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Pragmatic Analysis of *Pranavaha Srotas*

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ABSTRACT

In *Ayurveda*, *Srotas* is defined as the passages through which the various *Dhatus* are undergoing the process of several metabolic transformations. *Srotas* encompasses the major channels of the body like Gastro intestinal tract, Urinary tract, Respiratory tract etc besides the medium size channels of the body like the micro tubular structures such as Nephrons, Seminiferous tubules etc. The channels responsible for Nourishment, Circulation, Conduction, Excretion etc. By studying the *Srotas Mulasthanas*, *Nidana*, *Samanya Lakshana* and *Viddha Lakshana* of *Pranavaha Srotas* and how it is related to Respiratory system, Central Nervous system, and Cardio Vascular system is elaborated in this article.

Key words: *Srotas*, *Dhatus*, *Pranavaha Srotas*, *Respiratory system*

INTRODUCTION

In classics, the concept of *Srotas* has received enormous prominence because that the *Shareera* or *Purusha* is composed of countless *Srotas*. Depending on the *Srotas*, some *Moola Sthanas* are focused on the source of pathogenic abnormalities in the metabolism or have diagnostic red flag symptoms. In term *Prakupita Doshas* are moving in the body, produces disease after lodging in *Srotovagunya* and *Doshadushyasammurchana*. The *Swaroopa* of these *Srotas* is described as their color is similar to that of the *Dhatu* they carry and these are tubular either large or small in size, and either straight or reticulated in shape. These are the hollow organs predominantly constituted

by *Akasha Mahabhuta*. *Acharya Charaka* has categorized 13 *Srotas*^[2] and *Acharya Sushruta* has described 11 pairs of *Srotas*^[3] on the basis of clinical utility. These *Srotas* or channels are named according to the substance which they carry in them like *Pranavaha Srotas*, *Udakavaha Srotas*, *Rasavaha Srotas* etc. *Pranavaha Srotas* is first and important *Srotas*, which carry *Prana* all over body.^[4] In classics *Prana* as life, it does *Preenana* of entire *Sharira* and responsible for metabolism of *Jataragni* and it is a *Lakshana* of *Atma* consider one amongst *Panchavata* and according to *Shabdha Kalpa Druma* it is a vital force of the body.

Synonyms of *Srotas*

Sira (vein), *Dhamani* (arteries), *Rasayani* (lymphatics), *Rasavahini* (capillaries), *Nadi* (tubular structures), *Pantha* (passages), *Sthana* (sites), *Ashaya* (repositories), *Niketha* (resorts), *Marga* (tracts, pathway), *Samvrita-Asamvrita* (open or blind passages).

MATERIALS AND METHODS

Materials related to *Pranavaha Srotas* and contemporary references are collected from *Ayurveda Samhitas* and textbook of modern medicine respectively. Relevant materials are also obtained from medical journals.

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Understanding Prana in Pranavaha Srotas

Pranavaha Srotas is responsible for transportation of *Prana Sanjnaka Vata*.

Location and functions of Prana Vata

Sites of *Pranavata* is *Murdha, Ura* and *Kanta*. It has main functions like *Budhi, Indriya, Chitta, Drik, Steevana, Shvayathu, Udgara, Nishwasa, Annapravesha*⁵ all are related to Respiratory, Higher mental function and Gastro Intestinal system.

Moola of Pranavaha Srotas

Mulam as "*Mulamiti Prabhava Sthaanam*" meaning that the *Mula* of *Srotas* is the anatomical and physiological seat of respective *Srotas* and also it is the main seat of pathology of that *Srotas* and the principal seat of manifestation of disease.^[6] According to *Acharya Charaka*, the *Hridaya* and *Mahasrotas* are the *Moola* of *Pranavaha Srotas*^[7] and *Acharya Sushruta* has described *Hridaya* and *Rasavahini Dhamani* as *Moola* of *Pranavaha Srotas*.^[8] Both *Acharyas* have mentioned *Hridaya* as a *Moola* of *Pranavaha Srotas* because of its role in *Pranavahana Karma*.

