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THE ENDURING LEGACY OF NĀḌĪ YANTRA: FROM SUSHRUTA'S WISDOM TO MODERN SURGICAL INNOVATION

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ABSTRACT

Surgery has long stood at the forefront of medical science, and among the earliest contributors was Ayurveda—the ancient Indian medical system. Acharya Sushruta, a pioneering figure in surgery, not only documented operative techniques but also introduced specialized instruments, including Nāḍī Yantras, whose design and utility strikingly resemble modern endoscopic devices. This paper critically explores these historical instruments, evaluates their structural and clinical integrity, and compares them to contemporary surgical tools. The study highlights the relevance of Sushruta's contributions in today's minimally invasive procedures and underscores the scientific foresight embodied in ancient Ayurvedic literature.

KEYWORDS: Ayurveda, Sushruta, Nāḍī Yantra, Shalya-Tantra, Surgical Instruments, Endoscopy, Medical History, Ancient Surgery

❖ INTRODUCTION

Among the eight specialized branches of Aṣṭāṅga Ayurveda, *Shalya-Tantra* (surgical science) is regarded as a discipline with deep historical roots extending back to the Atharva Veda.[1]

Legendary narratives describe surgeries involving royal figures such as King Youvanāśva, who reportedly underwent an abdominal incision during an ectopic pregnancy—an event that predates modern cesarean delivery.[2] Additionally, texts mention the Aśvinī Kumāras—twin deities of medicine—are credited with performing head transplants[3], reconstructive surgeries, and teaching secret sciences like *Madhu-Vidya* and *Sandhan-Vidya*.[4] These stories weren't idle fantasy—they hinted at a profound understanding of human anatomy and surgical intervention. Successor Sushruta blossomed into what history now calls the Father of Surgery and the tools? They were detailed meticulously—each described with its shape, size, material, and intended use. No comparable text, Eastern or Western, had offered such technical elegance.

❖ REVIEW OF LITERATURE

➢ *HISTORICAL CONTEXT AND THE LEGACY OF ACHARYA SUSHRUTA*

Kashi, also known as Varanasi, holds a venerable position in the history of medicine as the cradle of **Shalya-Tantra (Surgical Science)**. It was here that **Divodasa Dhanvantari** imparted his profound surgical knowledge to **Maharshi Sushruta** and his contemporaries.

This ancient lineage of medical wisdom, embedded in the traditions of Ayurveda, is substantiated by modern historical references that highlight India's significant contributions to the field of surgery.

Acharya Sushruta, revered globally as the **first surgeon of recorded history**, compiled his surgical expertise in the monumental work, *Sushruta Samhita*. While the world only began embracing surgical science in countries like the USA 2700 years after Sushruta's time, his teachings had already made their way through **Arabia, the Middle East, Italy, and France**, leaving a trail of influence.[5]

Historical documentation, including a report in *The Gentleman's Magazine* (October 1794, London), speaks of British doctors **Thomas Crusi and James Findlay** witnessing Indian Ayurvedic surgeons performing plastic surgeries.[6] These accounts serve as a testament to the advanced nature of Indian surgical practices, long before Western medicine formalized the field.

However, by the mid-medieval period, surgery in India became limited to rural areas, practiced primarily by barbers and Muslim jarrahs. Despite this decline, traditional

techniques such as leech therapy, *Raktamokshana*, and the use of *Shringi* for abscess drainage continued as **para-surgical measures**.

Acharya Sushruta's contributions were not limited to theory—his methodology included surgical principles for procedures ranging from **head and neck surgeries**, **amputations**, and **abdominal operations**, to **fracture management**, **anorectal disease treatment**, and **aseptic techniques**. These principles are still considered relevant in contemporary medical practice.

A) ***Surgical Instruments: Yantra and Shastra***

Acharya Sushruta classified surgical instruments into two principal categories:

1. **Yantra (Blunt Instruments)** – Used primarily for the removal of foreign bodies.
2. **Shastra (Sharp Instruments)** – Employed in procedures like incision (*chedana*), puncture (*vyadhana*), and excision (*lekhana*).

