



CO-RELATION OF SUSHRUTOKTA NADI YANTRA AND MODERN SURGICAL INSTRUMENT: AN ANATOMICAL PERSPECTIVE

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ABSTRACT

Ayurveda is the oldest medical system, and anatomy is one of the oldest modalities of the medical system. Ancient Indian scientists explored essential knowledge of practical anatomy. Neither in *Sushruta* nor in *Charak* is there any indication of animal dissection; they perched about human dissection only, and the *yantra* used in it are also specially designed for human dissection only, which are now adapted by modern with different names. Dissection is the first milestone in the journey of being a doctor. *Sushruta*, the great sage surgeon, philosopher and teacher of ancient India, is renowned worldwide for his contribution to surgery. His conception of surgical instruments, description of quality, methods of manufacture and usage are unique, as there were no earlier comprehensive descriptions of similar surgical instruments by any surgeon in India and the world. *Sushruta* was the first surgeon in the world to describe different types of surgical instruments, including endoscopes.

Keywords: *Ayurveda*, *Yantra*, endoscope, *Sushruta*.

INTRODUCTION

Sushruta was the first surgeon in the world to describe surgical instruments and other related subjects in a detailed treatise called *Sushruta Samhita*.

Sushruta has described rectal, nasal, aural, and vaginal speculum in his treatise used for diagnosis and treatment. There is hardly any reference to *Sushruta*'s

contribution to endoscopy and laparoscopy. *Shalya Tantra* is an *Ayurveda* branch of surgical practice that utilised different surgical and para-surgical interventions for treating disorders of deep tissues, wounds, cuts, Haemorrhoids, *Arsha* and other surgical conditions, including injury and trauma. *Shalya Tantra* utilised medicines along with specific *Yantra* for curing various diseases. *Shalya Tantra* mainly treated conditions like *Bhagandar*, *Mudhgarbha*, *Arsha*, *Ashmari*, *Granthi*, and *Arbuda*. *Shalya Karma* is performed in three stages: *Purva karma*, *Pradhana Karma*, and *Paschat Karma*.^[1-4] *Purva karma* means preoperative preparation, *Pradhana Karma* is considered the main operative procedure, and *Paschat Karma* is described as post-operative measures. The sterilizations of *Shalaka*, cotton, *Sutra* horns, etc., are performed in *Purva karma*; this stage involves the arrangement of equipment and instruments required for a surgical procedure. *Pradhana Karma* includes surgical procedures like *Chedana*, *Lekhana*, *Esana*, *Aharana*, *Visravana*, *Seevana*, etc. The *Paschat Karma* involves patients' post-operative care, including pain management, infection prevention, *Seevana* for suturing purposes etc., and dietary advice^[4-8]. This branch of *Ayurveda* utilised different surgical instruments. One entire chapter is devoted to the principles of experimental surgery. Detailed descriptions of 121 types of surgical instruments are classified into two main groups, which comprise 101 blunt and 20 sharp instruments.

The blunt instruments are further classified as follows:

1. Cruciform instruments - [*Swastika Yantra*] - 24
2. Dissecting forceps or tongs - [*Sandansha Yantra*] - 2
3. Scoops or spoon-shaped instruments - [*Tala Yantra*] - 2
4. Tubular instruments - [*Nadi Yantra*] - 20
5. Probe like instrument - [*Shalaka Yantras*] - 28
6. Accessory instruments - [*Upa Yantra*] - 25

Cruciform instruments - [*Swastika Yantra*]:

Swastika Yantra (forceps) are divided into 24 subclasses. They are named so because they resemble the faces of various birds and animals. These are used to remove *Asthigata Shalya* (foreign bodies embedded in bone).^[9] As per modern era, artery forceps, Allis forceps, Sponge Holding forceps, chelate's forceps, Kocher's forceps, Babcock's forceps, needle holder, etc. They all are the advancement of the swastika yantra, which Sushruta described.

Dissecting forceps or tongs - [*Samdansha Yantra*]:

Samdansha Yantras are classified into means to two classes and are with or without a lock. These extract *Shalya* from *Twak*, *Mamsa*, *Sira*, and *Snayu*.^[10] The *Samdansha Yantras* can be correlated to the Dissecting forceps used in modern surgery.

1. Plain, non-toothed dissecting forceps are used to hold delicate structures like the peritoneum, bowels, vessels, nerves, and tendons.
2. Toothed dissecting forceps are used to hold skin and rigid structures. These are the forceps that are always used while suturing the skin. '

Scoops or spoon-shaped instruments - [*Tala Yantra*]:

Tala Yantra has one or two surfaces resembling the scale of a fish. They extract foreign bodies from the ear, nose and sinuses. The *Tala Yantras* can be correlated to the Scoops used in modern surgical procedures.

