The Concept of Vatavaha Sira w.r.t. to Modern Anatomy

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ABSTRACT
The term Sira stands for channels through which substances or physical forces flow. In general, this term stands for blood vessels, even though Sushruta has also used it in the sense of nerves i.e. Vatavaha Sira. In such a condition, it is very difficult to know doubtlessly about it like modern anatomy. Though Sushruta and other profounders of Ayurveda have not described the structural aspect of the nervous system, they were in the know of its functional aspect. According to them, all the activities of the body are done by Vata, the chief among the Tridoshas. Many of the physical and mental phenomena described by modern physiologists are primarily the activities of the central, autonomic and peripheral nervous systems. They can be identified by the functions ascribed to Vata in the classical Ayurvedic literature. Vata reaches the different parts of the body through Vatavaha Siras for performing all the physical and mental functions. The aim of this study is to correlate the Vatavaha Siras with possible modern anatomical structures i.e artery and nerve.

KEYWORDS
Sira, Vata, Buddhi, Nerve, Artery
INTRODUCTION
Acharya Caraka starts from the root meaning of Sira. The word Sira is derived from the root ‘Sru’-to go or move slowly. “Saranat Sira”, Sira, therefore, means channels in which there is a slow movement of some fluid. Sira has been defined those structures in which there is a passive flow of the blood or Siras are tubular structures it carries vital fluid. Cakrapani, the commentator of Caraka Samhita has also explained Caraka’s view very clearly. He said that – Sarana means passing from one organ to another organ. Siras are structures simple carry substances from one place to another, they do not pulsate. According to Sushruta Sira and Dhamini are the channels other than Srotas.

The principal Siras are 40. These Siras are dividing into 700 branches. These are classified into 4 types on the basis of carrying Vata, Pitta, Kapha and Rakta. These Siras have specific colour, character and functions. The particular Sira is to circulate particular Dosha in its specific area. The other Dosha also circulate in lesser quantity along with a predominant Dosha.

REVIEW OF LITERATURE
Vatavaha Siras are 10, when they reach the organs of the body where Vata predominant, they divide into 175 branches. By this Sushruta meant that Vatavaha Siras are those which are found in Vata predominating areas, such as Pakvasaya, Kati, Shroni, Sakthi, Asthi, and Sparshanendriya.

In Ashtanga Sangraha, Vagbhatta has described that blood flows in all the 700 Siras in that -a quarter of the total number (175) flows blood polluted with Vata.

Distribution of Vatavaha Sira in Shadanga
A. In limbs-100 (25X4=100)
B. Trunk - Vatavaha Siras are 34 in the trunk.
   - Guda (Anus), Medhra (Penis) and Shroni (Pelvis) - 08
   - Parshva (Flanks) - 04
   - Prustha (Back) - 06
   - Udara (Abdomen) - 06
   - Vaksha (Thorax) -10
C. Head and neck - Vatavaha Siras are 41 in trunk.
   - Griva (neck) - 14
   - Karna (ear) - 04
   - Jivha (Tongue) - 09
   - Nasa (nose) - 06
   - Netra (eye)-08

Colour, characters and functions
Vatavaha Sira is Aruna Varna (crimson red) and filled with Vayu. These Siras perform physical functions without
hindering the specific of Buddhi and sense organs.

Acharya Dalhana has explained the term Kriyanam in this he includes both voluntary action and involuntary action. The word Buddhi Karma is related to the five sense organs and Manas. The intellect plays its role in taking the decision in the normal state. When there is a hindrance in the normal functioning of sense organs; it is supposed that there is something wrong with the Buddhi or it has gone under Moha.

In Ashtanga Hrudaya Vagbhatta has described only characters of Siras but not mention any functions of these Siras. He stated that those Siras which are bluish-red (syav-aruna) in colour, small, full and empty momentary and having throbbing are carrying blood mixed with Vata. It seems that Vatavaha Siras perform the same function of those carrying Dosha. It means Vatavaha Siras perform the functions of Vata.

DISCUSSION

Sira is a tubular structure (Nadi) attached to Hrudaya / Nabhi, having Sarana Karma and transports Rasa / Rakta to the nourishment (Poshna) of Dhatus of the body. In this definition, it seems Sira is a blood vessel (Rakta carrying channel) and lymphatics (Rasa carrying channel).

In modern anatomy blood vessels also defined the same as the Ayurveda. Blood vessels (Rakta carrying channel) are intricate networks of hollow tubes (nadi) that transport blood (Rakta) throughout the entire body. Blood vessels are three types - arteries, veins, and capillaries. Arteries, veins, and capillaries are not structurally the same. Blood vessels carry blood from the heart (Hrudaya) to all areas of the body.


