

PRANASHTA SHALYA PAREEKSHA – A MULTIFACETED RATIONAL APPROACH

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ABSTRACT

Pranashtashalyavijnanam adhyaya is an exquisite piece of work tiled by *Acharya Susruta* – which entails about the different dimensions of the Ayurvedic science including Pathology, Diagnosis, Forensics, Surgery, Ethics, Emergency medicine, etc. *Pareeksha* or examination is mandatory before any diagnosis, treatment and or when there is a *shalya* or foreign body lodged inside moreover ignored, its progression can cause a severe disease or permanent disability. This article analyzes the entire *pranashta shalya* chapter and is an attempt to study the laws of physics, bioscience, and general pathology thereby bringing these areas together. There will be a sincere attempt to unfold all mystiques behind every methodology and thereby to explain the rationality behind them. This provides the room of discussion for utility of these concepts even today in current practice and research by which the good old science has to be reborn and be available to all.

Keywords: *Pranshtashalya, Pareeksha, Foreign body, Diagnosis*

INTRODUCTION

*Shalya*¹ means anything that causes tormentation or suffering to the body and those *shalya* which is hidden in any body compartment like *tvakaadis* (skin, etc.) are termed as *pranashtashalya*². *Pranashtashalyaadhyaya*³ is an exquisite piece of work tiled by *Acharya Susruta*, which entails about the different dimensions of the Ayurveda science. *Pranashtashalyapareeksha* (hidden foreign body investigation) is detailed in this chapter by *Acharya Susruta*. They are the best examples for

faster, smarter and non-invasive tools of examination from the ancient days of practice. Ayurveda emphasizes thorough examinations and investigations to diagnosis followed by an appropriate intervention^{4,5}.

Tools for discerning *pranashtashalya*:

The scientific background of *pranashtashalyapareeksha* can be unveiled by integrating with the modern principles of inflammation⁶ with reference to generation of symptoms of hidden foreign objects. This help in drawing

inference about presence or absence of *shalya* in the body. In this context we consider *pranashdashalya* as an antigen that stimulates a series of inflammatory events. They can be classified as *shareerikapranashdashalya* and *aganthujapranashdashalya*⁷. In *shareerika* (bodily – derived from the body itself or internal) includes – *danda* (teeth), *kasha & roma* (hairs), *nakha* (nails), *pooya* (pus), *pakshma* (eyelashes), *shmathru* (moustache), *dosa* (body humors), *dushta* (tissues), *mala* (excreta)⁸. *Aganthuja* (foreign body) includes – *trna* (grass), *kaashta* (wood), *paashaana* (stone), *loha* (metal), and other foreign materials⁹.

Relevance of *pranashdashalyapareeksha*:

The goal of *pranashdashalyapareeksha* is the wellbeing of the traumatized by providing or establishing a precise diagnosis through a flawless investigation, thereby facilitating a good piece of treatment modality. Targets of *pranashdashalyapareeksha* include, identifying the affected location, discerning the presence or absence of *shalya*, understand the depth or intensity of the injury involved and finally to draw inference about the prognosis. *Pranashdashalyapareeksha* can be considered as a practical implication of *darshana* and *sparshanapareekshas*¹⁰. *Acharya Susruta* in the *pranashdashalyavijnaniyamadhyaya* mentions about the *saamanyapranashdashalyalakshana* (general features) as *Shyavampidakachitham*, *shopha-vedanavandammuhurmuhur*, *shonithasraavinam*, *budbudavatunnata*, *mrudurmamsam*¹¹.

