

CLINICAL CORRELATION OF PRANAVAHA SROTAS AND ITS VIDDA LAKSHANA WITH MODERN SCIENCE

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ABSTRACT

Ayurveda, the ancient science of life has given a great importance to the concept of *srotas* as no substance moves or transports into or out of the body without these channels. *Acharyas* of yore have described the *Purusha* is made-up of innumerable *srotas*. The diagnosis and treatment in Ayurveda are built on the fundamental principles like how the *srotas* are vitiated and what symptoms they exhibit. Innumerable *srotas* are present in body representing infinite elements transporting in the entire body. Conceptually body has as many *srotas* as it contains the biochemical entities and all metabolic activities take place in connection with the *srotas*. *Acharya Charaka* mentioned there are 13 *srotases* where as *Sushruta* explained 11 paired *srotases*. *Pranavaha Srotas* is a specific channel in which *Pranavayu* enters, nourishes and maintains the activities in the body. *Hridaya* has its role in the *Pranvahan karma* i.e. conveying *Prana* all over the body and hence *Hridaya* is considered its *Moolasthan*. There are many factors which are the definite indicative of *Pranavaha srotas* can be correlated with the Respiratory system. All clinical conditions associated with organs of the respiratory system can be considered same as clinical conditions affecting the *Pranavaha srotas*.

Keywords: *Pranavaha srotas, Hridaya, Mahasrotas, Viddha lakshana, Pradushta lakshana, Shwasa, Respiratory system, Anoxia.*

INTRODUCTION

Ancient Ayurvedic classics are based on the concept of *Tridosha*, *Saptadhatu*, *Trimala* and the *Srotas* carrying these objects. The term *Srotas* is derived from sanskrita root- "*Sru gatau*" which means the entity which oozes, filters, flows, exudes moves or secretes. By etymology, *srotas* is a channel within which something flows or transported. *Srotas* can be defined as a channel transporting the objects in the body undergoing transformation. It can also be considered as the functional channel within the living body concerned with a specific vital function. The *srotas* function as a media through which the biological materials, nutrients and waste products flow in the body and to the exterior. The word '*Srotas*' is used as a generic term indicating all the macro and micro channels and pathways operating in the living organism. It refers both to the gross major channels like respiratory tract, gastrointestinal tract, genito-urinary tract and micro channels like blood vessels, capillaries, lymphatics. It also refers to the molecular channels like the permeability of membranous pores of the cell membrane through which particles move. [1]. Ayurvedic texts described the *Purusha* as "*Srotomayam hi shariram*", means the living body is comprised of innumerable channels which are designed for transporting various substances. The entire range of life processes in health and disease depends on the integrity of the *srotas* system. *Srotas* are not only the passage or channels for flow of various substances but also, they are specific in their functions. *Pranavaha srotas* is one among them which conveys the *Pranavayu* and present study has been taken to correlate it in all possible ways with special respect to modern anatomy and pathology.

Various perspectives of the term "Prana" Various *Samhitas* in Ayurveda described the term '*Prana*' in different contexts. The term '*Prana*' is used while explaining its ten seats in the body as *Dashavidha Pranayatana*. It is also used while describing twelve *Pranas* of the body as *Dwadasha Prana*. *Prana* is also mentioned as one of the types of *Vayu*.

Pranavaha Srotas

- *Tatra Pranavahanam srotasaam hridayam moolam mahasrotascha. Ch.Vi. 5/7* [1]
- *Tatra Pranavahe dwe tayormoolam hridayam rasavaahinyascha dhamanyaha. Su.Sha 9/12* [2]

Acharya Charaka and *Sushruta* both have mentioned *Hridaya* as a *moolasthan* of *Pranavaha srotas*. This is because *Hridaya* has its role in the *Pranavahana karma* by conveying *Prana* all over the body. This is supported by the fact that, *Hridaya* is an organ which, after taking impure blood from the lungs for purification propels oxygenated or pure blood to all the body tissues. Even *Acharya Sharangdhara* while explaining *Swasanakriya* has referred the *Hridaya* as, *Pranavayu* moves out of the body by touching *Hridaya* to collect the *ambara piyush* i.e. the saturated oxygen from the air. As the functional aspects are considered, the *Pranavayu* circulates in the body along with fluid media of the blood. Hence *Acharya Sushruta* considered *Rasavahini dhamani* along with *Hridaya* while explaining the *moolasthan* of *pranavaha srotas*. *Pranavahanamiti Pranasamjnaka vaatavahanam | Etachcha pranakhyavishishtasya vayorvishishta srotaha* || Chakrapanidatta on Cha.Vi. 5/8 [3]

Acharya Chakradatta mentioned the meaning of '*Prana*' also can be taken as the breath. So *Pranavaha Srotas* is the specific channel in which *Pranavayu* enters, nourishes and maintains the body activities.

