

Review Article

Physiological and Clinical Significance of Srotas

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ABSTRACT

The living body is the resultant of aggregation of innumerable structures called 'srotas'. *Srotamsi* is plural form of *srotas*, which mean minute individual cells i.e. *anusrotas* and it also mean different organ systems i.e. *sthula srotas*. Actually *srotas* is a channel. The word etymologically derived from the Sanskrit root 'stru-strabane' dhatu which has different meanings - exudation, oozing, filtration, permeation, to flow, to move, etc. According to *Charaka Samhita*, *srotas* is a structure through which *sravanam* occurs. The internal transport system of the body is represented by *srotas* and has been given a place of fundamental importance in *Ayurveda* - both in health and disease - an importance which recent developments in the field of medicine have begun to emphasize. The structural and functional integrity of this system to physiological states and likewise, the impairment of their integrity to pathological state were correlated by *Charaka Acharya*. He says- "No structure in the body can grow and develop or waste and atrophy, independent of *srotas* that transport *dhatu*s, which latter are constantly subjected to (metabolic) transformations. They sub-serve the needs of transportation. They are transporters of factors that cause the *prakopa* (excitation) or *shamana* (alleviation) of *doshas*. The *srotas* recognized by surgeons as - having regard to traumatic injuries as may be inflicted on them or due to piercing them during surgical manipulations with sharp instruments. The special kinds of pain exhibited in cases of *srotodushti* (pathological involvement of *srotas*) which are important to gain knowledge of prognosis of disease as well as to treat the root cause of the disease.

Key words: *Srotas, dosha, dhatu, srotodushti.*

Aim

To study the physiological and clinical significance of *srotas* as it is involved in pathogenesis of disease.

Objectives

1. To understand concept of *srotas* in detail by review of literature.
2. To get knowledge of functions of *srotas*.
3. To understand clinical significance of *srotas* in disease condition.

Need of study

Srotas are transporters of factors that cause the *prakopa* (excitation) or *shamana*

(alleviation) of *doshas*. *Dosha* get vitiated due to *apathyaahara-vihara* causing *khavaigunya* and disease process occurs. So as to know the prognosis and treat the disease, knowledge of *srotas* is necessary.

MATERIALS AND METHODS

Classical texts which were available in the library of Government Ayurved College, Nanded were reviewed. Pubmed database available from net surfing was also reviewed as per the title. Three research articles are included in review of this article.

INTRODUCTION

The living body has two basic components - one of them is *chetana*, which is responsible for giving life. Another component is a figure or shape, which is a body, composed of *panchamahabhuta*. [1] Various structures produced by *panchamahabhuta* stay together and also maintain co-ordination with each other to keep homeostasis. *Akasha* is the basic *mahabhuta* from which others evolve. Wherever space exists, it is due to this *mahabhuta*. Body entities bearing properties of *Akashamahabhuta* are - inter and intramolecular space, different channels, words, ears, etc. [2] From this we can understand that, there existed a concept of minute and numerous individual living units in the body which are imperceptible by sense organs. Nowadays, such microscopic living units are known as 'cell' (basic structural and functional unit of human body) which can be considered as 'Anustrotas'. Tissues is a group of structurally and functionally similar cells which work together to form an organ system are considered as 'Sthulastrotas'; perceptible by sense organs.

Dictionary meaning of word 'strotas' are read as -a current, a stream, a river. As *srotas* are formed due to *Akasha mahabhuta*, they have characteristics like - patency, porous, clean, soft, slightly unctuous, thin, colorless and transparent. [3] *Kala* is a structure which is limitation between *dhatu* and *ashaya*. [4] *Kala* acts as semi-permeable membrane and only selected substance are allowed to pass through it. The *kalas* are seven in all and are situated at the extreme borders (forming encasement and support) of the different fundamental principles (*dhatu*s) of organism.

