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A REVIEW: ANATOMICAL EVALUATION OF THE MOOLSTHANA OF ANNAVAHA STROTAS WITH SPECIAL REFERENCE TO THE ANNAVAHINI DHAMANI

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Abstract:

In Ayurvedic literature, the term *Strotas* refers to the body's dynamic internal transport system, responsible for integrating physiological processes. Each *Strotas* is associated with a specific anatomical structure called *Moola*, which plays a crucial role in its normal function. The *Annavaha Srotas* is the channel responsible for the transportation, digestion, and absorption of food. Its anatomical roots, or *Moola*, include the *Amashaya* (stomach) and *Vamparshwa* (sides of the abdomen) as described by Charaka, and the *Annavahini Dhamani* as described by Sushruta. The term *Dhamani* in Ayurvedic texts is used broadly to refer to arteries, nerves, or tubular structures.

A thorough review of Ayurvedic texts, modern anatomical references, and research journals was conducted to clarify the meaning of *Annavahini Dhamani*. Some previous studies have equated the *Annavahini Dhamani* with arteries or blood vessels associated with the stomach. However, each *Strotas* has two functional components: one acts as a source or reservoir, while the other serves as a disposing or transport organ. Since the *Annavaha Strotas* is involved in the movement of food, the *Annavahini Dhamani*, as described in the context of this system, is better understood as a tubular structure other than an artery. In anatomical terms, the *Annavahini Dhamani* may correspond to the oesophagus and small intestines.

Keywords: Annavaha strotas, annavahini dhamani, amashay, vamparshva

Introduction:

Ayurvedic texts describe the body as "*Sroto mayam hi Shriram*," highlighting that the living body is a complex network of channels functioning as an internal transport system. These channels serve various purposes, both gross and subtle, encompassing tangible and intangible, biological, and energetic functions[1]. The term *Strotas* is a broad classification that encompasses all macro and micro pathways operating within the organism.

Sushruta identifies *Strotas* as specialized structures responsible for *Vahana Karma* (transport) of *Dhatus* (body tissues). Anatomically, these *Strotas* differ from *Sira* (veins) and *Dhamani* (arteries). Each *Strotas* is associated with a specific structural foundation, referred to as its *Moola* (root), known in Ayurvedic terms as *Prabhava Sthana* (area of influence)[2]. The proper functioning of each channel system is closely tied to the health and integrity of its *Moola Sthana*.

In the context of *Annavaha Srotas* (digestive channels), there is notable variation among classical Ayurvedic texts regarding its anatomical root. Sushruta identifies the *Aamashaya* (stomach) and *Annavahini Dhamani*[3] (digestive vessels) as the *Moola Sthana*. However, Charaka and Vagbhata describe the *Aamashaya* and *Vama Parshva* (left flank) as the foundational structures[4]. This difference underscores the diversity in anatomical interpretations within Ayurveda and their implications for understanding physiological processes.

Materials and Methods:

A comprehensive review of literature on *Strotas* and related topics was conducted, encompassing Ayurvedic compendia, various classical Ayurvedic texts, and contemporary scientific textbooks. Additionally, references from reputable internet sources and scholarly journals were critically analysed. The study aimed to affirm the *Moolasthana* of *Annavaha Strotas* as described by Sushruta.

Review Of Literature:

The term *Strotas* is derived from the root "Sru Gatou," which encompasses actions such as mooring, filtering, flowing, leaking, and secreting[5]. Anatomically, *Strotas* represent the body's intricate internal transport system,

essential for maintaining physiological balance. Charaka identifies 13 *Strotas*, while Sushruta describes 11[6]. Among these, *Annavaha Strotas*, the food carrying channels, are acknowledged by both Acharyas.

Annavaha Srotas have their anatomical roots in the *Aamashaya* (stomach) and the left lateral region (*Vama Parshva*). Clinical signs such as loss of appetite, anorexia, indigestion, and vomiting indicate dysfunction in these channels[7]. Additionally, the structural roots of these pathways include the *Aamashaya* and food-carrying *Dhamini's* (vessels). Injury to these channels can result in serious conditions, such as flatulence, colic, aversion to food, vomiting, excessive thirst, blindness, and even death[8].

A review of classical Ayurvedic texts (*Bruhattrayee*) reveals three principal anatomical roots of *Annavaha Strotas*:

1. *Aamashaya* (stomach)
2. *Annavahi Dhamini's* (food-carrying vessels)
3. *Vama Parshva* (left lateral region)

These foundational structures highlight the anatomical significance of *Annavaha Strotas* in ensuring proper digestion, nutrient transport, and overall systemic health.

Amashaya:

The *Aamashaya* (stomach) is the primary organ of the *Annavaha Strotas* and is anatomically located in the left hypochondriac region (*Vama Parshva*)[9]. It is positioned between the *Sthanantara* (breasts) and the *Nabhi* (umbilicus)[10]. As a key site for *Pitta*, the *Aamashaya* plays a crucial role in digestion, along with related structures such as *Sweda*, *Rasa*, *Lasika*, and *Rudhira*[11].