Sushruta identified **101 Yantras**[7], categorized into six groups such as Swastika Yantra, Samdamsha Yantra, Tal Yantra, Nadi Yantra, Shalaka Yantra and Upyantra, while **Shastras** were further divided into **20 primary tools** and **14 auxiliary (Anushastra)** tools.

He also emphasized the use of specific metals like **pure iron, copper, bronze, and gold**, depending on the procedure. Materials such as **ivory, animal horn**, and **wood** were alternatives when metals were unavailable.

- Instrument Design, Quality, and Practice Explained in Ayurveda Context[8] Surgical tools were designed to mirror animals or natural elements, and their dimensions were measured in **Angulas** (1 angula ≈ 2 cm).[9] Instruments were rigorously tested for **balance, durability, grip, and precision**, with guidelines on the ideal sharpness (e.g., as fine as a hair for puncturing tools).

Sushruta advocated thorough **pre-surgical practice**, urging students to simulate procedures on objects like **watermelons, animal bladders**, or **leather bags**, emphasizing the necessity of **practical training alongside theoretical mastery**.[10]

He also documented the **tempering (Payana)** process [11]—immersing tools in **alkaline solutions, oil, or water**—to enhance sharpness and functionality. Storage of instruments involved the use of **shalmali wood planks** to preserve their edge.

Table I: Classifications of instruments yantras-101.[16]

Category	Modern classification	No. of Types	Details / Examples
Swastika Yantra	Grasping / Holding forceps	24	Sinha Mukh, Vyagra Mukh, Tarakshu Mukh, Ruksha Mukh, Dwipi Mukh, Marjar Mukh, Shrugal Mukh, Mrugirvaruka Mukh, Kaak Mukh, Kank Mukh, Kurar Mukh, Chass Mukh, Bhass Mukh, Shashighsti Mukh, Ullik Mukh, Chilli Mukh, Shyen Mukh, Ghridhra Mukh, Krounch Mukh, Bhringaraj Mukh, Anjalikarn Mukh, Avabhanjan Mukh, Nandi Mukh, Vruk Mukh
Sandamsa Yantra	Grasping/Forceps-type Yantras	2	1. Sanigrah2. Anigrah
Taal Yantra	Tongs/Clamps	2	1. Ektaal2. Dwitaal
Naadi Yantra	Tubular Instruments (Channels)	20	Bhagander Yantra (a. single hole, b. double hole), Arsho Yantra, Basti Yantra (4 types), Uttar Basti Yantra (2 types), Mutravridhi Yantra, Dakodar Yantra, Dhoom Yantra (3 types), Nirudhprakash Yantra, Sannirudhguda Yantra, Alabu Yantra, Shringa Yantra, Vrana Yantra
Shalaka	Probes/Rods	28	Gandupadamukh (2), Sarpfanmukh (2), Sarpunkhmukh (2) , Badismukh (2), Masurdalmukh (2), Karpaskritosnisha (6), Darbyakriti (3), Jambava Vadan (3) , Ankush Vadan (3), Nasa Armbud Haran (1), Anjanartham (1), Mutramarg Vishodhak (1)
Upayantra	Accessory Instruments	25	Rajju, Venika, Patta, Charma, Antatvalka, Lata, Vastra, Aathilasma, Mudgar, Panital, Padtal, Anguli, Jihwa, Danta, Nakha, Mukh, Bala, Ashwakantak, Shakha, Ashthiwan, Prawahan, Harsh, Ayaskant, Kshar, Agni

- **Yantra Qualities and Functionality Qualities of Yantras[13]**

1. **Samahitani:** (or exact dimentions; neither too long nor too short). The undue length of an instrument prevents proper pressure being applied on it so that the part or foreign body may be easily grasped or taken out. The shortness on the other hand is inconvenient on account of either failure to handling the instrument properly.
2. **Khara-Shlakshna-Mukhani:** (rough but finely made or some to be rough and some to be smooth): the working instruments should be little rough; otherwise the foreign body will slip away from the grip.
3. **Sudrudhani:** (Strong Structure): Instruments shoud be strong enough. Unless the instrument is of strong material, it may break or become bent and thus the main purpose of the instrument will not be attained.
4. **Suroopani:** (Good Shape): If the instrument is of repulsive shape it fails to inspire

confidence in surgeon and does not afford proper facility for handling it.

