Evolution Of Surgical Instrumentation: A Comparative Review of Swastika Yantra and Modern Cruciform Instruments

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***Abstract*—The Sushruta Samhita, the foundational text of Ayurvedic surgery, describes 101 types of blunt instruments (*Yantras*). Among these, the *Swastika Yantra* (cruciform instruments) holds a pivotal position for its ergonomic design and mechanical efficiency. This article reviews the structural characteristics, classification, and surgical applications of *Swastika Yantra* as described in ancient texts and draws a direct correlation with modern surgical tools such as artery forceps, and speculums. The study highlights that the fundamental principles of leverage and grip utilized in ancient India remain the cornerstone of contemporary surgical engineering. As Acharya sushrutha considered to be as father of surgery, currently practiced surgeries and procedures are also mentioned in Sushrutha samhita. Instruments used are different for different procedures, hence it's better to compare the ancient instruments with modern instruments and hence, study have been carried over.**

***Index Terms*—*Swastika Yantra*, *Sushruta Samhita*, *Shalya Tantra*, Forceps, Ancient Indian Surgery.**

I. INTRODUCTION

The history of surgery is incomplete without acknowledging the contributions of Maharishi Sushruta, often hailed as the "Father of Surgery". Acharya Sushrutha mentioned the context of *Yantra* and *Shastra* in the Sutrasthana. Here acharya classified instruments into two broad categories: *Yantra* and Shastra. *Yantra's* are known as Blunt instruments and *Shastras* are known as Sharp instruments. Mainly *Yantras* are categorised into 6 kinds. Such as *Swastika Yantra*, *Sandamsha Yantra*, *TalaYantra*, *Naadi Yantra*, *Shalaka Yantra* and *Upayantra*[1]. Here in this Section study had been carried over Modern correlation with a *Swatika Yantra* as its much required for the ancient variety of instruments to be known with currently used instruments for a surgery aspect.

II. SPECIFIC MORPHOLOGY AND DESIGN OF SWASTIKA YANTRA

According to the Sushruta Samhita (Sutra Sthana, Chapter 7): *Yantras* which are 101 in no[1].Among them, hand itself is the most important. *Shalya* are those which produce troubles to the mind and body, *Yantras* are the means to pull out/ remove those *Shalyas*. Mainly *Yantras* are categorised into 6 kinds. Such as *Swastika Yantra*, *Sandamsha Yantra*, *TalaYantra*, *Naadi Yantra*, *Shalaka Yantra* and *Upayantra*[2].

The *Swastika Yantras* is the first among the six types of *Yantras* described. The term "*Swastika*" in this context refers to the cruciform (cross-shaped) design of the instrument. *Swastika Yantras* possesses the following characteristics. These tools consist of two metal arms joined by a central pin (*Keela*), allowing them to function like a pair of scissors or forceps or

which utilizes a central pivot or fulcrum to provide mechanical advantage[3].

The instrument which resembles like a Swastika when it opens are known as Swastika Yaantra (it typically features an equilateral cross with arms bent clockwise). It also called as Artery Forceps or Mid-Widery forceps. *Swatsika yantras* are like *Masoordal* resembling a *Masura* (lentil seed). joint at the center with a nail and are 18Angula *pramana*. *Swastika Yantra's* are 24in no. out of which 09 are *Pashumukha Yantra* and 15 are *Pakshi mukha Yantra*. Instruments have been named based on the resembles like a face of Animal and Birds i.e The working ends were modelled after the jaws of animals and beaks of birds (*Simhamukha* - Lion, *Kakamukha* - Crow, etc.), designed to provide specific grip patterns for different tissues. Handles: The base (*Moola*) was typically curved or ringed to facilitate a firm manual grip[4].