Sushruta highlights that the *Aamashaya* serves as a *Kaphasthana* and lies superior to the *Pittashaya*. This positional relationship reflects the contrasting actions of *Kapha* and *Pitta*, as *Kapha* exhibits an upward (Urdhwa Gati) movement, opposite to *Pitta*[12]. Functionally, the *Aamashaya* receives food via *Prana*, where the ingested material is sweetened and made foamy[13]. The sweet and cool properties of *Kapha* ensure that the food remains non-irritant, fluid, and viscous, marking the initial *Madhura* stage of digestion and the generation of *Kapha*[14].

From an embryological perspective, the *Aamashaya* is considered a *Matrujavayava* (maternal derivative) due to its soft nature. Additionally, the *Aamashaya* contains one *Peshi* (muscle layer) and is classified as one of the *Saptashaya* (seven cavities), as described in *Ashtanga Sangraha*.

This anatomical and functional framework underscores the significance of the *Aamashaya* in maintaining digestive and systemic health, harmonizing the actions of *Kapha* and *Pitta*.

Dhamani:

In differentiating between *Sira*, *Dhamani*, and *Strotas*, Acharya Charaka explains that *Dhamani* is a structure involved in transportation, similar to *Sira* and *Strotas*. However, the distinguishing feature of *Dhamani* is the presence of pulsations, which set it apart from the other pathways[15]. *Strotas*, *Sira*, and *Dhamani* are terms used to describe both visible and invisible channels within the bodily tissues (*Sharirdhatu*)[16]. Anatomically, *Dhamani* refers to vessels that carry *Rasa* (lymph) and *Rakta* (blood) throughout the body, and their pulsating nature signifies their role in dynamic circulation, underscoring the critical function of these vessels in maintaining circulatory and systemic balance[17].

Annavahini Dhamini:

The tubular structure extending from the mouth to the stomach is known as *Anna Nadi* or *Anna Vahinee*, anatomically referred to as the oesophagus. It is located posterior to the *Swasa Nadi* (trachea) and gradually expands below in a funnel-like shape. The oesophagus passes through the diaphragm and enters the abdominal cavity, where it continues as the *Aamashaya* (stomach). Acharya Sushruta identifies this pathway as a primary root source of the *Annavaha Srotas* (food-carrying channels). This anatomical connection highlights the crucial role of the oesophagus in the digestive system, acting as a conduit for food transport and a vital component of the digestive process[18].

Kshudrantra (Grahani):

The *Kshudrantra* is anatomically positioned between the *Aamashaya* (stomach) and the *Pakwashaya* (large intestine). It functions as a critical part of the digestive system by retaining food temporarily and allowing the passage of digested food to the next phase of digestion, earning its designation as *Grahani*. This structure is anatomically supported by the *Jatharagni* (digestive fire), which itself relies on the *Grahani* to maintain proper digestive function.

If the *Kshudrantra* becomes deranged due to conditions like *Agnimandya* (weak digestion) or *Agnidushti* (digestive disturbances), it may only allow undigested food to pass, leading to improper elimination. Even when digestion is functioning, an injured *Grahani* can result in symptoms such as pain, tenesmus, offensive stools, and irregular bowel movements, including constipation or diarrhoea. This pathological condition is known as *Grahanee Roga*.

Anatomically, the *Kshudrantra* acts as a vital "valve" or "door" within the alimentary canal, regulating the flow of food and waste, highlighting its significant role in both digestion and the overall gastrointestinal health[19].

Discussion:

Srotas is a comprehensive term used in Ayurvedic compendia to describe the various channels in the body responsible for transporting essential components like *Dosha*, *Dhatu*, and *Mala*. As biological forces, the *Doshas* are distributed throughout the body, while the other components, known as *Bhavpadartha*, need specific channels for their movement and distribution. *Srotas* serve as these transportation systems, ensuring that the body's essential materials are carried to the appropriate locations. Each *Strotas* is composed of two main parts: its root sources and the transport system itself.

The root sources (*Moolasthana*) of each *Strotas* are typically two cardinal organs, either directly or indirectly connected through the scattered *Strotas* within the body. The normal functioning of these channels depends on the health and integrity of their *Moolasthana*. Between the two root sources, one organ functions as the collector or generator, while the other serves as the disposer or eliminator.

Among the key *Strotas* is *Annavaha Strotas*, which plays a vital role in providing nutrition to every cell in the body. The *Moolasthanas* of *Annavaha Strotas*, as described in the *Bruhattrayee*, include the *Aamashaya* (stomach), *Vamaparshwa* (left lateral region), and *Annavahi Dhamani* (food-carrying vessels). However, the *Annavahi Dhamani* described by Sushruta, in the context of *Annavaha Strotas*, remains insufficiently clarified in Ayurvedic literature.

The *Aamashaya*, as defined in Ayurveda, closely corresponds to the stomach in contemporary science. The stomach is a sac-like organ with muscular walls that serves multiple essential functions. It not only holds food but also mixes and grinds it, while secreting acid and powerful enzymes to further break down food into a liquid or paste-like consistency. Once this process is complete, the food moves to the small intestine for further digestion and absorption. This anatomical function highlights the critical role of the *Aamashaya* in the digestive process, aligning it with modern understanding of the stomach's digestive capabilities.