These signs and symptoms of *pranashdashalya* in human body coincides with those listed by Roman writer - Celsus – *rubor*, *calor*, *dolar*,

tumor, finally *functionallaesa* added by Virchow¹². Hence, these signs and symptoms can be comprehended through an integrated approach. The scientific background behind manifestation of each *pranashdashalyalakshanas* and its *pareekshas* can be comprehended through indepth knowledge in understanding various events of inflammation. *Samanyapranashdashalyalakshanas* can be understood with reference to the modern principles of inflammation. This integrated approach can be justified with the following descriptions:

Shyavam (reddish discoloration) is the initial feature of area afflicted with *pranashdashalya*. This may arise due to the vasodilation resulting in stagnation of blood within the vessel imparting redness. Discerning *shyavam* as blackish discoloration indicates the advanced stage, where inflammatory response fails and progresses to the stage of infection leading to tissue necrosis¹³. *Pidakachithambudbudavatunnatam*¹⁴ (boils) literally refer to the elevation or boils. It may manifest due to an infection lodged in the wound from the foreign body (e.g. streptococcal infected wounds seems to possess boils adjacent to the wound)¹⁵. Hence *pranashdashalya* act as a vector for harbouring infection. *Shoppha*¹⁶ (oedema) indicate the accumulation of interstitial fluid, initially due to an increased hydrostatic pressure build up within the vessel due to vasodilation and stasis of blood flow. Later due to the altered vascular permeability. The mechanism contributes to the accumulation of interstitial oedema fluid. The former is transudate in nature and the latter is exudate in nature¹⁷. *Vedanavantham*¹⁸ (pain) mentioned as a feature in the *pranashdashalyapareeksha*

arises due to the action of prostaglandin to peripheral sensory neurons and the central axis during the time of inflammation¹⁹. *Mrudur-mamsam*²⁰ (flaccid muscles) reflects the flaccidity of muscles due to the action of cytokine –TNF (Tumor Necrosing Factor) alpha, or we can consider due to the presence of any neuro muscular junction blocking poison lodged in the *shalya* in turn causing flaccidity. Due to any trauma or inflammation there can be flaccid muscles²¹.

Signs & symptoms based on location:

Apart from the general features mentioned for the presence of hidden foreign body within the human body, specific features has been mentioned by *Acharya* Susrutha for the presence of hidden foreign body in different compartments or sites like the skin, etc²².

Hidden foreign body in Skin (*Twakgatapranashtashalya*)²³:

Vivarna (discolouration) occurs due to the prostaglandin mediated vasodilation causing redness whereas inflammatory *Shopha* (swelling) results from the collection of interstitial fluid due to initial development of hydrostatic pressure and later due to the altered vascular permeability mechanisms. *Katinya* (hardness) arise due to the swelling caused by abnormal collection of fluid in the interstitial space. *Snehanam* (oleation) and *swedanam* (fomentation) are the two methods adopted for analysing the presence of a foreign body in skin²⁴. The role of *snehanam*²⁵ and *swedanam*²⁶ is for inducing softness to the affected area where the hidden foreign body is present. Mechanism of *swedanam* (fomentation) from the perspective of biochemistry unveils it as a heat shock inducing method, where it causes the upregu-

lation of heat shock protein genes through the release of prostaglandins. These prostaglandins also play a major role in catalysing the inflammatory events, if the *shalya* (foreign body) is still lodged in the body compartment²⁷. The other techniques used for the purpose of investigation includes the application of *mrud* (mud), *maasha* (black gram), *godhooma* (wheat), *gomaya* (cow dung), *yava* (barley) to the area that can trigger *samrambha* (redness) and *toda* (pain) in the presence of a foreign body²⁸. The rationality behind this can be explained as due to pressure induced vasodilatation, peripheral sensitization and direct neuronal irritation²⁹. The relevance of using these substances are because of their *rooksha* (dry), *ushnavirya* (warm potency), *pittakara* (increases fire) and *vatakara* (increases wind) properties catalysing the inflammatory process.