Structures Associated with Pranavaha Srotas

a) Hridaya as Moola

Nirukti of *Hridaya* can be known as the one which receives and removes impurities (*Harati*), does analysis and sends (*Dadati*), at last the one which helps in accumulation of blood all over body (*Yayati*). This word *Hridaya* can refer to both the heart and the brain since the Autonomic Nervous System oversees the appropriate functioning of the heart, which is responsible for absorbing blood, eliminating impurities, and circulating it to all regions of the body. According to *Acharya Sharangdhara's* explanation of *Swasankriya*, "*Hridaya*" is the *Moolasthan* of *Pranavaha Srotas*. According to him, after leaving *Hritkamala*, '*Prana Pavana*' at *Nabhi* emerges through *Kantha* mixed with *Vishnupadamruta*. Prof. Ghanekar, who agrees with *Acharya Sharangdhara* on the term "*Pranavahadve*," believes that both lungs on either side of the thorax should be considered. In this context, the term "*Moolam Hridayam*" refers to the pulmonary

arteries that branch from the heart and go transversely to the lungs. He also takes into account the bronchioles branching out from both the bronchi. Thus, the deoxygenated blood, brought by pulmonary arteries gets spread over the surface of the lungs and getting oxygenated with the "*Pranavayu*" carried in by bronchioles the blood goes back in to the heart through the pulmonary veins. This description concludes that the take up and carry of the "*Pranavayu*" are mainly conducted by lungs and its accessory channels.^[9]

The commentator *Adhamalla*, in his commentary "*Gudharth Sandipani*" over the above verse describes that "*Nabhistha-Iti-Hridayasth*" Heart with vessels is called *Nabhi* in *Ayurveda*, not only lungs concern with the respiration but lungs along with heart are responsible for respiration.

It is also known that heart has its own autonomous conduction system, which regulates cardiac cycle. The conduction system of heart and the respiratory center of brain ultimately govern the process of respiration, which is done by lungs. In many of cardiac disease it is observed that *Shwasa* and *Kasa* as common cardinal feature. Which can be regarded as *Partantra Swasa* or *Kasa*, there are many of cardiac disorders resulting from *Pranavaha srotovyadhis* which are placed under *Swasa* particularly *Maha, Urdwa* and *Chinnaswasa*.

Moordha: In *Charaka Samhitha* it was mentioned that, "*Siras*" is the seat of all *Indriyas* and the *Pranavahi Srotas* concern with these *Indriyas* shoot out or diverge from this center controlling the life just similar to the rays of sun. *Pranavata* initiates impulses from *Siras* and travels through nose, tongue, pharynx, neck till *Uras* understood as reticular formation from medulla oblongata with higher center connected especially "respiratory center" which promotes intake of air, food and expulsion of phlegm. The function of *Prana* is "*Hridayendriyachittadruk*", *Pranavayu* controls heart, senses and mind. It suggests the brain center in medulla oblongata does the control of respiration. So *Moordha* is the seat of *Prana*. Therefore, *Pranavaha Srotas* stands for the system concerned with the activities of *Prana Vayu*. Head is the region where all

Prana's situated and all the sensory and motor activities are controlled from. That is why the head is called the most superior organ of the body. All sensory organs along with their *Pranavaha Srotamsi* are basically situated in the head region in a fashion similar to the connection between sunrays and sun. *Pranavaha Srotas* stand for the *Srotas* which is concerned with the passage of the specific type of *Vayu*, i.e., *Prana Vayu*, which is located in the head. The injury to *Pranavaha Srotas* leads to the manifestation of various neurological system and abnormal rate and depth of respiration.^[10]