Srotamsi of body are channels of different kinds. It includes all cannel - big or small, perceptible or imperceptible, minute or gross - that compose internal transport system of the body. [5] The concept of *srotas* can be understood with the help of synonyms. [6]

➤ <i>Srotamsi-</i>	channels
➤ <i>Sira-</i>	veins
➤ <i>Dhamanis-</i>	arteries
➤ <i>Rasayanis-</i>	lymphatics, ducts
➤ <i>Rasavahinis-</i>	capillaries
➤ <i>Nadis-</i>	tubular conduits
➤ <i>Panthanas-</i>	passages
➤ <i>Marga-</i>	pathways, tracts
➤ <i>Sharirchhidrani-</i>	body orifices, openings, cavities
➤ <i>Samvrutta- asamvruttani-</i>	open or blind passages
➤ <i>Sthanani-</i>	sites, locus
➤ <i>Ashayas-</i>	repertories
➤ <i>Niketas-</i>	resorts

These words seem to be used as synonyms, yet they indicate different functions and structures. The above explained nomenclature maintains to both the *drushya* and *adrushya* channels that afford passage to the movement of *sharira dhatu*s. Though all of these body entities are defined and indicate one common function of conveyance of material from one place to another in living body, purpose of each space in body seems to be different. [7]

REVIEW OF LITERATURE

Genesis of Srotas

In intra-uterine life, *srototpatti* takes place. *Vayumahabhuta* is responsible for generation of *srotas*. With appropriate *Agni*, when differentiation takes place, *vayu* creates *srotas*. [8]

In this way, during the intrauterine life, due to differentiation of fertilized zygote, many *srotas* are created in which various body entities take their origin.

Types of Srotas

According to law, '*Bheta hi bhedyam anyatha bhinnatti*'- categorization of *srotas* is done different ways.

They are structurally similar to their corresponding tissues they transport (*svadhatusamavarnani*), but the size may differ as per morphology of *dhatu*- some of them may be round (*vrutta*), some may be gross (*sthula*) or minute (*anu*), some may be slender (*dirgha*) or reticular (*pratansadrushyani*). [5]

Srotas can be classified on following basis:

1. According to number:

- i. Numerable
- ii. Innumerable

2. According to perceptibility:

- i. *Drushya* (perceptible)
- ii. *Adrushya* (imperceptible)

3. According to *adhishthana*:

- i. *Sharirika*
- ii. *Manasika*

4. According to *sthanabheda*:

- i. *Bahirmukha* (opening outside) :
These are seven in number
2 *akshi* (eyes)
2 *nasika* (nose)
2 *karna* (ears)
1 *mukha* (oral cavity)
- ii. *Antarmukha* (opening inside) : These are thirteen in number
Pranavhasrotas
Annavahasrotas
Udakavahasrotas
Rasavahasrotas
Raktavahasrotas
Mamsavahasrotas
Medovahasrotas
Ashtivahasrotas
Majjavahastrotas
Shukravahasrotas
Mutravahastrotas
Purishavahasrotas
Swedavahasrotas

Movement of *tridosha* i.e. *vata*, *pitta* and *kapha* is through entire body and through different *srotamsi*. Even *manasika guna sattva* and *manasika dosha raja* and *tama*, which are imperceptible by sense organs, use the entire body as vehicle and field of operation. [9]

Physiological Significance of Srotas

There is much diversity in the *srotamsi*, as there is in the elements that compose the structure of the body. All body entities which are present in the body possess their own '*srotas*'. All body entities get replenished in own *srotas*. We can understand from this quotation that, at the time of *Charaka Samhita*, knowledge of the internal transport system of the body had reached a high degree of development. The living body is nothing but the resultant of aggregation of innumerable '*srotamsi*', that are transporters of factors which causes

prakopa (excitation) or *shamana* (alleviation) of *sharira doshas*. [10]

Srotas are concerned with the metabolic state of their corresponding tissues through different communicating mechanisms. In fact all *srotas* are conveyers of body entities, which are under process of bioconversion. *Charaka Acharya* says '*srotas*' serves as *ayanmukhas* to both the *mala* and *Prasada* part of *dhatu*. *Ayana* is derived from *en-gatou* root, meaning, to go or to move, that is, hat through which movement of materials takes place. [11] The word *mukha* is derived from root *much-mokshane*, meaning to leave or to be free. Also *mukha* is used as a synonym of *nih-sarana*, meaning a structure through which things get out or get in. In this way *srotas* nourish *sthayidhatu*. This is exact nature of and main function performed by *srotas*.

Let us understand functions of *srotas* point wise in physiological condition:

➤ ***Sravanam* (oozing)**

The nutrient material of a particular *dhatu* does not nourish it through a *srotas* other than its own. E.g. the nutrients necessary to nourish *asthidhatu*, if reaches to *mamsadhatu* while circulating with *ahararasa*, may not be allowed to ooze through *ayanamukhas* of *mamsavaha strotas*. According to *Ayurvedic* point of view, *parthivatva* related to nourishment of *mamsa dhatu* is different from that of *parthivatva* related to nourishment of *asthidhatu*. The concerned *srotas* apparently decide as to which kind of *parthiva dravya* should be allowed to pass through their *ayanamukhas*. All body entities get replenished in its own *srotas*. Also we can take the example of digestive system. Release of bile from gall bladder, produced in liver is necessary for digestion of fats.