Hidden foreign body in Soft tissue (*Mamsagatapranashtashalya*)³⁰:

The prime feature shown is the *shophaativrudhi* (excessive swelling). It manifests due to the richness of blood supply in the soft tissues there is great amount of accumulation of interstitial fluid because of the vascular events in inflammation. The second key feature is the *shalyamargaanupasaroha* (delayed healing of the track). This can be comprehended as either delayed healing or a complete non-healing of the wound track. According to the contemporary medical science, soft tissue healing occurs in three phases³¹. It is initiated by an acute inflammatory phase starting from about 0 to 72 hours, a reparative phase for about 72 hours to 6 weeks, and the remodelling phase lasting for about 3 weeks to

12 months. So, we can discern it as the delayed healing or as complete non-healing of the soft tissue due to a mass destruction. *Peedanaasahishnutha* (hyper sensitization) refers to the increased sensitivity to pain. It arise due to the direct neuronal irritation, peripheral sensitization, or swelling compressing an adjacent nerve³². *Chosha* (severity of pain) refers to an intensity or quality of pain. *Paaka* indicates the suppuration due to the depth of the injury involved, where there is more chance for infection. *Action of snehana* (oleation) & *svedana* (fomentation) is based on the mechanism mentioned above. *Kshubhyamanam* (pressure bandage) indicate the application with pressure. Because *mamsa* (soft tissue) is comparatively deeper than the *tvak* (skin) hence, to identify the presence it requires sufficient pressure to explore the presence of hidden foreign body. *Samrambha* (redness) and *toda* (pain) are the two indicators for the presence of a *shalya* (foreign body) in the *mamsa* (soft tissues)³³. Mechanism for generation of these symptoms was already described.

Hidden foreign body in Alimentary & Urogenital Tract (*Koshtagatapranashtashalya*):

When a foreign body has lodged in the alimentary tract, it produces symptoms like *aadopaa* (gurgling noise), *aanaha* (flatulence), *mootrapureeshadarshanam* (appearance of flow of urine, faeces and food particles from the orifice of the wound). The mechanism of manifestation of these features is self-explanatory³⁴. In this case *mamsagatapranashtashalyapareekshas* (foreign body investigations for soft tissues) has been implicated

as both are sharing almost similar features in its structure and function³⁵.

Hidden foreign body in Bone (*Asthigatapranashtashalya*)³⁶:

When the bone is impacted with a foreign body it leads to *vividhavedanapradurbhava* (severe pain). It is severe enough to make the patient unable to perceive and differentiate the type of pain. Severe pain results due to the abundance in periosteal pain receptor distribution. The number is more than 200 periosteal pain receptors per square millimetre i.e. more than the skin receptors³⁷. Associated feature from impact includes the bony swelling too. *Snehana* (oleation) and *svedana* (fomentation) performed with the same rationality discussed for other sites are implemented for diagnosis of foreign body in bones. Apart from this, the individual is subjected to *bandana* (bandaging) and *peedana* (squeezing hard). Here, the individual is subjected to pressure by binding with cloth, leather, *valkala* (bark) etc. to apply pressure. This results in *samrambha* (redness) and *toda* (pain) if *shalya* (foreign body) is present, and if *shalya* (foreign body) is absent the signs are not manifested³⁸. The foreign body investigation measures for *mamsa* (soft tissues) also can be implemented for *asthi*³⁹.

Hidden foreign body in Joint (*Sandhigatapranashtashalya*)⁴⁰:

Loss of function of the involved joint is reflected as the symptom of a foreign body lodged in the joint. The functions may be the act of flexion, extension, rotation, circumduction and deviation. *Snehana* (oleation) and *svedana* (fomentation), *bandana* *peedana* (pressure bandaging), *sandiprasaranaakunjana* (flexion and extension of the joints) are

the methods adopted for discerning the presence of a foreign body in the joint. This highlights the step by step analysing of the area for the presence or absence of *pranashtashalya* (hidden foreign body) within the body⁴¹.

Hidden foreign body in Muscle (*Pesigatapranashtashalya*)⁴²:

The symptoms are same as that of *mamsagatapranashtashalya* (foreign body lodged in soft tissues). Because the *peshi* (muscles) are derived from the *mamsadathu* (soft tissues) by the action of *vayu*. The mechanisms established in the *mamsagatapranashtashalya-pareekshas* (foreign body investigation in soft tissues) can reason here also. But the reason for *shophavarjam* (reduced swelling or absence of swelling) is due to the fact that the muscular area is having comparatively less vasculature than the other soft tissues⁴³. *Mamsagatapranashtashalyapareekshas* (foreign body investigation in soft tissues) are applicable for *pesigatapranashtashalya* also, due to similar structural features.