b) *Mahasrotas as Moola*

Acharya Charaka mentioned महास्रोतसीति कोष्ठे (GI Tract) and *Acharya Sushutha*

Koshta includes *Amashaya*, *Agnashaya*, *Hridaya*, *Unduka*, *Phupusa* etc. The important hollow organs present in trunk are digestive tract, heart and lungs and the functioning of these organs is controlled by Vagus Nerve. As the definition of *Srotas* states that channels where transformation of metabolism and transportation of the nutrients, formation of *Dhatu* takes place.^[11] While explaining the organogenesis of the body *Acharya Sushruta* opines, *Phupphusa* as "*Shonitaphenaprabhava*". Here the *Phenadhatu* resembles the lightest part of blood which is rich in *Vayu* and *Akasha Mahabhutas*, by that the lungs resembles a cluster of bubbles or multiple air-filled sacs for providing a large surface area for gaseous exchange as in alveoli. So, it is clear that *Shonitaphenaprabhava* indicates the functional anatomy of lungs. *Acharya Charaka* while explaining *Pranavaha Srotodushti Lakshanas*, all *Lakshanas* clearly shows the functions of lung hence indirect reference to involvement of lung in the *Pranavaha Srotas* is there. In *Sharangdhara Samhita* it is mentioned that *Phupphusa* is the *Adhara* for *Udanavayu*. Moreover, *Udanavayu* is the one, which helps in *Ucchwasakriya*. This also supports *Phupphusa* as *Mahasrotas*.

c) *Rasavaha Dhamani as Moola*

Dhamani is a structure mentioned in classics which carry *Rasa* all over the *Shareera* and maintains the

Poshana of the *Shareera*. Origin of *Rasavahi Dhamani* is *Hridaya* and these are said as the carrier of *Rasa* from *Hridaya* to all the body parts.^[12] *Prana* reaches to every corner of the body through *Rasavahi Dhamani* and then perform the categorical functions. So thereby *Rasavahi Dhamani* is considered as *Moolasthan* as mode of transportation. *Rasavaha Dhamani* can be understood as Aortic bodies in contemporary science, The Aortic bodies measures partial gas pressures and the composition of arterial blood flowing through it. The aortic bodies give feedback to Medulla Oblangata, specifically to the dorsal respiratory group via the afferent branches of the vagus nerve. The Medulla oblangata, inturn, regulates breathing and blood pressure.

Pranavaha Sroto Nidana^[13]

- *Kshaya (Dhatu Kshaya)* refers to hypovolemia. This can cause respiratory distress in two different ways. Development of shock with reduced cardiac output- cardiac abnormalities that decrease the ability to pump blood. Disease such as arrhythmias, old myocardial infraction. Development of shock without reduced cardiac output; this can result from excess metabolism of the body, so that cardiac output is inadequate.
- *Sandharana* means *Vega Sandharana* of *Mutra*, *Pureesha*. *Pureesha Vega Dharana* is one of the *Vegadharana* examples, if the person suppresses the urge of defecation it will lead to increase absorption of water and salts from absorptive colon which is a functional anatomical portion of colon along with storage colon, which leads to increase in the volume of blood causing higher pulmonary pressure finally leading to pulmonary congestion.
- *Roukshya* increase of *Ruksha Guna* either by *Ahara* such as *Ruksha Bhojana* or *Vihara* as *Jagarana*. This quality is responsible for the activation of Parasympathetic nervous system which has action on respiratory passages causing contraction of bronchioles and hampers the respiratory system.
- *Kshudhitasya Vyayama* exercise during hunger or starvation there will be shift in the metabolism

from carbohydrate to fat metabolism because of hypovolemia and reduced renal perfusion which is responsible for keto acidosis mechanism which disturbs the breathing pattern.

- *Anya Daruna Karma* doing many such activities which are beyond one's physical capacity which hampers respiration by mechanism of ketoacidosis by fat metabolism.

Dushti Lakshana of Pranavaha Srotas^[14]

While explaining the symptoms of the vitiated *Pranavaha Srotas* vitiation, it has been observed the abnormalities related to breathing pattern, rate and rhythm and associated complaints has been given prime importance rather than structural symptoms of respiration, like *Hikka, Shwasa, Prathishya* etc.

Atisrishta Svasa (Increased phase of respiration) is a *Dushti Lakshana* where in there is rapid prolonged breathing (RR > 20 cpm) that results in the lack of oxygen or too much CO₂ in the cellular level of the body. Its *Lakshana* is seen in *Urdhwa Shwasa* (दीर्घ श्वसिति यस्तूर्ध्वं). Increased rate (tachypnoea) and depth (hyperpnoea) are seen in the conditions where increased demand for ventilation is seen such as exercise, fever, thyrotoxicosis, ketoacidosis. Presenting deep and labored breathing pattern and it is called as Kussmaul's Breathing). Kussmaul breathing starts when acid level in the body increases which is known as Metabolic Acidosis. The presence of Metabolic Acidosis will normally generate a respiratory response. The reduction of serum bicarbonate pH will result in hyperventilation and reduction of carbon dioxide, partially preventing further fall in pH and bicarbonate concentration.