While commenting on this context, Ghanekar said that the above description regarding classification of Siras, on the basis of Doshas, does not mean that the forty Siras originate from Nabhi or Hrudaya. Vatadhi Doshas circulate in blood vessels for maintenance of the body. At Vatadhi Sthanas in the Siras Vatadhi Doshas will be increased. That means in Vata Sthanas Siras contain more Vata and same happened in other Doshas viz. Pitta, Kapha. In Rakta Sthanas Yakrut and Pliha the Siras contain more Rakta. Because of this Siras are classified into Vatavaha, Pittavaha, Kaphavaha and Raktavaha.

While modern correlation Dr. Ghanekar stated that Siras are transporting channels of Rasa / Rakta. Along with Rasa / Rakta; Siras also transports Doshas to all over the
body for carrying different functions of these Doshas. He also said that according to meaning only the structures are correlated but not anatomical approach. But some authors like Pandit Gangadhar shastri correlated the Sira with nerve. According to him, Aruna Sira (Vatavaha Sira) is sympathetic nerve because these nerve fibers which carry on all the involuntary vital functions. But according to meaning Sira is not a nerve because it not transports any Rasa / Rakta. Dr. Ghanekar has also accepted the structure of Sira in Ayurveda, implies the four anatomical structures namely artery, vein, capillary and lymphatic in modern science³. Sushruta stated that the Siras carrying Vayu have Aruna Varna (crimson red) and look filled with Vata. The Vayu circulating in their Siras performs physical functions without hindering the specific functions of Buddhi (intellect) and sense organs. When vitiated Vata reaches in its own Siras, serious diseases manifest as a result of vitiation of Vata. The normal functions of the Vatavaha Siras stated by Sushruta also point out that the Siras are nerves. But they are not nerves, they are blood vessels. In Ayurvedic classics, the anatomy of the brain or the nervous system has not been described but the functions of the nervous system have been described through the blood vessels. The Vayu which circulates in blood vessels has been held responsible for performing the functions of nervous system¹⁰. In Ancient Hindu Medicine, an interpretation by Candra Cakravarty has explained that it seems that Sushruta includes the nervous network in the vascular system which is divided into four types, nervous (Vata), venous (Pitta), lymphatic (Kapha) and arterial (Rakta). The identification of Vata, Pitta, Kapha and Raktavaha Sira with the nervous, venous, lymphatic and arterial system is not farfetched and fanciful. The various terms for the blood and lymphatic vessels and ducts arising from the heart were used indiscriminately, although some of the authorities feel that terms Vatavaha, Pittavaha, Kaphavaha and Raktavaha Srotas (Siras) should be identified with the nerve cords, venous, lymphatic and arterial channels respectively¹¹. The above all statements of different samhita commentators as concluded and Vatavaha Siras are correlated with modern science in two ways –

A. The anatomical aspect of Vatavaha Siras- If considered the colour Aruna (crimson red) and characters Vatavaha Siras are may be correlated with arteries. In Ayurveda, Dhamanis are also considered as
arteries because it’s having the character of pulsation.

The characters of arteries are more similar to Vatavaha Siras.

<table>
<thead>
<tr>
<th>Character</th>
<th>Vatavaha Sira</th>
<th>Artery$^{12}$</th>
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<tbody>
<tr>
<td>1. Carrying material</td>
<td>Rasa / Rakta along with Vata</td>
<td>Pureblood (except pulmonary and umbilical arteries)</td>
</tr>
<tr>
<td>2. Colour</td>
<td>Aruna (crimson red)</td>
<td>Red</td>
</tr>
</tbody>
</table>
| 3. Character | a. Praspandana (throbbing)  
b. Full and empty momentary | Pulsate  
During dilatation, arteries to be full and during contraction these are empty |
| 4. Place | Sukshma (Deep) | Deep seated |

**Table 1** Showing correlation in between Vatavaha Sira and Artery

**B. Physiological aspect of Vatavaha Siras**

- Nowadays, nervous system is described in two aspects i.e. anatomical or structural and physiological or functional; the former describes the brain, spinal cord and nerves, while the latter describes the nerve impulse, its transmission through the nerves, stimulation of all the parts of the body (inclusive of the mind), for performing their functions.

Thus Vata in terms of modern physiology closely resembles to the neural impulse (motor, sensory and integrative), which is also an invisible, self-originated and propagated as metabolic reaction sequence bringing about all activities of the nervous system, namely motor, sensory, integrative (higher intellectual functions)$^{13}$.

*Sharira-Vata*, as stated in our ancient texts, stands in always similar if taken in contrast to the nerve impulses that are nothing but a self-propagating biological chemical reaction occurring in the nerve fibers. Thus we can presume the Sharira-Vata as a biological force or in other words a chemical reaction sequence that occurs during the course of life processes$^{14}$.