5. **Sugrahani:** (of good handle or capable of proper handling): This property of the instrument is very important, unless the instrument has a good handle for grasping, it can not be manipulated with proper balance to achieve the desired effect. Thus though the instrument may be endowed with all other qualities as strength, firmness, etc. it will become useless, unless it can be handled well. Thus it may be concluded that a yantra or blunt instrument specially Swastika type of Yantra should be of proper dimension, neither too long or too short. The end of the yantra should be toothed and well build. It should be strong, graceful effording a firm grip.

Defects of Yantras[14]

1. Atisthool (Very Bulky): the atisthoola instruments are not handled properly due to their heavy weight.
2. Asaara (Very Lightor made of Bad Metal): this defect gives a very short life to the instrument and the instrument may break or become bent during operation.
3. Atidirgha (Too Long): Exessive length makes the instrument un-manageable.
4. Atiharswa (Too Short): this defect shows neither proper grasp of the instrument nor nor good hold of the foreign body.
5. Agrahi (Incapable of Grasping): This defect prevents firm grip of the foreign body or tissues.
6. Vishamagrahi (Giving an irregular grasp): this defect do not allow the instrument to grasp properly as it holds the foreign body irregularly, so it fails to give a strong grip.
7. Vakra(Curved): On account of this defect, the instrument may damage the tissue surrounding the foreign body.
8. Shithila (Loose): A loose instrument fails to give any pressure whatsoever or to achieve.
9. Atiunnata (Raised bolted instrument): It may cause inconvenience to the surgeon.
10. Mridukeela (Weak bolted instruments): this defect may cause the instrument broken during use.
11. Mridumukha(of soft mouth or weak mouth): the grip on the foreign body will become weak or it may become broken or bent. It may also fail to give pressure on the foreign body.
12. Mridupaasha (of weak loop or handle or ring or catch): This defect will prevent proper and strong grasp on the instrument.

Majority of the above said defects apply to the Swastika yantras.

***Functions of Yantras*[15]**

1. Nirghaatana: Extraction by moving to and from i.e Shalya Nirghaatana.
2. Purana: Filling the bladder or eyes with oil.
3. Bandhan: Bandaging and binding by rope or cloth.
4. Vyuhana: Retracting the incised part for removing a thorn or bringing together the wound margins.
5. Vartana: Contracting or curling up.
6. Chaalana: Transfering i.e removing from one part to another.
7. Vivartana: Turning round
8. Vivarana: Exposing or opening out any part
9. Pidana: Pressing by fingers to let out pus from an abcess
10. Marga Vishodhana: Cleaning the urethra. Rectum etc.
11. Vikarsana: 1) Extraction by pulling; or 2) Loosening a foreign body fixed in muscles etc.
12. Aaharana: Pulling out or to extract deeply seated shalya
13. Aanchana: Pulling out
14. Unnamana: Elevating or setting up right as the depressed cranial bones
15. Vinamana: Depressing as of the elevated ends of the fractured bone
16. Bhanjana: a) Contusing a part all round before it is surgically operated on, b) Breaking any adhesive bands
17. Unmathana: All round probing or stirring the tract formed by an impacted foreign body
18. Aachushana: Suction as of poisoned blood and milk by SHRING or ALABU
19. Eshana: Exploring the direction of a sinus or the existence of a foreign body in the wound
20. Daarana: Splitting or dividing
21. Rijukarana: Straightening of any thing which is bent
22. Prakshalana: Washing the wound with water
23. Pradhamana: Blowing the powder into the nose through tubes
24. Pramarjana: Cleaning by a swab to remove the exudations

B) ***Nadi Yantra***

Nāḍī Yantras are tubular instruments designed for diagnosing and treating conditions within body channels (*srotas*). They are characterized by their cylindrical shape, one or more openings, and a standardized length and diameter suited to their clinical purpose.