Principles behind designing *Swastika Yantras*

तत्र, नानाप्रकाराणां व्यालानां मृगपक्षिणां मुखैर्मुखानि यन्त्राणां प्रायशः सदृशानि;

तस्मात्तत्सारूप्यादागमादुपदेशादन्ययन्त्रदर्शनाद्युक्तितश्च कारयेत् ॥८॥

Su, su-7/8

Mouths of *Swastika yantra* resemble the jaws and beaks of carnivorous animal and birds, it is interesting that the dental formula of these animals is designed in such a way that they can easily caughy their prey which is firm, with the same principal *Swastika yantra* work, which help in firm hold on tissue, foreign bodies or anatomical structure *Pashumukha Swastika Yantra's* are 09 *in no. they are:*

Simha Mukhayantra,Vyaaghra Mukhayantra,Vrikha Mukhayantra,Tarakshu Mukhayantra,Riksha Mukhayantra, Dweepi Mukhayantra, Maarjara Mukhayantra,Shrugala Mukhayantra,Mrugair varuka Mukhayantra. And 15 are *Pakshi Mukha Yantras.* They are,*Kaka Mukhayantra,Kanka Mukhayantra,Kurara Mukhayantra, Chasa Mukhayantra,Bhaasa Mukhayantra,Sashagati Mukhayantra,Ulookha Mukhayantra,Chilli Mukhayantra,Shyena Mukhayantra, Gridhra Mukhayantra, Krouncha Mukhayantra,Bhringaraja Mukhayantra, Anjalikarna Mukhayantra, Avabhanjana Mukhayantra,Nandi Mukhayantra*[5].

General Uses:

It is to remove the foreign particle from hard anatomical structures like Bone, Cartilage etc. *Praanimukha Swastika Yantras* are usually thick, heavy and so they all used to remove those particles which are visible externally

Pakshimukha yantra are resembles the neck of birds i.e., thin slender and so are used to remove those particles which are deep inside structures.

III. CORRELATION WITH MODERN INSTRUMENTS

The design of *Swastika Yantras* is remarkably similar to modern instruments that utilize the first-class lever principle. Following are Comparative Analysis of *Swastika Yantras* and Modern Equivalents are,

Praanimukha Yantras are 09 in no. they are enlisted below

1. *Simha Mukhayantra* are instruments which resembles like a *Simha mukha* i.e lion hence it is known to be as Lion Forceps / Bone Holding Forceps which helps for Grasping tough structures or bones[6].



2. *Vyaaghra mukha Yantra* resembles like a face of a tiger and hence named to be as tiger forceps - Used to grasp tissues and retrieve foreign bodies, excised tissues and stents from within the gastrointestinal tract[7].



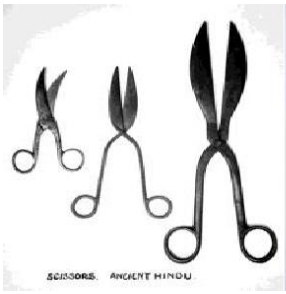
3. *Vrikha mukha yantra* are insturments which resembles like a Wolffaced and are known as Dental Pliers / Extractors. It will be useful for Extraction of teeth or deep- seated foreign bodies[8].




4. *Takakshu mukha yantra*- hyena faced forceps (Dental pliers)- Most orthodontists and general dentists who perform orthodontic work keep several pairs of orthodontic pliers on hand. These pliers can be used for a variety of specific tasks, including archwire work like loop forming and contouring, as well as torqueing and placing stops in the archwire




5. *Riksha mukha yantra*- Bear Forceps- properly removing pieces of the placenta or products of conception from the uterus to prevent infection.





6. *Dweepi mukha yantra*- Panther forceps- These forceps are easily found in most operating rooms within an ear, nose and throat instrument set, and can be used to remove both magnetic and non-magnetic foreign bodies




7. *Maarjara* - Cat Extraction Forceps designed for efficient removal of upper third molars (wisdom teeth).




8. *Shrugala mukha*- Jackal forceps- Wrigley forceps (or Wrigley's outlet forceps) are specialized, short-stemmed obstetric instruments used to assist with the final stage of vaginal delivery when the baby's head is already visible at the pelvic floor. They safely assist in rotating and extracting the fetal head to prevent maternal exhaustion, fetal distress, or during C-section delivery.




9. *Mrugairvaaruka*- Deer forceps- castration pliers- Castration pliers, also known as castration clamps or emasculators, are specialized surgical instruments used primarily in veterinary medicine for the purpose of castrating male animals.




