**PRANASHTA SHALYA PAREEKSHA – A MULTIFACETED RATIONAL APPROACH**

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**ABSTRACT**

Pranashthashalyavijnanam adhyaya is an exquisite piece of work tiled by Acharya Susrutha – 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 pranasha 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* 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 *pranashtha-shalya*. *Pranashthashalyaadyaya* is an exquisite piece of work tiled by Acharya Susrutha, which entails about the different dimensions of the Ayurveda science. *Pranashthashalyapareeksha* (hidden foreign body investigation) is detailed in this chapter by Acharya Susrutha. 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.

Tools for discerning *pranashtha-shalya*:

The scientific background of *pranashthashalyapareekshas* can be unveiled by integrating with the modern principles of inflammation 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 pranashthashalya as an antigen that stimulates a series of inflammatory events. They can be classified as shareerikapranashthashalya and aganthujapranashthashalya. In shareerika (bodily – derived from the body itself or internal) includes – danda (teeth), kasha &roma (hairs), nakha (nails), pooya (pus), pakshma (eyelashes), shmashru (moustache), dosa (body humors), dushta (tissues), mala (excreta). Aganthuja includes – tna (grass), kaashta (wood), paashaana (stone), loha (metal), and other foreign materials.

Relevance of pranashthashalyapareeksha:
The goal of pranashthashalyapareeksha 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 pranashthashalyapareeksha 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. Pranashthashalyapareeksha can be considered as a practical implication of darshana and sparshanapareekshas. AcharyaSusrutha in the pranashthashalyavijnanamadyayam mentions about the saamanyapranashthashalyalakshana (general features) as Shyavampidakachitham, shopha- vedanavandammuhurmuhr, shonithasraavinam, budbudavaatumnata, mruuduramsams. These signs and symptoms of pranashthashalya in human body coincides with those listed by Roman writer - Celsus – rubor, calor, dolar, tumor, finally functionalaesa added by Vircow. Hence, these signs and symptoms can be comprehended through an integrated approach. The scientific background behind manifestation of each pranashthashalyalakshanas and its pareekshas can be comprehended through indepth knowledge in understanding various events of inflammation. Samanyapranashthashalyalakshanas 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 pranashthashalya. 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 necrosis. Pidakachithambudbudavatunnatam (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). Hence pranashthashalya act as a vector for harbouring infection. Shopha (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 nature. Vedanavantham (pain) mentioned as a feature in the pranashthashalyapareeksha
arises due to the action of prostaglandin to peripheral sensory neurons and the central axis during the time of inflammation\textsuperscript{19}. Mrudur-mamsam\textsuperscript{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 neuromuscular junction blocking poison lodged in the shalya in turn causing flaccidity. Due to any trauma or inflammation there can be flaccid muscles\textsuperscript{21}.

**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, etc\textsuperscript{22}.

**Hidden foreign body in Skin (Twakgatapranashtrashalya)\textsuperscript{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 skin\textsuperscript{24}. The role of *snehanam*\textsuperscript{25} and *swedanam*\textsuperscript{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 upregulation 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 compartment\textsuperscript{27}. 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 body\textsuperscript{28}. The rationality behind this can be explained as due to pressure induced vasodilatation, peripheral sensitization and direct neuronal irritation\textsuperscript{29}. 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)\textsuperscript{30}:**
The prime feature shown is the *shophativrudhi* (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 *shalyamargaanupasamroha* (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 phases\textsuperscript{31}. 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 nerve. 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). 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 aadopa (gurgling noise), aanaha (flatulence), mootrapureeshadharshanam (appearance of flow of urine, faeces and food particles from the orifice of the wound). The mechanism of manifestation of these features is self-explanatory. In this case mamsagatapranashtashalyapareekshas (foreign body investigations for soft tissues) has been implicated as both are sharing almost similar features in its structure and function.

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

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 receptors. 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 manifested. The foreign body investigation measures for mamsa (soft tissues) also can be implemented for asthi.

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

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), sandiprasaranaaakunjana (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 body\textsuperscript{41}.

**Hidden foreign body in Muscle (Pesigatapranashtashalya)\textsuperscript{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 mamsagatapranashtashalyapareekshas (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 tissues\textsuperscript{43}. Mamsagatapranashtashalyapareekshas (foreign body investigation in soft tissues) are applicable for pesigatapranashtashalya also, due to similar structural features.

**Hidden foreign body in Marrow (Astitivaragatapranashtashalya)\textsuperscript{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)\textsuperscript{45}.

**Hidden foreign body in Vein, Artery, Nerve (Sira, dhamani and snayugatapranashtashalya)\textsuperscript{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 represent 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 phenavatraktadeeryadi – 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 loss\textsuperscript{49}.

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 reason\textsuperscript{50}.

**Hidden foreign body in Various biological channels (Srotogatapranashtashalya)\textsuperscript{51}:**

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

For the above structures like sira (vein), dhamani (artery), snayu (neuronal network) and srotas (body channels), the pranashtashalyapareekshas (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 observed\textsuperscript{52}.
Hidden foreign body in Vital spots (Marmagatapranashtashalya)\textsuperscript{53}:

Even though marmagatapranashtashalyalakshan\textsuperscript{a} (foreign body lodged in vital spots) and pareek\textsuperscript{sh}as (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), sandh i(joint), asthi (bone) and sannipata (confluence of all). By considering type of marma, such as sadyopranahara (causing sudden death), kalantarapranahara (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 pranshtashalyapareek\textsuperscript{sh}a\textsuperscript{a}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)\textsuperscript{56}.

**DISCUSSION:**

Classical Ayurvedic treatises mention various tools of Pareek\textsuperscript{sh}as 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. Pareek\textsuperscript{sh}a means investigation or examination. Therefore, Pranashtashalyapareek\textsuperscript{sh}a 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:

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Signs &amp; Symptoms (Classics)</th>
<th>Mechanism behind Manifestation</th>
<th>Features (Inflammation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Shyavam(Reddish or blackish hue)</td>
<td>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.</td>
<td>Rubor (and Calor)</td>
</tr>
<tr>
<td>2.</td>
<td>Pidakchithambudbudavatunnatam(Boils)</td>
<td>Elevation or boils due to lodging of infection (typical of streptococcal infection)</td>
<td>Tumor</td>
</tr>
<tr>
<td>3.</td>
<td>Shopha(Oedema)</td>
<td>Abnormal accumulation of interstitial fluid due to initial vasodilation and stagnation of blood; later altered vas-</td>
<td>Tumor</td>
</tr>
</tbody>
</table>
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 shareerarachanatmaka (anatomical) and kriyatmaka (physiological) elements. Pareekshas (examinations) were also framed reference to rogavijnana (pathology), vishachikitsa (toxicology), arthashastra (state craft), and dravyaguna (pharmacology) and shalya/shalakya/shalakyanatra (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 intention 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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