Classification (Based on Sushruta)

Acharya Sushruta identifies **20** Nāḍī Yantras:

1. Bhagandara Yantra
2. Arsho Yantra
3. Vraṇa Yantra
4. Vāsti Netra
5. Uttara Vāsti Yantra
6. Mūtravriddhi Yantra
7. Dakodara Yantra
8. Dhooma Yantra
9. Nīruha-Prakāśa and Sanniruddha Gūḍa Yantras
10. Alābu and Śrīnga Yantras

Design Features

- **Size**: Determined per clinical indication, generally measured in *Aṅgulas* (≈2 cm).[16]
- **Shape**: Hollow, tubular—open at one or both ends, often with lateral fenestrations.
- **Naming Principles**: Based on disease target (e.g., Bhagandara for fistula-in-ano), material (e.g., Śrīnga from animal horn), or function (e.g., Ṣalya Nirghatinī for foreign body extraction).

Clinical Indications[17]

Nāḍī Yantras are used for:

1. **Removal of lodged foreign bodies** (*Srotogata śalyoddhāraṇa*)[18] from deep channels (e.g. throat, esophagus).
2. **Visualization or diagnosis** (*rogadarśana*)[19], such as internal hemorrhoids.
3. **Aspiration** (*āchuṣaṇa*)[20], for conditions like infected lymph or deep-seated pus.
4. **Treatment facilitation** (*kriyāsaukarya*)[21]: enabling application of caustics, cautery, or medicaments through controlled access.

Key Instruments in the Nāḍī Yantra Suite by Acharya Sushruta - Bhagandara Yantra

- Used similarly to *Arsho Yantra*—diagnosis and treatment of anal fistula.
- Available as **Eka-chidrā** (single slit) for treatment and **Dwi-chidrā** (two slits) for diagnostic visualization.
- Dimensions: ~4 Aṅgula length; circumference varies by sex (males ≈ 5 Aṅgula, females ≈ 6). Slits run the entire shaft length (~3 Aṅgula). Shape tapers from wider base to narrower

tip.

Arsho Yantra[22]

- Hollow instrument in gold, silver, bronze, iron, ivory, or wood.
- Three types: **Eka-chidrā**, **Dwi-chidrā**, and **Śharang** (no slot).
- Dimensions: ~4 Aṅgula length; gender-based circumferences, lateral slit, two circular ridges near ends.
- Uses: *Dwi-chidrā* for diagnosis, *Eka-chidrā* for applying treatment, *Śharang* to exert pressure or dilate the anal canal.

Vraṇa Yantra

- Resembles *Vāsti Yantra*, adapted for *nadi vraṇa* (sinus tract) irrigation and oily medicament application.
- Consists of:
  - **Vraṇa Vastiputa**: medicine reservoir
  - **Vraṇa Vasti Netra**: tubular shaft connected to the reservoir
- Length: ~6–8 Aṅgulas. One end widens like a cow's tail, distal end like *mung dal*.
- Used for cleaning (*prakṣālana*) or massaging (*abhyanga*) internal tract with medicinal fluids.

Vāsti Netra

- Larger than Nāḍī Yantra, designed for rectal administration of liquids.
- Constructed from animal bladder (reservoir) and a telescoping nozzle made of metal, bone, or precious material.
- Features grip rings (*karṇika*) at both ends to control insertion depth.
- Deployed for diseases involving fever, dysentery, gastralgia, hemorrhoids, urinary disorders, and vata ailments.