Pakshimukha yantra are 15 in no.they are 9

1. *Kaakamukha Yantras* can be correlated as Dressing forceps which can resembles like crow face and it will be useful to remove bandages or handling superficial foreign bodies.




2. *Kankamukha Yantra* also known as Hemostatic forceps which will be useful for clamping blood vessels and are considered to be as Praadhanya yantra.




3. *Kuraramukha* – Eagle or Osprey Forceps-Nevelle forceps- A special feature of the American Eagle forceps range are the so-called deep-gripping pliers. A better, partly subgingival placement on the tooth prevents fractures when extracting damaged or weakened tooth crowns. The tapered forceps' beak can be placed deeper at the root.




4. *Chasamukha*- Kalt Needle holder forceps. Kalt needle holder is a commonly used tool in postoperative management of ophthalmologic procedures. The instrument is used to grip the needle in strabismus, lid, or lacrimal operations.



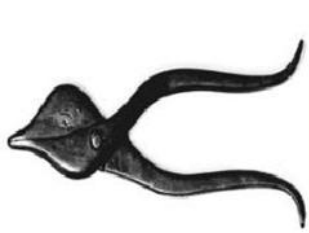

5. *Bhaasa mukha*- Dental extracting forceps- These instruments are specifically designed for removing teeth from their socket. Extraction forceps are used to deliver previously luxated teeth and should not be used to extract teeth out of their sockets. In addition, the extraction forceps can expand the alveolar bone when used under controlled forces.




6. *Sashagati mukha*- Hawk Forceps-Hawk's Bill English Pattern Tooth Extraction Forceps is a surgical instrument used to extract Lower Molars.




7. *Ulookha Forceps*- owl forceps- not found




8. *Chillimukha forceps*- Moynihan forceps-Moynihan artery forceps are specialized, heavy-duty surgical instruments used primarily for clamping large blood

vessels, controlling bleeding (hemostasis), and grasping dense tissue in abdominal, gynecological, and general surgeries. Featuring long shanks and curved, serrated jaws, they provide secure, atraumatic handling in deep surgical sites.




9.&10 *Shyena-Gridhra mukha*- Vulture- vulsellum forceps-In gynecology, vulsellum forceps are employed during cervical biopsies to stabilize the cervix for accurate tissue sampling. In surgical settings, they assist in grasping and holding tissues during various procedures, enhancing control and precision




11.*Krouncha mukha*- Catlew forceps- Cheatle forceps are specialized, long-handled stainless-steel instruments primarily used in operating rooms to remove sterilized instruments (such as scalpels, scissors, and swabs) from boilers, drums, or formalin cabinets without contaminating them. They maintain a sterile field and are commonly used for handling dressing materials, fixing surgical drapes, and holding diathermy tubes.



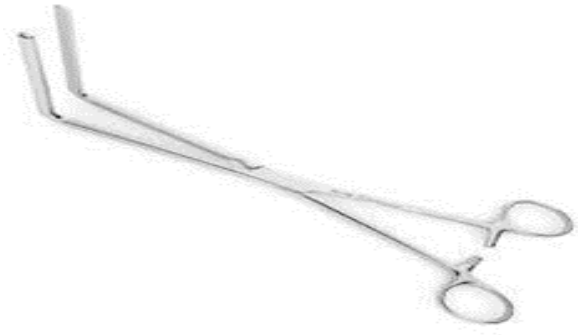

12. *Bhrungraja mukha*- Kochers forceps-(Butcher bird)- Kocher forceps are strong, ratcheted, locking instruments with serrated jaws and sharp interlocking teeth at the tip (1x2 teeth), designed for grasping, holding, and retracting tough, fibrous tissues. Their primary uses include manipulating heavy tissues (fascia, uterus, muscle) during surgery, providing strong, non-slip retraction, and clamping large blood vessels (haemostasis).




13. *Anjali karna*- Barraquer Needle holder- Barraquer Needle holder forceps (or needle drivers) are specialized surgical instruments used to securely grasp, guide, and manipulate suture needles through tissue during wound closure and surgical procedures. They are essential for stitching incisions, performing ligation, assisting in anastomosis, and minimizing hand fatigue.