Pranavaha Srotas as Respiratory System: The symptoms explained by *Acharya Charaka* for *Pranavaha srotas* when it gets deranged, appear to be same as that of many symptoms that arise due to the disorders of the Respiratory system. Hence it would be appropriate to correlate *Pranavaha srotas* as a channel conveying *Pranavayu* within the body i.e., the respiratory system with both of its conducting and respiratory passages.

Pranodakannavahaanam dushtanam shwasiki kriyaha | Karyaha trishnopashamani tathaivampradoshiki.

Ch.Vi. 5/26 [4] When it comes to the pathological aspect, the symptoms of *Shwasaroga* seem to be same as those arose due to the vitiation of *Pranavaha srotas*. Hence it is explained as *Pranavaha srotas* vitiation should be managed with same line of treatment of *Shwasa Roga*. In this context, *Shwasa roga* is one of the symptoms of respiratory system disorders. Again, this proves the close relation between *Pranavaha srotas* and respiratory system. All the above factors definitely indicate the *Pranavaha srotas* stands for nothing but the same Respiratory system.

Factors affecting normalcy:

The factors affecting the normal functions of the Pranavaha srotas can be of two types.

Dwividhaha vyadhayoho nijagantubhedena. Ch Ni 1/4^[5]

- *Nija* (Infection)
- *Agantuja* (External trauma/ Growth/ Compression)

Pradushta Lakshana according to Charaka:

*Pradushtanam tu... Atisristamatibaddham
kupitamalpamabheekshnam vaa
Sashabdashoolamuchchwasantam drishtwa
praanavahaanyashcha srotamsi pradushtaniti vidyaat.
Ch. Vi. 57*^[6]

According to *Charaka*, the deranged *Pranavaha srotas* may lead to excess secretion (*Atisrashtam*), discharge of more thick mucus (*Atibaddham*), shortness of the breath (*Alpampabheekshnam*) and laboured or painful breathing (*Sashabdashoolamuchwasam*).

Viddha Lakshana according to Sushruta:

*Tatra viddasya
aakroshanavinamanamohanabhrimanavepanani
maranam vaa bhavati.*

Su Sha 9/12^[7]

According to *Sushruta*, the impaired *Pranavaha srotas* causes irritability and frustration (*Akroshana*), bending of the body (*Vinamana*), loss of consciousness (*Moha*), giddiness (*Bhramana*), tremors (*Vepana*) and even to the death (*Marana*).

Applied aspect of Respiratory system

All clinical conditions associated with organs of the respiratory system can be considered same as clinical conditions affecting the *Pranavaha srotas*. The effort has been made in this article to correlate pathogenesis of respiratory system with ayurvedic explanations of *Viddha* or *Pradushta lakshana of Pranavaha srotas* as explained by *Acharya Charaka* and *Sushruta* respectively.

Clinical Conditions Associated with Trachea and Bronchi

Compression of Trachea: A unilateral or bilateral enlargement of thyroid gland may cause gross displacement or compression of trachea which is a main passage of the air. A dilatation of aortic arch (aneurism) may also cause the same manifestation thereby making the lumen narrow which leads to the entry of insufficient air volume into the lungs. Bronchial tumours also represent the most common cause of obstruction to a major bronchus.^[8]

Foreign body aspiration: Presence of any foreign body in the larynx or inflammation of the mucosa may result in asphyxia. It is very common in children. Foreign bodies tend to enter the right bronchus rather than left as the right bronchus is more in line with trachea than the left bronchus. These foreign bodies then may pass into middle or lower lobar bronchi and may obstruct the airway.

Clinical Conditions Associated with Pleura:

Pleurisy, Pleural effusion, Pneumothorax, Haemothorax, Hydropneumothorax and Empyema are the clinical conditions associated with pleura which are hampering the expansion of the lungs during inhalation. These conditions may lead to rapid breathing, shallow breathing or shortness of the breath.

Emphysema: Emphysema is a chronic obstructive airway disease characterized by permanent enlargement of airspaces distal to terminal bronchioles.^[9] Histologically there is thinning and destruction of alveolar walls. With the loss of elastic tissue in the surrounding alveolar septa, they tend to collapse during expiration which is an important cause of chronic airflow obstruction.^[10]

Asthma: Asthma is defined as a disorder characterized by chronic airway inflammation and increased airway responsiveness resulting in symptoms of wheeze, cough, chest tightness and dyspnoea.^[11]

Penetration through the Lungs: A splinter from a fractured rib may penetrate the lung and air may escape into the pleural cavity causing pneumothorax.

Pneumo-mediastinum: It occurs due to intrapulmonary rupture of alveoli and spread of air along the vascular sheath of mediastinum.

COPD (Chronic Obstructive Pulmonary Disease): It results in the inflammation of airways causing restricted flow of O₂ to the tissues. Shortness of the breath while resting, decreased tolerance of physical activity, wheezing, frequent cough with phlegm are the other symptoms.

