ABSTRACT

The Srotas, besides performing numerous functions at both macroscopic and microscopic level, which when gets disrupted, causes pathological features; hence it is immensely required to understand the physiological and pathological concepts of srotas. Generally srotas are considered only at gross level, as structures, carrying material. But the concept of srotas is very deep and minute, which can be explained with the help of cell adaptation concepts, explained by the modern science. This article shall be helpful in putting forth the ayurvedic perspective of srotas along with modern pathological considerations.

Keywords: Srotas; sroto dushti; cell adaptations.
1. INTRODUCTION

As mentioned in Ayurvedic classical texts, that a living human body is a system made up of numerous channels “Srotomayah hi Shariram”, and can be considered as the tracks carrying the complete process of transportation at gross and subtle level. Body-mind-spirit organization has as many as Srotamsi the number of life factors operating in the life process [1].

2. REVIEW OF LITERATURE

The word “Srotas” has Sanskrit origin meaning moving, flowing, leaking etc. According to Charaka samhita it is a structure through which ‘Sravanam’ (Flow) is occurring, whereas Sushruta and Vagbhatta Acharyas have considered them as fine passages and pores comparing to the ones present in the stem of the lotus, through which Rasadi dhatu circulate all over and provide nutrition to the body [2,3].

Broadly, Srotas can be considered as a system or structures involved in the process of production, conversion and circulation of any element in the body, that is, it can be considered as structural and functional unit- framing the complete living structure or the body.

3. SYNONYMS

The different synonyms mentioned in our classical texts and the analysis of the same indicates that these ‘Srotas’ are operating as macro and microscopic pathways. Few synonyms to be mentioned are Sira (vein), Dhamani (arteries), Rasayani (lymphatics), Rasavahini (capillaries), Nadi (tubular conducts), Pantha (passages), Sthana (sites, locus), Ashayas (repositories), Niketa (resorts), Marga (pathways, tracks), Samvrita – asamvrita (open/ blind passages), Sharir chidra (body orifices, openings) [4].

4. CLASSIFICATION

On a wider aspect Srotas has been classified into “Bahirmukha Srotas” (can be taken as apertures or natural orifices) 9 in male, 11 in females, and “Antarmukha Srotas”- 13 [5,6].

Charaka has described thirteen gross channels, seven for seven dhatu (tissue elements), three for mala (waste material) and three for intake of nutrient substances like food, water and air [7].

While considering these channels of the subtle type, it can be taken as the minute ionic channels, which are widely divided into [8]:

1. Voltage gated
2. Ligand gated
3. Mechanically gated
4. Always opened channels

4.1 Characteristic Features of Srotas

They have the colour similar to that of the material they carry with a tubular structure which is large or small which is straight or reticulate.

4.2 Functions of Srotas

Srotamsi are not only the passage or channels for flow of various substances but also are specific in their functions. Each Srotas provides nutrition to their respective dhatu only with requisite quantities and not of others [9,10].

Besides, the Srotas also constitutes the whole inner transport system in a living being in which the Bio-energies- Tridoshas, the sapta –Dhatus, Mala, Agni, Ojas, emotions, thoughts etc. are being formed, transported and destructed.

At microscopic level, in a cell the adaptations taking place as a response to stressful environmental change, can also be taken as occurring due to the dysfunctions at srotas level and on considering mainly the ionic channels, they not only reside in external plasma membrane, but also in membranes of intra-cellular organelles such as endoplasmic reticulum, endosomes, lysosomes and mitochondrion. Gap junction channels connect the cytoplasm of adjacent cells and are formed by closely opposed hemi-channels in their respective plasma membranes.

Apart from generating the electric currents, there are many other functions for channels [11].

4.3 Srotodushti – Signs of Vitiation of Srotas

According to the principle of Karya- Karana (Effect – cause), Srotas can be taken as Karana, and the moorti -maana bhava or the body elements that is carried by them can be considered as Karya. As per the siddhanta, if Karana is destructed or disturbed, so the Karya too will be affected/ destructed accordingly, that
is, if *Srotas* is destructed or is affected by any pathology, the body elements too will be destructed/affected with some pathology.