Hidden foreign body in Marrow (*Astivivaratapranashtashalya*)⁴⁴:

When a foreign body tends to lodge in the marrow, it produces a feeling of fullness of the bone due to the accumulation of fat globules, bone fragments, blood, etc. whereas *asthinistoda* (bone pain) is due to the direct neuronal irritation and peripheral sensitization. *Samharshobalavamcha* (pain) refers to the type of pain caused by the *vatadosha* as mentioned in the *Dalhana* commentary. Foreign body impacting the marrow can be detected through implementing the techniques from *mamsagatapranashtashalyapareekshas* (foreign body investigation in soft tissues)⁴⁵.

Hidden foreign body in Vein, Artery, Nerve (*Sira, dhamani and snayugatapranashtashalya*)^{46, 47, 48}:

When the foreign body tends to be trapped in veins, it produces symptoms like *shoola* (pain) and *shopha* (swelling) of veins. This represents the events in inflammatory process such as the vasodilation, pain and swelling.

The symptoms involved in case of a foreign body lodged in arteries are *phenavatrak-taudeeryadi – shabda vat* (discharge of frothy blood with sound) associated with *pippasa* (thirst) and *hrudshoola* (chest pain). This spectrum of symptoms is similar to the hypovolemic shock arising out of blood loss⁴⁹.

In *snayugatapranashtashalya*, *snayu* can be comprehended as tendons that are rich in neuronal network (*snayujaala*) or nerve as such. This results in the key symptom such as severe pain. Pain can be due to either a neuropathic or neurogenic reason⁵⁰.

Hidden foreign body in Various biological channels (*Srotogatapranashtashalya*)⁵¹:

The *srotas* (channels) lose its function and quality when a hidden foreign body exists within it.

For the above structures like *sira* (vein), *dhamani* (artery), *snayu* (neuronal network) and *srotas* (body channels), the *pranashtashalya-pareekshas* (foreign body investigations) mentioned are the same, where the patient is boarded on the chariot with broken wheels to create certain jerky movements. Hence, if the *pranashtashalya* (foreign body) is present it leads to the *samrambha* (redness) and *toda* (pain), if absent signs and symptoms are not observed⁵².

Hidden foreign body in Vital spots (Marmagatapranashtashalya)⁵³:

Even though *marmagatapranashtashalyalakshanas* (foreign body lodged in vital spots) and *pareekshas* (investigations) are not directly mentioned. We may examine by understanding the type of *marma* and performing the corresponding examination, i.e. the *marma* can be *amamsa* (soft tissue), *sira* (vein), *snayu* (neuronal network), *sandhi* (joint), *asthi* (bone) and *sannipata* (confluence of all). By considering type of *marma*, such as *sadyo-pranahara* (causing sudden death), *kalantara-pranahara* (causing a delayed death), *vai-kalyakara* (inducing abnormality) and *vishalyaghna* (inducing death when extracted) appropriate measures has to be undertaken.

Ayurveda literature also explains many other *pranshtashalyapareeksha s* (foreign body investigation techniques) where he made a keen multisystem observation that can elicit the presence or absence of the *shalya* (foreign body) through observing *samrabha* (redness) and *toda* (pain)⁵⁶.