Regarding Vata and nervous system, Srikantha Murty stated that - all these properties and functions of Sharira Vata exactly correspond with the nature and functions of the nerve impulse. Though the nature of the nerve impulse is not fully understood, what has been established now are-“that it is a process of physicochemical change in the nerve fiber, is self generated, self propagating, its rate of travel ranges from 6 meters to 120 meters per second, it is not visible and it is of one kind only-impulse ending in the skin creates sensations of cold, heat, pain etc, ending in a gland it makes for secretions etc. All the functions of all the parts of the body and mind are made possible by the nerve impulse only acting as the stimulator”.

Comparing this ancient and modern knowledge we can without hesitation assert that Sushruta and others like him had a
good knowledge of the functional aspect of the nervous system\textsuperscript{15}.

In understanding of neuro-physio-anatomy of \textit{Vata Dosha} in modern terms, the nervous system and its important constituents i.e. the neurons dendrites axons, brain and spinal cord, cranial & spinal nerves, autonomic nervous system, in the neuroendocrine system, chemical mediators (the substances that allow various cells and organs to communicate with each other), the neurotransmitters and neuropeptides must be understood\textsuperscript{16}.

Consider the definition of \textit{Vata} also indicates the two main functions of nervous system viz. motor and sensory.

\textbf{A.} The first word \textit{Gati} indicates “to move” or to cause movement or motor activities of the body.

\textbf{B.} The second word is \textit{Gandhan}, term \textit{Gandhan}\textsuperscript{17} indicates Suchma or information or \textit{Jnana} (knowledge) through \textit{Ghranendriya} (organ of smell) which is sensory in nature, it is the function of olfactory nerve, which is the first cranial nerve and sensory in action. So, the term \textit{Gandhanyoh} represents all other sensory organs and nerves which are also described under the heading of \textit{indriya pancha panchaka}.

Regarding functions of \textit{Vatavaha Sira}, \textit{Sushruta} has stated \textit{Buddhi Karma}. The word "\textit{Buddhi Karma}" has related to five senses organs and \textit{Manas}. The intellect plays its role in taking the decision in the normal state. When there is a hindrance in the normal functioning of sense organs, something goes wrong with \textit{Buddhi} or it is trapped in \textit{Moha}. The \textit{Vatavaha Sira} performs other actions along with functions. It seems functions of \textit{Vatavaha Siras} are psychological and \textit{Vata} controls the \textit{Manas} and \textit{Manas} controls the \textit{Buddhi}. These three are interrelated and perform psychological functions of the body\textsuperscript{18}.

While there are four anatomical channels through which property of three \textit{Dosha} are being ruled while \textit{Vatavaha Sira} all those functional properties are present through which \textit{Vahana} of \textit{Vatika} (neural impulses) activities are being performed. \textit{Vatavaha Siras} are exclusively channels for carrying neural impulses in either way i.e. center to periphery or periphery to center. All \textit{Vatavaha Siras} has been recognized along with their anatomical situation in specific regions of \textit{Vata Dosha}. \textit{Sushruta} also adds that \textit{Vatavaha Siras} ramified in one hundred and seventy five branches. \textit{Dr. Ghanekar} had a vision of his own and said that these ramifying \textit{Vatavaha Sira} can be traced in \textit{Vata} predominating area like \textit{Pakvasaya}, \textit{Kati}, \textit{Sroni}, \textit{Sakthini}, \textit{Asthi} & \textit{Sparshanendriya} (skin) etc. The \textit{Sushruta's} statement regarding clarification of
**CONCLUSION**

1. The term *Sira* stands for channels through which substances or physical forces flow. In general, this term stands for blood vessels, even though *Sushruta* has also used it in the sense of nerves (*Vatavaha Sira*).

2. If considered the Anatomical aspects of *Vatavaha Siras* i.e colour (*Aruna*-crimson red) and characters it may be correlated with arteries.

3. If considered the functions (*Buddhi Karma* etc.), *Vatavaha Siras* are looked like nerves. Because these *Siras* are performing motor as well as sensory functions. These functions are carried by *Vata*. So many scholars have correlated the different functions of *Vata* with nervous phenomena. It is no doubt here *Vatavaha Siras* are anatomically arteries but because of carrying *Vata* it performs functions of nerves.

*Vatavaha Sira* initially appears to be scientific because any structure which carries *Vata* in a cable like morphology carries neural impulses and provides energy for movement. *Vayu* or nerve impulse circulates in these. *Vatavaha Sira* performs all neural activities, without hindering the specific functions of *Buddhi* (intellect) and sense organs.
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