➤ ***Vahanam* (transportion)**

Ahararasa is fluid, which circulates through different channels in entire body. This fluid reaches every *srotas* and supplies required material for that part of *dhatu*, which undergo catabolism. The *prasada* part of *dhatu* and also *mala dhatu* (waste products or products of degradation) are

transported. If *dhatu* is not mobile then actual motility of that *dhatu* is not expected. Transport of material needed for nourishment of that *dhatu*, from one place to another is strongly indicated. The channels which serve as vehicles of transport of both *prasada* and *mala dhatu*s also serve the purpose of their egress and ingress. E.g. Nutrients from *Rasa dhatu* are transported to *Raktavaha srotas* to replenish *Rakta dhatu*.

➤ Site of Biotransformation

Srotas is meant to carry *dhatu* in stage of metabolism. It means that during process of metabolism, one *dhatu* gets transformed into further *dhatu* in *srotas*. *Srotas* is a device in which biotransformation of previous *dhatu* to next *dhatu* occurs. E.g. *Rasa* can be replenish *Rakta* only where *Rasa* gets bio-transformed into *Rakta*; this happens only in *srotas*. If *Rasa* goes somewhere else and tries to get transformed in *Rakta*; *Rasa* is unable to increase quantity of *Rakta*. *Mamsa dhatu* is generated in *Mamsavaha srotas* by nutrients coming from *Rakta dhatu* and so on.

➤ Excretion

The term *malakhya dhatu* is used for waste products or the degraded elements of tissues, which are not meant to be discarded entirely. A part of *malakhya dhatu* is utilized for the synthesis of some structural elements of the body as well as sub-serve some of the vital functions of the organisms while a part is utilized to compose excrements which are periodically thrown out of the body. *Sthayidhatu*s are seldom without *malas*. E.g. *Mala* of *Asthidhatu* is *Kesha* (hair) and *shmathru* (beard) are structural elements of the body while sweat is *mala* of *Medo dhatu* which is excreted out of the body.

➤ Absorption

Srotas are also has power of selective absorption. Nutrients of different *dhatu*s are present in *ahararasa* while travelling through it. But only concerned *srotas*'s nutrient gets selectively absorbed there. E.g. In the *mootra-nirmiti* process (urine formation), at the site of *pakvashaya*

only *mootraposhaka* part gets absorbed and it oozes in *basti* (urinary bladder) where urine is stored.

➤ Typical functions

Poshana or nourishment of *sthayidhatu* is one of the main function of *srotas*. Nutrient substances which nourish the *sthayidhatu*s undergo *paka* by *ushma* (*agni*) of *dhatu*s. They are then made available to *dhatu*s through their own *srotas*.^[12]

Mulasthanas of Different *Srotas*

In classical *Ayurvedic texts*, concept of *srotomula* is focused. Although they have different opinions regarding *mulasthanas*, they consider it to be *prabhavsthanam*,^[13] meaning from where almost all the activities of that particular *srotas* takes place and also which is affected most during pathological conditions.

Although purpose of stating *mulasthanas* of *srotas* is not mentioned directly, the commentator of *Charaka Samhita*, *Chakrapanidatta* says- 'If root of the tree is destroyed, it will cause harm to the whole tree, likewise if harm is caused to *srotomula*, it will lead to damage to whole *srotas*.'

Clinical Significance of *Srotas*

General *Srotodushti* Hetu

In general, all food and activity that are promotive of the morbid tendencies of the *doshas* and deleterious to the body elements are vitiative of the body channels i.e. *srotas*.^[14]

Characteristics of *Srotodushti*

The characteristics of the morbidity of the body channels are the increased or decreased flow of their contents, knotted condition of the passages or flow of their contents in abnormal channels.^[15]

1. *Atiprvrutti*

The term *atiprvrutti* means excessive flow. When the *srotas* gets vitiated due to *dosha*, it may lead to functional deformity which causes *atiprvrutti*. E.g. in *prameha* due to *medovaha srotodushti*, there is *bahumutrata* (excessive passage of urine).

2. *Sanga*

Sanga means obstruction/retention or holding up. Due to vitiated *dosha*, *srotas* gets affected functionally. It cannot perform its routine function of *sravanam*/transport. The flow is obstructed and leads to diseased condition. E.g. In case of *mutrakruhha*, there is obstruction in the passage of voiding urine, so there is retention or dribbling micturition.