Atibaddha Svasa (reduced or cessation of respiration) obstruction is more physical concerned with upper air way (i.e., nasal cavity, oral cavity, pharynx and larynx) varying from narrowing to partial or complete occlusion of any of these anatomical structures. Decreased respiratory rate is seen during sleep and depression of respiratory centre due to cerebral disease and other causes are Epiglottitis, Foreign body in throat, nose etc. According to classics,

Badhatha causing *Atiucshwasam* is seen in ailment such as *Nasaarsha, Apachi, Galashaluka*.

Kupita Svasa breathlessness associated with features related to vitiation of *Dosha*. Abnormal rate, rhythm and force of respiration has been referred as *Kupitham*. The *Lakshanas Kupita* which can be taken as aggravated seen in *Tamaka Svasa*.

Alpalpa Svasa increased short phases of respiration. This is seen in conditions of pleural involvement where in irritation of parietal and visceral pleura occurs during inspiration. In contemporary science Cheyne stoke breathing pattern resembles with *Alpa Alpa Dushti Lakshana*. Is an abnormal breathing pattern characterized by progressively deeper, sometimes faster followed by a gradual decrease that results in a temporary stop in breathing called an Apnoea.

Abhikshina Svasa is present in *Kshataja Kasa*, where frequent breathing. Changes in the pitch, rhythm and force of respirations leading to hypoventilation, apnea and hyperventilation as seen in biots breathing. Biots breathing is caused by damage to the Medulla oblongata due to stroke, trauma or by pressure on the medulla due to uncal or tentorial herniation.

Sasabdha Svasa means breathing with sounds (some heard on auscultation or without auscultation) seen in *Kshyaja Kasa (Paravatha Eva Kuchana), Tamaka Shwasa (Ghurghuka), Kasa, Maha Shwasa, Maha Hikka*. The Respiratory sounds like stridor, rhonchi, crepitation are seen in various pathological conditions. For instance, the presence of Rhonchi implies bronchospasm or bronchoconstriction whereas in the presence of crepitation in the chest suggest the presence of free fluid in the Alveoli.

Sashoola Svasa Lakshana (pain while breathing) is seen in *Mahashwasa, Vataja Kasa, Gambira Hikka*. In contemporary science chest pain while breathing seen in pleurisy, chest trauma etc. For example, in Pleurisy the involvement of nerve irritation and inflammation of pleura results in the pain in the sides of chest.

Vidha Lakshana of Pranavaha Srotas^[15]

Akroshana, this is due to significant pain, depending on

whether the injury is to the retrosternal area or the sides of the chest. *Vinamana* forward bending is responsible for relaxing the abdominal muscles, which in turn helps to relax the thoracic muscles

Mohana means altered state of consciousness in case of serious injury to the heart, the person may go into the state of coma due to cerebral hypoperfusion.

Bhramana means giddiness this is attributable to cerebral hypoperfusion. This is leading to the manifestation of episode of syncope.

Vepana this type of clinical presentation is observed when the person is having cerebral hypoperfusion in region of basal ganglia may lead to limb weakness, disturbance of movements. *Marana* this is attributable to profuse fluid or blood loss where the person is prone to have deprived blood supply to either brain or heart leading to sudden death.

CONCLUSION

Life starts with breath, ends with breathlessness; this breath is maintained throughout the life by *Pranavaha Srotas* along with its *Moola Sthanas*. *Srotas* are the channel through which *Sraavan Karma* takes place. By considering the functions and *Moola* of *Pranavaha Srotas* it can be understood as Cardio vascular system and Gastro Intestinal system. *Pranavaha Srotas* can be interpreted as the respiratory system by *Acharya Charaka* and as the central nervous system by *Acharya Sushruta*. Respiratory centre is present in Medulla oblongata and pons from the point of view of contemporary science by this we can conclude that *Pranavaha Srotas* can be understood as both Respiratory System and Central Nervous System. This article may help for further research works.

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