Uttara Vāsti Yantra

- Employed for urethral or vaginal medicinal instillation.
- Contains two parts: reservoir and *puṣpa netra* (tubular nozzle), typically ~10– 14 Aṅgulas long, varying by sex and clinical need.

Mūtravriddhi Yantra

- Treats scrotal fluid collection.

- Consists of:
  - **Vṛīhimukha Śastra**: a 6 Aṅgula knife for incision
  - **Dwidāra Nāḍī**: hollow drainage catheter
- After incision, the catheter drains fluid and post-operative bandaging is applied.

Dakodara Yantra

- Functions similarly to *Mūtravriddhi Yantra*, but used to evacuate abdominal fluid accumulation.

Dhooma Yantra

- Facilitates inhalation of medicated fumes or fumigation of wounds.
- Design comprises a tubular netra and a *dhooma varti* (fumigation wick), lengths varying by intended effect (16–32 Aṅgulas).

Nīruha-Prakāśa and Sanniruddha Gūḍa Yantras

- Utilized for graded dilation in phimosis (*niruddha prakāśa*) or rectal stenosis (*sanniruddha gūḍa*) via successive instrument insertion.

Alābu and Śrīnga Yantras

- **Alābu Yantra**: cylindrical suction tool made of the gourds (*alābu*), creating localized vacuum for removal of toxins.
- **Śrīnga Yantra**: crafted from cow horn, narrow at one end; used for ear foreign body removal or deep detoxification.

Vāgbhata's Additions and Variations

1. **Kānt-Shalyāvalokini** – A multi-holed probe for oral/pharyngeal foreign body retrieval.
2. **Śalya Nirghatinī** – A longer hollow tube with lotus-like flange, designed for deeper extraction.
3. **Naasārbud Yantra** – Narrow, short tool for nasal lesion treatment.
4. **Aṅgulī Tṛāṇa Yantra** – A ring-mounted tubular sleeve protecting a surgeon's finger while probing the unconscious oral cavity.
5. **Yoni-vranekṣaka Yantra** – Lotus-petal type dilator for vaginal inspection and delivery of medications.
6. **Ghaṭi Yantra** – Metal vacuum device used to promote localized swelling reduction in tumors or abdominal masses, similar to Alābu Yantra.

➢ ***EVOLUTION OF TUBULAR INSTRUMENTS IN GLOBAL SURGICAL HISTORY***

The use of tubular instruments in medicine dates back to **ancient observations of anatomy** in both humans and animals, leading to early attempts at **relieving conditions like urinary obstruction** with basic "sticks" or "tubes." Early materials included **plant stems, animal bones, and feather quills**.

A) Key historical developments include

- **Hippocrates (4th Century BC):** Used quills with animal bladders for syringing and lead tubes for drainage.[23]
- **Roman Era (1st-2nd Centuries AD):** Employed **bronze urethral catheters**, though their scarcity suggests high cost and specialized craftsmanship.
- **Paulus (7th Century AD):** Documented using **hollow reeds for ear foreign body extraction by oral suction**, and lead/copper tubes for various post-surgical drainage.[24]
- **Albucasis (10th Century):** Described sophisticated instruments like **J-shaped catheters for the male bladder**, and syringes made of silver or ivory for bladder irrigation, demonstrating significant advancements.[25]
- **Medieval Period:** Saw the continued use of funnel-shaped pipes and animal bladders for enemas, as depicted in Arderne's manuscripts.[26]

Throughout history, and even in more recent primitive communities, **organic materials** remained crucial for conduits and pipes, primarily for drainage or active injection with bladder "syringes." Unlike modern syringes, these **could not aspirate**. However, the practice of **oral suction** for wounds and the use of the mouth for "injection" (like for enemas) highlight its fundamental role as a model for early mechanical syringes.

Structural considerations

Surgical tubes must stay open (patent) during use, so they need enough **rigidity around their walls**. Most are **single-channelled**, but some have **two or three channels**. Tubes can be **rigid** (like those made of silver) or **flexible** (like rubber or gum elastic catheters).