3. *Sira-Granthi*

It means dilatation of veins causing obstruction to normal flow through *srotas*. E.g. Atherosclerosis is a condition in which plaque builds up inside arteries, which causes obstruction to flow of blood.

4. *Vimarga Gamana*

Due to some pathology, at the level of *srotas*, there is the flow of fluid in the affected area through channels other than its own. E.g. according to *jwaravyadhi samprapti*, *Udakavaha* and *Sweadavaha srotas* are obstructed and vitiated *doshas* causes *srotodushti*, *agni* gets out of its original place and resides in *twaka* causing *jwara*.

Concept of *Srotovaigunya*

Srotas perform function of the transmission of materials from one side to the other. The nutrient substances which nourish the *dhatu*s undergo *paka* by the *ushma (agni)* of *dhatu*s. This kind of *agnivyapara* and *paka* takes place at the level of *dhatuvaha srotas*. The *dushti* or impairment of *agni* may, lead to *khavaigunya* or *srotovaigunya* i.e. the impairment of the function integrity of the *srotas*. It causes its inability to perform its normal functions. The *doshas* get vitiated and they interact with *dushyas* of the affected region. This phenomenon is called as *dosha-dushya sammurchana*. At the site of interaction the process of disease initiates. According to *SushrutaSamhita* - this process in detail explained under the heading of *Shatkriyakala*. In which *chaya*, *prokopa*, *prasara* and *sthanasamshraya*, relate to accumulation, excitation, spread and initiation of symptoms of diseases. This fourth stage of *Shatkriyaka* is due to *khavaigunya* or *srotovaigunya*.^[16] Thus, all

pathological lesions -acute or chronic, have their beginning at the level of *srotas*.

Understanding Concept of *Srotas* in Modern Point of View

In *Vatakalakaliya Adhyaya* of *Charaka Samhita*, function of *Vatadosha* is described as '*sthulanu-srotasam cha bhetta*'.^[17] This is the evidence to say that classification of '*srotas*' into *sthulasrotas* and *anusrotas* existed. If this theme is taken into consideration, *anusrotas* at cellular level. The cell membrane permits only some selective substances to pass through it and acts as a barrier for other substances. The nutrients are also absorbed into the cell through the cell membrane. The metabolites and other waste products from the cell are excreted out through the cell membrane. Also gaseous exchange takes place through the cell wall, oxygen passes inside the cell from blood while carbon dioxide comes out of the cell. So, at the cellular level *anusrotas* performs all its functions as per *Ayurvedic* texts, if there is no evidence of any pathology. Likewise at the level of *sthula srotas*, for example *Annavaha srotas*, all the physiological functions e.g. deglutination, digestion, secretion, absorption, excretion are carried out routinely in normalcy. But if functional integrity is hampered due to vitiated *doshas*, all the functions are disturbed. There is *srotovaigunya* at the site of *dosha-dushya sammurchhana* which initiates disease process. Manifestation of a disease occurs in the body as a result of the defective *Srotas* of the body. Hence, any defect of *Srotas* must be corrected quickly, for the restoration of normal health.

DISCUSSION

Srotas is a processing unit in which function of biotransformation of previous *dhatu* into next *dhatu* takes place. Manifestation of a disease in the body as a result of the defective *srotas* favoring the *dosha-dushya sammurchhana*. Now, we know the factors causing *srotodushti*, the best method is to prevent factors responsible for *srotodushti*. So, 'Prevention is better than cure'. *Nidana parivarjana* is the

method by which 'swasthasya swasthya' is maintained, which can play a key role in maintenance of homeostasis.

CONCLUSION

Present article emphasis on proper understanding on concept of *srotas* in systematic manner, to understand functions carried out by *srotas* in physiological conditions, its *mulasthanas*, causes of *srotodusthi*, its characteristics and clinical importance of *srotas*. The role of *Srotas* in the manifestation of disease is well discussed in almost all *Ayurvedic* texts; so also its importance in the maintenance of normal physiological functions, that is, the basis for good health. *Ayurvedic* physician must have a complete knowledge of *Srotas*, to approach a patient in a holistic way. Clinically at the stage of *srotovaigyna*, symptoms of disease are almost on the way of their appearance. According to symptoms, we can get the idea about the site of disease, accordingly by treating the vitiated doshas present in the *mulasthana*, there is complete management of a disease from its root.

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