Between meals, the non-liquefiable remnants of food are released from the stomach and moved through the intestines to be eventually eliminated. The *Vamaparshwa*, as described by Charaka, refers to the left lateral aspect of the abdominal cavity, which can be correlated with the left hypochondriac region, where a major part of the stomach resides. This anatomical region plays a crucial role in digestion and any pathology affecting the *Annavaha Srotas* (food-carrying channels) will manifest symptoms in this area. This likely explains why Charaka included *Vamaparshwa* as one of the root sources of *Annavaha Srotas*, as it is closely associated with the stomach and the digestive process.

Sushruta also identifies the *Annavahini Dhamini* as one of the root sources of *Annavaha Srotas*. The term *Dhamini* is used extensively in Ayurvedic literature to describe the transportation of materials, typically associated with arteries. However, the term *Dhamini* is used in different contexts, with Charaka using it synonymously with *Strotas*, while Sushruta excludes both *Sira* (veins) and *Dhamini* from the definition of *Strotas*. This variation in terminology reflects the anatomical and functional flexibility of terms based on the context in which they are applied.

In earlier interpretations, the *Annavahini Dhamini* has been taken to refer to the arteries or blood vessels related to the stomach. However, the notion that food can be transported through blood vessels is anatomically incorrect. The ingested food moves from the mouth through the oesophagus, enters the stomach for storage, and is then released into the small intestine through the pyloric sphincter. In the small intestine, essential nutrients are absorbed through the intestinal wall, where they are picked up by red blood cells, which are rich in oxygen and transport these nutrients throughout the body. This process highlights the distinct roles of different anatomical structures in digestion and nutrient absorption, clarifying the unique function of the *Annavahini Dhamini* in Ayurveda.

The stomach functions as a reservoir for food, but its ability to process and move food is highly dependent on the transportation systems provided by the oesophagus and small intestine. The oesophagus is a muscular tube that facilitates the movement of food from the pharynx to the stomach. It is normally closed at both ends by the upper and lower oesophageal sphincters. The upper sphincter opens in response to the swallowing reflex, allowing food to pass through while preventing backflow into the pharynx. The lower oesophageal sphincter (LES), located at the junction of the oesophagus and stomach, remains constricted most of the time to prevent the stomach's contents from entering the oesophagus, only relaxing to allow food passage during swallowing or vomiting.

The small intestine, which consists of three parts—duodenum, jejunum, and ileum—plays a key role in digestion and nutrient absorption. After food enters the small intestine, it moves first to the duodenum, where it is mixed with bile and pancreatic juices. This mixture of enzymes and bile helps process the food into a semi-liquid form known as chyme. The duodenum, as the first segment of the small intestine, is a hollow, C-shaped tube that connects the stomach to the jejunum. The jejunum and ileum, which follow, are primarily responsible for absorbing nutrients into the bloodstream.

Most digestion occurs in the small intestine, highlighting its critical role in breaking down food and extracting essential nutrients. Once digestion is complete, the remaining waste moves into the large intestine for further processing and eventual elimination. The anatomy of these digestive structures, from the oesophagus to the small intestine, showcases their collective importance in ensuring efficient digestion, nutrient absorption, and waste elimination.

In the above discussion, it is evident that the oesophagus and small intestine are two crucial tubular structures connected to the stomach, facilitating the transportation of ingested food and its subsequent digestion. Similarly, *Dhamini*, a tube-like structure described in Ayurvedic texts, also serves the function of transportation. Sushruta identifies the *Annavahi Dhamini* as one of the root sources (*Moolsthana*) of the *Annavaha Strotas* (food-carrying channels). However, Sushruta excludes *Sira* (veins) and *Dhamini* from the definition of *Strotas*, indicating that the term *Dhamini* here refers specifically to a tubular structure responsible for the transportation of food, rather than an artery.

A detailed anatomical study of the digestive system in contemporary science clarifies that the oesophagus and small intestine are integral to the transportation of food in relation to the stomach. Therefore, it can be concluded that the oesophagus and small intestine function similarly to the *Annavahi Dhamini* described by Sushruta, acting as the key channels through which food is transported from the mouth to the stomach and beyond for digestion and nutrient absorption.

Conclusion:

Strotas refers to the macro and micro channels or pathways within a living organism that facilitate the transportation of body tissues. The *Annavaha Strotas*, as described in Ayurvedic texts, are associated with the structural and functional units involved in both mechanical and chemical digestion, specifically in the oesophagus, stomach, and small intestine. In this context, the oesophagus and small intestine can be directly correlated with the *Annavahini Dhamaniya*, which Sushruta identifies as the *Moolasthana* (root source) of the *Annavaha Strotas*. These digestive organs play a pivotal role in the transportation and transformation of food, mirroring the function of *Annavaha Strotas* as described in Ayurveda.

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