Tube shapes include:

- Straight
- Straight with a beak
- J-shaped
- S-shaped

- C-shaped (rare)

Rigid catheters were often made in **detachable parts** for easy storage, especially for men. Some were even hidden inside **walking sticks** or **top hats**.

- The **entry (proximal) end** is usually cut straight across.
- The **exit (distal) end** may be angled or blunt/sharp.
- Many tubes contain a **removable wire (stylet)** for guidance.
- Some have **loops or decorations** for orientation during use.

These instruments are mainly used to **carry fluids, air, light, or tools** like forceps or catheters. They sometimes connect to devices like **syringes or pumps** for added function.

Table II: Tubular Instrument Structure (with Examples).[27]

Shape	Single conduit	Double conduit	Controlling conduit
A. Rigid			
Straight	Pipe — enema Cannula + trocar Cannula-speculum Hollow needle	Cannula + snare Resectoscope	Swab holder + ring Bullet-catch + tube Needle-holder + tube
J-shape	Catheter Nasal sound	Cystoscope Tracheostomy tube	
S-shape	Catheter for induction	Flushing uterine Curette	
C-shape	Cannula + trocar for urine retention		
B. Pliable			
	Catheters and gastric tubes in gum, rubber and plastic	Balloon catheter Endotracheal tube	Endoscopic forceps

Table III: Modes of Entry for Tubes.

Channel Type	Examples	Mode of Entry	Instruments Used
Natural Channels	Nose, ear, lacrimal duct, mouth (alimentary tract & air passages), urethra, vagina, rectum	Blunt-ended penetration	• Alone: Simple catheter • With accessory: Ureteric catheter • With attachment: Urethral syringe with pipe
Traumatic / Disease-Made Channels	Abscess cavities, sinuses, fistulas, missile tracks, foreign body tracks	Blunt-ended penetration	• Same as natural channels
Man-Made Channels	Hollow needle tracks, trocar tracks, elective wounds (e.g., tracheostomy, colostomy)	Sharp-ended penetration	• Alone: Transfusion needle • With accessory: Cannula with trocar • With attachment: Hollow needle with syringe

Table IV: Tubular Instrument Form and Operative Action (with Examples).

Form	Blunt entry (natural, disease and traumatic channels)	Sharp entry (man-made channels)
Tube alone	Catheter, Speculum, Wound drain	Exploring needle, Simple tracheostomy tube
Plus accessory instrument	Cystoscope, Tonsil snare, Epistaxis sound	Arthroscope, Trocar and cannula, Ovariotomy trocar
With attached item	Aural pipe and syringe, Enema pipe and syringe	Needle and syringe, Suction tube and pump

Specific examples of Tubular Instruments

Instruments survive from the sixteenth century in increasing numbers and, taken with improved book and catalogue illustrations, a clearer picture emerges. Tubular instruments can be divided into at least seven categories.

(i) ***Catheters***

Derived from the Greek meaning "to send down", catheters were initially urethral but later adapted for other channels: nasal, uterine, cardiovascular, etc. Romans preferred S- shaped catheters; later, J-shaped ones became common. In the 18th century, Petit revived the S-shape for continuous drainage.[28]

Solingen introduced a tight silver spiral catheter in 1684, followed by articulated and pliable types. Gum elastic catheters (1782) and Charrière's flexible ivory catheters (1838) marked significant progress. The 1841 vulcanization of rubber improved catheter performance. Foley's balloon catheter (1930s) and later plastics (1950s) became standard.

(ii) ***Other Catheters***

Female ureteric catheterization advanced earlier due to shorter urethras. Pioneers include Newman (1883), Brenner (1889), and Albarran (1897). Eustachian catheterization began in 1724.[29] Cardiac catheterization started with Forsmann in 1929. The term also includes uterine devices like Bozeman's catheter.

