive for the fetus, ensured maternal survival¹⁶. Such methods reveal both the depth of surgical innovation and the primacy given to saving the mother's life.

13. Plastic and Reconstructive Surgery

Sushruta is hailed as the pioneer of plastic surgery. Techniques include; Rhinoplasty – using forehead or cheek flaps to reconstruct the nose, Otoplasty – repairing torn earlobes, Skin grafting – described in primitive but effective forms¹⁷.

These procedures were revolutionary and demonstrate surgical artistry far ahead of their time.

14. Ophthalmic Surgery

Fifty-one of the seventy-six ocular disorders are surgical. Each case provides a detailed description of the manner of operation that must be followed. The skill of cataract-crouching, which the ancient Greek and Egyptian doctors were unaware of, is credited to Sushruta¹⁸.

15. Arbuda (Neoplasms / Malignant Lesions)

The term *Arbuda* literally denotes a swelling, mass, or polyp. As per Sushruta, these are progressively enlarging, rounded, firm, and deep-seated growths that are slightly painful, non-suppurative, and fleshy in consistency. They may develop in any region of the body surface. The origin of Arbuda is attributed to the vitiation of *Māmsa* (muscle tissue) and *Rakta* (blood) under the influence of the three *doṣas*¹⁹.

Ancient Ayurvedic physicians were aware of the concept of tumour spread or metastasis, referred to as *Dwīrarbuda*. Sushruta's writings also describe both local and distant dissemination of these growths, along with their recurrence, termed *Adhyarbuda*. In his surgical teachings, he stressed that complete excision of tumours is essential, since incomplete removal often results in recurrence, ultimately endangering life. To illustrate this, he compared a remnant tumour to a small spark of fire capable of consuming an entire house¹⁹.

Ayurveda also highlights the supportive role of *Śodhana* (detoxification therapies) before undertaking primary treatment. Clinical studies suggest that such preparatory measures may enhance patient outcomes by improving body weight, elevating haemoglobin levels, boosting serum immunoglobulins, normalizing liver function, and mitigating the adverse effects of chemotherapy.

16. Ashmari Chikitsa^{20,21}

In the surgical treatment (*Shastra Karma*) for *Ashmari Chikitsa* — the management of bladder or kidney stones — the patient must first undergo purification to eliminate imbalanced doshas. Once ready, the patient, who should be strong and calm, is positioned lying on his back with his upper body supported by someone sitting on a low bench, facing east. His waist is elevated with cushions, and his knees and ankles are bent and tied together — a position similar to the modern lithotomy position.

After oil is applied to the abdominal area around the navel, gentle pressure is used below the navel to help push the stone down toward the bladder. The surgeon then inserts lubricated index and middle fingers into the patient's rectum (below the perineal raphe) and uses controlled force and manipulation to guide the stone between the rectum and the penis.

To make the stone easier to locate and remove, the bladder should be kept full and stretched. Once the stone becomes prominent and can be felt like a lump, a small incision is made near the midline of the perineum, just to the left of the raphe (though some surgeons prefer the right side for convenience). Care is taken to avoid breaking the stone during extraction, as any fragments left inside can grow again.

The stone is then carefully removed using a small, fine-tipped surgical instrument called *Agravaktra* (similar to modern mosquito forceps). This ancient surgical method, known as perineal cystolithotomy, was also practiced in medieval Arabian and European medicine under the term "cutting for stone."

17. Other surgical practices mentioned in Sushruta Samhita

The ancient Indian surgeon Sushruta wrote about surgical techniques that are still used today. Using a trocar and cannula, he suggested tapping (Vedhan Karma) for Mutraivriddhi (hydrocele) and Jalodara (ascites), being careful to choose the right spot to prevent organ injury (Su. Su. 25/10, Su. Ch. 14/18, 19/19). He recommended a left paramedian incision, blockage removal, and layered closure for intestinal obstruction (Baddha-gudodar) (Su. Ch. 14/17). Ant-head clamping imitated contemporary intestinal stapling in intestinal perforation (Chhidrodar). Ksharsutra was advised for sensitive patients, and excision (Shastra Karma) for Arsha (hemorrhoids) and fistulectomy for Bhagandara (fistula-in-ano) were described (Su. Ch. 6/3, 17/29). Fetal evacuation to rescue the mother in Mudhagarbha (IUD) was similar to craniotomy (Su. Ch. 15/11). A precise limbus incision (Daivyakrit Chhidra) matched contemporary cataract surgery for Kaphaj Linganasha (cataract)-(Su. Ut. 17/59).

18. Agni Karma (Thermal Cautery)

Application of heated instruments served multiple purposes; arresting bleeding, relieving localized pain, destroying abnormal tissue growths, stimulating healing in chronic conditions²². This principle resembles today's electrocautery and laser therapy.

20. Suturing Techniques

Sushruta describes several types of sutures, tailored to wound type and location²³:

- Continuous, interrupted, zig-zag, and loop sutures.
- Materials included cotton, silk, horse hair, leather strips, or plant fibers.
- Proper approximation of tissue edges was emphasized to ensure minimal scarring and early healing.

This reflects an advanced understanding of surgical closure methods.

21. Post-operative Care

Sushruta's regimen included: rest and restricted movement, special diets rich in easily digestible foods, regular wound cleaning and dressing, medicated oils and decoctions to promote healing and prevent complications²⁴.

This holistic recovery plan parallels modern post-operative protocols.

22. Ethical duties of a Surgeon

Ethics are emphasized as much as technique.

The surgeon should protect patient confidentiality, avoid greed or experimentation for self-interest, Serve humanity with sincerity, humility, and respect for life.

24. Integration of Medicine and Surgery

Sushruta firmly asserts that surgery cannot function in isolation. Internal medicine, dietetics, preventive measures, and rejuvenation therapies complement surgical interventions. This integration reflects Ayurveda's holistic philosophy and underlines the multidisciplinary approach to patient care.

Conclusion:

This review affirms the monumental legacy of the Sushruta Samhita, establishing Shalya Tantra as the earliest comprehensive surgical science. The works of Sushruta, the 'Father of Surgery', detail sophisticated procedures, over 120 instruments, and meticulous pre- and post-operative protocols, reflecting a holistic and advanced understanding of medicine far beyond its era.

His insights into anatomy, surgical ethics, simulation-based training, and groundbreaking techniques like rhinoplasty and perineal cystolithotomy remain startlingly relevant. Ultimately, Shalya Tantra is not merely a historical text but a living tradition. Its core principles of asepsis, the surgeon's ethical duty, and the integration of internal medicine with surgery continue to inspire. The enduring wisdom of Ayurveda provides a valuable framework that seamlessly complements and enriches modern global healthcare.

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