1. Ear scoop - To clean the ear canal of ear wax
2. Volkmann's scoop - To scoop cavities, ulcer beds, and granulation tissues. Different-sized scoops are present on either side.

Tubular instruments - [*Nadi Yantra*]:

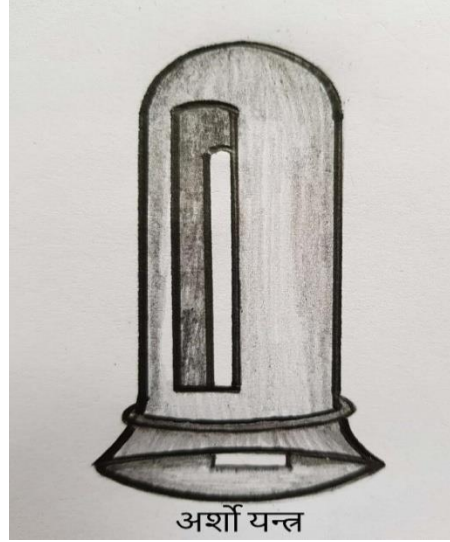
Nadi Yantras are of various types and are used to remove foreign bodies and inspect and treat disease spots of external orifices. They are of different diameters and lengths depending on the dimensions of the passage. Endoscopes come under the category of tubular instruments. They are used in piles, fistula in ano, anal stenosis etc. The also *Yantra*, *Bhagandara Yantra* and *Yoni Vranekshanam* are some the examples of endoscopes for examination of external body orifices. Furthermore, *Nadi Yantra* is classified as follows.^[11]

1. *Bhagandara Yantra*-2, with an opening at one end and both ends.
2. *Arso Yantra*- 2, with an opening at one end and both ends.
3. *Vrana Yantra*-1 - has a diameter equal to the diameter of the margins of the wound.
4. *Vasthi Netra*-4 - according to the age of the patient
5. *Utharavasthi Netra*- 2, one each for males and females
6. For aspirating hydrocele-1
7. For aspirating ascitis-1
8. *Dhooma Netra*-3, one each for *Virechana*, *Snehana* and *Prayogikadhoomapana*
9. *Nirudhprakashana Yantra*-1
10. *Sannirudhaguda Yantra*-1
11. *Alabu Yantra*-1

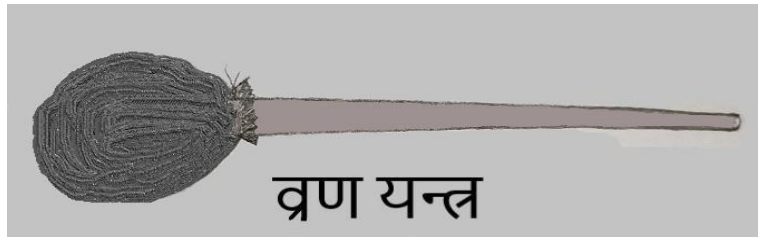
12. SringaYantra-1

- Proctoscope or Rectal Speculum for Piles (*Arso Yantra*)-
Dwichidra Yantra is used to visualise the rectum and the anal canal, and *Eka Chidra* is used for procedures like *Ksharpatan* in *Arsha*^[12].
- Rectal Speculum for Fistula in Ano (*Bhagandara Yantra*) –

The *Yantra* is recommended for checking the anal canal to diagnose whether the *Bhagandara* has an external or internal opening. There is no difference between *Arso Yantra* and *Bhagandara Yantra* except that in *Bhagandara Yantra*, the lips or ridge above the opening seen in *Arso Yantra* are not present^[13]. The anatomical significance of *Bhagandara Yantra* is similar to that of *Arso Yantra*.



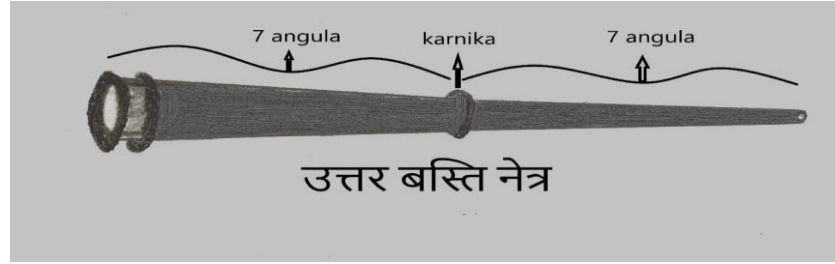
- Syringe Irrigator (*Vrana Yantra*) –
Yantra is used to apply oils or healing decoctions to treat wounds.^[14]



- Vaginal Douche (*Uttara Basti Yantra*)- To administer *Uttarabastidravya*. The *Yantra* is in two numbers – one for males and another for females. The *Yantra* is to be introduced up to four *Angulas* into the vagina and two *Angulas* into the urethra.