Chronic Bronchitis: It is the persistent productive cough for at least 3 consecutive months in at least 2 consecutive years. The individuals with chronic bronchitis may demonstrate hyper responsive airways with intermittent bronchospasm and wheezing.^[12]

Pneumonia: It is the inflammation of air sacs in one or both the lungs which may fill up with the fluid. It may result in cough with phlegm and difficulty in breathing.

Pulmonary edema: It is a condition caused by the back-up of blood in pulmonary veins and excess fluid in the lungs. It causes shortness of breath, pain in the chest and cough.

Pulmonary embolism: It can damage part of a lung tissue due to restricted blood flow and decreased O₂ levels in the blood. Large or multiple clots may be fatal.

Decrease of Respiratory Efficiency:

Constriction of bronchi: Spasm of smooth muscles in the wall of bronchioles reduces the diameter of the bronchioles. Usually an asthmatic patient experience great difficulty during expiration. In asthmatic cases, difficulty during expiration results in distension of lungs leading to permanent enlargement of thoracic cage as seen in 'Barrel Chest Syndrome'.

Loss of Lung elasticity: Emphysema and pulmonary fibrosis destroy elasticity of the lungs which leads to disability of the lungs to recoil adequately causing incomplete expiration. The respiratory muscles have to assist in expiration, which is no longer a passive phenomenon.

Loss of Lung distensibility: Silicosis, asbestosis, carcinoma and pneumonia interfere in expansion of the lung tissue during inspiration leading to compliance of the lungs and chest wall. This causes inspiratory muscles to take greater effort to inflate the lungs.

DISCUSSION

Acharya Charaka explained, the deranged *Pranavaha srotas* may lead to excess secretion (*Atisrashtam*) of mucus within the channels. In cystic fibrosis and asthma, more thick mucus (*Atibaddham*) is secreted making the breathing more difficult. Airflow through the bronchioles also will be impeded by the presence of excess mucus. Excessive accumulation of bronchial secretions in a lobe or a segment of lung affects normal flow of air into the alveoli. The person shows shortness of the breath (*Alpambheekshnam*) in response to the less supply of the required volume of air to the lungs. These pathological factors also cause the laboured and painful breathing (*Sashabdashoolamuchwasam*).

Anoxic Effect on Brain: Although brain constitutes only a small fraction of the total body weight, it accounts for a large percent of O₂ consumption (20%).^[13] Brain cells are highly sensitive to the lack of oxygen. Concentration problems, loss of co-ordination, short term memory, headache, sweating and increased

breathing are the effects of hypoxia to the brain. Anoxia of the particular areas of the brain gives rise to distinctive features ranging from simple dizziness to death. *Acharya Sushruta*, while describing the impairments of *Pranavaha srotas*, has emphasized the symptoms which are more likely seen as the effects of hypoxia or anoxia to the brain.

Akroshana: Hypoxia to frontal lobe of cerebral hemisphere may produce changes in personality including irritability, poor tolerance and frustration. These symptoms can be correlated to *Akroshana* as explained by *Sushruta*.

Vinamana: Severe anoxic injury to the brain tissues can cause damage to the hypothalamus or pituitary gland leading to hyposecretion of hormones. It may cause excessive tiredness and muscle weakness leading to the disinclination of the body stature. These symptoms can be taken same as *Vinamana* explained by *Acharya Sushruta*.

Moha: Because of their high demand for energy, the nerve cells of the brain are very much sensitive to lack of oxygen. The damage to nerve cells may result in seizures and in severe cases may lead to loss of consciousness and coma. Hypoxia to brainstem results in loss of brainstem reflexes and loss of motor responses. Consciousness is usually lost at a PaO₂ of less than 30 mm of Hg within 6 to 8 seconds. The loss of consciousness is same as *Moha* as mentioned by *Sushruta* as one of the *Vidda Lakshana*.

Bhramana Vepana: Anoxic injury to the cerebral cortex and cerebellum may lead to limb weakness, dizziness, disturbance of movement, balance and co-ordination. Hypoxia to basal ganglia may lead to abnormal movements including tremors and jerky movements (chorea). These symptoms can be correlated with *Bhramana vepana* as mentioned by *Sushruta*.

Marana: The long-term consequences of hypoxia to the brain reflect neuronal depression, decrease in ATP levels and slowing of metabolic processes. Continuously more than 2 min of anoxia to the brain results in cell death.

CONCLUSION

The knowledge of applied aspect of any *srotas* is very much essential for a clinician apart from its normal anatomy. It would be appropriate if the structures

involved and functions of *Pranavaha srotas* are correlated with that of the respiratory system. As the functional aspects are considered, the *Pranavayu* circulates in the body along with fluid media of the blood. Hence there is the reference of *Rasavahini dhamani* while explaining the *moolasthanas* of *pranavaha srotas* by *Acharya Sushruta*. All the *Pradushta lakshana* and *Viddha lakshana* mentioned for *pranavaha srotas* can be seen in clinical conditions associated with pathology of respiratory tract.

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