DISCUSSION:

Classical Ayurvedic treatises mention various tools of *Pareekshas* or diagnostic techniques in multiple dimensions and scattered references. The physician or surgeon needs a complete knowledge; keen observational skills, examination tactics and intelligence to locate the *Pranashtashalya*. *Pranashtashalya* refer to hidden foreign body. *Pareeksha* means investigation or examination. Therefore, *Pranashtashalyapareeksha* refer to the investigation of hidden foreign body. They may be classified into those derived from the body; e.g. teeth, hairs, nails, eyelashes, moustache, body humors, tissues and excreta. Whereas, those derived from outside source includes grass, wood, stone, metal and other foreign materials. Knowledge of various phases of inflammation, mechanism behind manifestation of signs and symptoms of inflammation has been utilized for discerning the presence or absence of hidden foreign body.

Table 1: The mechanism behind manifestation of general signs and symptoms of *Pranashtashalya* can be briefed as:

Sl.No	Signs & Symptoms (Classics)	Mechanism behind Manifestation	Features (Inflammation)
1.	<i>Shyavam</i> (Reddish or blackish hue)	Vasodilation causing stagnation of blood within the vessel imparting reddish hue to the skin. Blackish discoloration, indicating failure of inflammation and progression to infection leading to necrosis.	Rubor (and Calor)
2.	<i>Pidakachithambudbudavatunnatam</i> (Boils)	Elevation or boils due to lodging of infection (typical of streptococcal infection)	Tumor
3.	<i>Shopha</i> (Oedema)	Abnormal accumulation of interstitial fluid due to initial vasodilation and stagnation of blood; later altered vas-	Tumor

		cular permeability.	
4.	<i>Vedanavantham</i> (Pain)	Action of prostaglandin to peripheral sensory neurons and the central axis.	Dollar
5.	<i>Mrudurmamsam</i> (Flaccid muscles)	Action of TNF (Tumor Necrosing Factor) alpha or due to any neuro-muscular junction blockade.	Functional laesa

The rationality behind various techniques adopted for examination of hidden foreign body are the pressure induced vasodilation, peripheral sensitization and direct neuronal irritation. For examining the deeper tissues various additional techniques has been adopted. The rationality of *Pranshtashalyapareeksha* in various body parts vary slightly according to the structural and functional behavior of the underlying tissue. *Pranashtashalyapareeksha* can be comprehended as the practical application of *darshana* and *sparshanapareeksha*.

CONCLUSION

Pranashtashalyapareekshas (hidden foreign body investigations) are some valuable investigatory measures we can comprehend from the classics with lot of scientific background behind them. *Pranashtashalyavijnanamadhyaya* is explaining principles of *shareer-arachanatmaka* (anatomical) and *kriyatmaka* (physiological) elements. *Pareekshas* (examinations) were also framed with reference to *rogavijnana* (pathology), *vishachikitsa* (toxicology), *arthashastra* (state craft), and *dravyaguna* (pharmacology) and *shalya/shalakyatantra* (surgery).

Examination is mandatory before any diagnosis and for further intervention. When there is a *shalya* or foreign body lodged inside & moreover ignored, its progression can cause a

severe disease or permanent disability. The physician or surgeon needs a complete knowledge, keen observational skills, examination tactics and an intelligent mind to locate the *pranashtashalya*. Instruments used for *pareeksha* (investigation) were readily available and non-invasive. Physician has to visit war field to diagnose unlike today where patient is shifted to trauma centre or casualty. The intension of this article is to reopen the good old skills of *Acharyas* practiced in those days all of which are replaced today with instrumental diagnosis. *Pranashtashalyavijnaniyam* reflects practical application of all *pareekshavidhi* i.e. *trividhapareeksha* (three principles of treatment), *chaturvidhapareeksha* (four principles of treatment), *panchavidhapareeksha* (five principles of treatment), *astasthanapareeksha* (eight principles of treatment), *dashavidhapareeksha* (ten principles of treatment), etc. The chapter reflects the information that, *Acharyas* had a sound knowledge on various principles of physics (on force, acceleration, velocity, and inertia), biochemistry and so on. Though the method was crude and looks empirical the principles behind them are same even today. Subjective parameters were used then and today assessment is based on objective parameters. Merits and limitation were there then and present even now with advent of technology but what requires is not com-

menting or refining the science but refining of skill of physician.

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