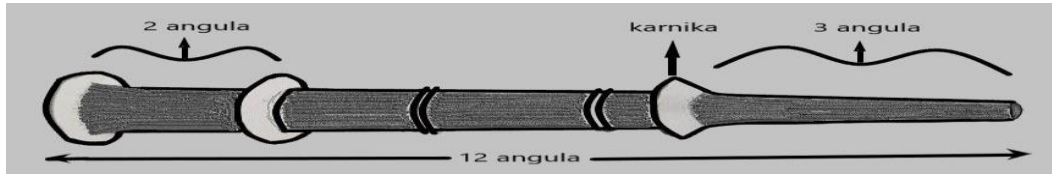
Utthara Basthi Netra for Males with Dimension



Utthara Basthi Netra for Females with Dimensions

- *Vasthi Yantra*-

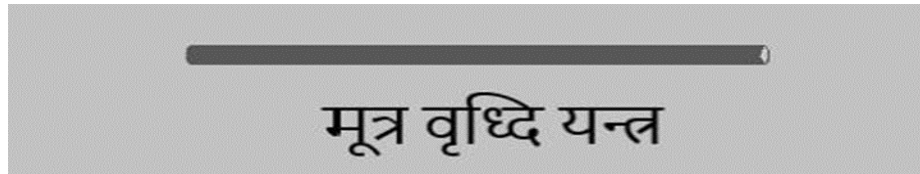
The *Vasthi* drug is poured into the rectal ampulla. The dimensions of the nozzle and the amount of medicine for *Kashaya Vasthi* should be decided according to the patient's age, strength and body.



- Trocar & cannula (*Mutra Vridhi Yantra*) –

It is used for the treatment of enlargement of the scrotum caused by urine (hydrocele); the urine should be drained using a *Nadi Yantra*. This *Yantra* is like a tube open at both ends ^[15].

- Trocar & cannula (*Dakodara Yantra*) –



A tube of materials similar to tin or feathers, open at both ends, should be introduced to drain the vitiated water ^[16]. It is used for tapping on ascites ^[17].

- Urethral Dilator (*Nirudhaprakasha Yantra*) –

This instrument used to treat *Nirudhaprakasa* or Phimosis involves gradual dilation of the passage by inserting thicker tubes. ^[18]

- Inhalers (*Dhooma Yantra*) –

Dhooma Netra is used for fumigating wounds, to treat cough, and as part of *Vamana* therapy. ^[19]

- Anal Dilator (*Sannirudha Guda Yantra*) –

This instrument is used for gradual dilation of the anal canal ^[20].

- Horn (*Shringa Yantra*) -

The *Shringa* or horn is used to suck out vitiated *Vatha Dosha*, poisons, blood, other fluids or spoiled milk from the body. *Shringa* is used for bloodletting in *Ekangaja Vatharoga* ^[21]

- Cupping glasses (*Alabu Yantra*)

It is prescribed for blood letting in predominant *Kapha Dosha* situations ^[22].

- Probe-like instrument – (*Shalaka Yantras*)

Shalaka yantras are of several types and are used for different purposes with lengths and circumferences depending on the application site.

- Accessory instruments (*Upa Yantras*)

These are rope, intertwined thread, bandages, linen cloth, round pebbles, stone, hammer, palm and sole, finger, tongue, teeth, nails, mouth, hair, caustic, fire cautery and drugs.

CONCLUSION

Sushruta was the first surgeon in the world to classify and describe, in detail, the surgical instruments, their method of manufacture, quality control, maintenance and their specific usage in diagnosing and treating disease. He was also the first surgeon to describe endoscopes such as rectal, aural, nasal, and vaginal specula. These *Yantra* perform functions of *Kshara Karma*, *Arsha Patan*, *Anal Dilation*, *Vedhana*, and *Visravana* in *Ayurveda* surgery. His contributions are significant to the medical history of the world. With his exemplary contributions to all branches of surgery, it is apt to call him the father of surgery.

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