14. *Avabhajana* - Fehland Atrauma Sigmoid Anastomosis Intestinal Clamp is an angled ratcheted surgical instrument that is used to clamp bleeders during complex intestinal surgeries such as intestinal resection, gastric cancer excision, diverticulectomy, intestinal anastomosis and gastrectomy.



15. *Nandimukha* forceps- crimpable hook pliers are used to attach hooks, power stops, and other orthodontic accessories directly onto archwires during treatment.



IV. DISCUSSION

Acharya Sushrutha considered as *Shastra pradhanya vaidya* and hence he is known as father of Surgery. Mainly instruments are classified into 2 categories i.e., *Yantra* and *Shastra*. *Yantra* are blunt instruments and *Shastras* are sharp instruments. *yantras* are mainly classified into 6 categories. Among them *Swastika Yantras* are *pradhanya* and hence, it's been placed in first place. The comparison of classical instrument descriptions often inspired by animal jaws, birds' beaks or symbolic hand gestures with contemporary surgical tools reveals an intriguing continuity in medical design philosophy. These analogies are not merely poetic; they reflect functional morphology, precision, and ergonomics that remain relevant in modern surgical practice.

As its difficult to say the ancient system of yantras with a currently used instruments. Here are some of the instruments correlated and enlisted with the uses. *Shyena-Gridhra mukha*- Vulture- vulsellum forceps- In gynecology; vulsellum forceps are employed during cervical biopsies to stabilize the cervix for accurate tissue sampling. In surgical settings, they assist in grasping and holding tissues during various procedures, enhancing control and precision.

Krouncha mukha- Catlew forceps- Cheatle forceps are specialized, long-handled stainless-steel instruments primarily used in operating rooms to remove sterilized instruments (such as scalpels, scissors, and swabs) from boilers, drums, or formalin cabinets without contaminating them. They maintain a sterile field and are commonly used for handling dressing materials, fixing surgical drapes, and holding diathermy tubes. *Bhrungraja mukha*- Kochers forceps-(Butcher bird)- Kocher forceps are strong, ratcheted, locking instruments with serrated jaws and sharp interlocking teeth at the tip (1x2 teeth), designed for grasping, holding, and retracting tough, fibrous tissues. Their primary uses include manipulating heavy tissues (fascia, uterus, muscle) during surgery, providing strong, non-slip retraction, and clamping large blood vessels (hemostasis). *Anjali karna*- Needle holder- Needle holder forceps (or needle drivers) are specialized surgical instruments used to securely grasp, guide, and manipulate suture needles through tissue during wound closure and surgical procedures. They are essential for stitching incisions, performing ligation, assisting in anastomosis, and minimizing hand fatigue. *avabhajana* - Fehland Atrauma Sigmoid Anastomosis Intestinal Clamp is an angled ratcheted surgical instrument that is used to clamp bleeders during complex intestinal surgeries such as intestinal resection, gastric cancer excision, diverticulectomy, intestinal anastomosis and gastrectomy. *Nandimukha* forceps- crimpable hook pliers are used to attach hooks, power stops, and other orthodontic accessories directly onto archwires during treatment.

V. CONCLUSION

The parallels between traditional descriptive analogies and modern surgical instruments demonstrate a timeless understanding of form and function. Ancient classifications based on animal morphology and symbolic gestures were not arbitrary they were rooted in keen observation of efficiency, grip, and control.

Modern surgical tools, despite technological advancements, continue to embody these same principles. This continuity highlights the depth of early medical insight and underscores the importance of integrating traditional knowledge with contemporary practice for a richer understanding of surgical instrumentation

Take home Message

Swastika Yantra described in Ayurvedic texts represents a thoughtfully designed traction and grasping instrument that served functions similar to several modern surgical tools such as forceps and retractors. Although simple in construction, it reflects a clear understanding of tissue handling, stability, and controlled manipulation. Modern instruments offer improved precision, ergonomic design, and

sterilization standards, but the fundamental surgical principles—secure grip, minimal tissue trauma, and effective exposure—remain the same. This comparison highlights that classical Ayurvedic surgical knowledge laid the conceptual foundation for many modern operative techniques, emphasizing that traditional Swastika Yantras were functionally relevant and scientifically rational even in contemporary surgical practice.

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