The common causes of *Srotodushti*, as mentioned in Charaka samhita are

1. Improper diet
2. Erratic behavior

That is diet and activities contrary to *dhatus* will cause “Kha Vaigunya” (imbalance in Akasha–space) leading to “*Srotodushti*”

“Kha Vaigunya”, is due the following factors

1. Kulaja (Hereditary in origin)
2. Jataja (Congenital in origin)
3. Ahaaraja (Due to food)
4. Aagantuja (External Cause)
5. Doshaja (Internal cause)

As per modern science, Channelopathies are diseases caused by disturbed function of ion channel subunits or the proteins that regulate them [12,13]. While considering a cell, the adaptations taking place as a response to stressful environmental change, can also be taken as occurring due to the dysfunctions at srotas level.

The channelopathic diseases may be either [14]

1. Congenital (often resulting from a mutation or mutations in the encoding genes) or
2. Acquired (as a result of an auto immune attack).

*Srotodushti* caused by “Kha- Vaigunya” as per Charaka Samhita [15] and Ashtang Hridaya

1. *Sroto-ati-pravriti*: there is excess flow of material in channels or there is increased pressure of the material flowing in the channel. Mutations “Khavaigunyata” in ionic channel genes may cause either loss/ gain of functions of the channel-srotodushti.
3. *Sira Granthi*: nodular obstructions may be structural or non structural
4. *Vimarga-gamana*: the flowing of material in a different channel or it can be taken as the material flows in a different direction.

5. **DISCUSSION**

*Srotas* are also made of *paramanu* (which forms cells). When we see from the single cell point of view, they undergo adaptations as per the condition they get exposed to. When we analyse the main adaptations of cells namely Hyperplasia, Hypertrophy, Aplasia, Atrophy, Metaplasia and Dysplasia occurring due to some pathology, we can see the similarity explained in charaka *Samhita* as *Sroto Dushti*

1. *Atipravritti* – In *Atipravritti* there is increase in the flow which looks similar to Hyperplasia and Hypertrophy. In Hypertrophy usually there is an increase in cytoplasmic material as well as cytosol. It may be due to mechanical cause or trophic cause. In Hyperplasia there is increase in the size of the cell which may be due to increase in mitosis or proliferation. Both these conditions if we see are more similar to the *atipravritti* and their cause. Example, ventricular hypertrophy that occurs due to increased blood pressure.

2. *Sanga or Apravritti*: There is obstruction or very little flow in this condition. In Atrophy there is a decrease in the cell size either due to physiological or pathological cause, as often occurring due to disuse. For example as in paralysis, due to chronic non stimulation of the muscle atrophy occurs. *Sroto sanga* or *apravritti* leads to reduction in stimulation or flow to a particular area.

3. *Vimarga Gamana/ Mithya Pravritti*: Improper flow through the channels is called as *mithya Pravritti* or *vimarga gamana*. Pathological Metaplasia is produced when a certain cell type is irreversibly replaced by the other. For example; 1. In Rakta meha there is flow of blood through Mutra marg which can be considered as *vimarga gamana* and 2. As a complication / improper application of vasti chikitsa the mala (faeces) is seen in *annavaha srotas* instead of *purisha vaha srotas*. Here also there is displaced flow.

*Srotas* can be described as gross structure like the whole body, or as a single system like Gastro intestinal system, a single tubular structure like nephron, each single cell of the body or sub-cellular structures and membrane, the receptor mechanism and network, pathway carrying emotions and chetna [16]
6. CONCLUSION

Srotas is a word used in different contexts with different meanings as a structural or functional element. All these constitute the components of Srotas System. Cell adaptations are mentioned in modern pathology. We need to converge on our sroto dushti and the cell adaptations. If treatment is based on such subtle factors mentioned by acharyas then, there can never be a failure.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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