(iii) ***Cannulas, Tubes, and Pipes***

Cannulas, often used with instruments like trocars, were used for paracentesis and abscess drainage. Early types were steel; later designs became nested for portability. Pipes for enemas and injections were made from bone, ivory, or pewter and remain in use for irrigation procedures.

(iv) ***Specula and Endoscopes***

Specula allow superficial examination without illumination. Endoscopes have internal lighting. Bozzini's “lichtleiter” (1806) led to the development of rigid scopes by

Desormeaux, Nitze-Leiter, and others. Modern fiber-optic scopes appeared in the 1960s, though rigid scopes remain in use.[30]

(v) ***Syringes and Needles***

Syringes have existed since the 10th century, evolving from pewter to glass types. The hypodermic syringe developed in the 19th century through Rynd, Pravaz, and Wood.[31] Needles evolved from blunt pipes to fine steel types. Disposable plastic syringes gained popularity in the 1960s.

(vii) Tubular-Controlled Instruments

Some instruments, like cystoscopes, act as illuminated catheters while also controlling tools such as ureteric catheters or diathermy loops. Others operate within tubular conduits, which may be structural or accessory control elements. These conduits range from short sliding rings (e.g., caustic holders) to longer tubes (e.g., early lithotriptors, stone trephines, bronchoscopic forceps).

Historically, this mechanism appeared in 16th–17th century bullet catches and was adapted to Hunter’s urethral forceps, Roux’s needle holder, and early gynecological/laryngological tools—often crafted in silver and spring-operated. Modern versions use stainless steel tubes to control endoscopic forceps, scissors, and cutters.

(vi) ***Miscellaneous Tubular Instruments***

This group includes crown saws, trephines, orthopedic impactors, uterine curettes, and radon seed introducers. Lithotrites evolved from grooved bars to modern devices with visual aids

❖ OBSERVATIONS

Nāḍī Yantras embody a sophisticated, function-driven surgical innovation in ancient Ayurvedic medicine. Acharya Sushruta and Vāgbhata provide precise tools for both diagnostics and interventional procedures. Their standardization of size, material, and method elevates Nāḍī Yantras beyond mere probes—they form an integrated therapeutic system for channel-based ailments.

Nāḍī Yantras serve not only as diagnostic tools but as therapeutic conduits deeply rooted in functional anatomy and clinical strategy. Their integration with pre-operative protocols and their specific naming conventions reflect a mature surgical framework. These instruments emphasize hands-on craftsmanship, standardization, and multipurpose adaptability that parallel today's endoscopic innovations.

Table V: Detailed Instrument Analysis and Comparative Examples.

Nāḍī Yantra	Structure	Purpose	Modern Equivalent
Bhagandara Yantra	Tapered tubular shaft with single/double slit	Fistula diagnosis/treatment	Proctoscope
Arsho Yantra	Hollow, with ridges and slit	Hemorrhoid Management	Anoscope
Vraṇa Yantra	Reservoir + tubular shaft	Irrigation of sinus Tracts	Sinus irrigator
Vāsti Netra	Bladder-based reservoir + nozzle	Rectal fluid Administration	Enema syringe
Uttara Vāsti Yantra	Long nozzle with reservoir	Vaginal/urethral Medication	Catheter
Mūtravṛddhi Yantra	Trocar and drainage tube	Scrotal swelling Treatment	Hydrocele aspirator
Dhooma Yantra	Tubular netra with wick	Medicated fumigation	Inhaler
Śṛṅga Yantra	Cow horn tube	Suction and detox	Vacuum device
Ghaṭi Yantra	Metal vacuum design	Tumor reduction	Cupping device

❖ CONCLUSION

Acharya Sushruta’s legacy, through instruments like the Nāḍī Yantra, laid the groundwork for modern surgical methodology. His meticulous categorization, precise construction parameters, and practical guidance remain relevant, particularly in laparoscopic and endoscopic procedures. Modern advancements have merely refined what was fundamentally conceptualized in ancient times—making surgical practice safer, more accessible, and cost-effective.

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