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 pleural form of srotas, which mean minute individual cells i.e. anusrotas and it also mean different organ systems i.e. shula 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 emphasis. 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 dhatus, 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 apathyahara-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 ‘Sthulasrotas’; perceptible by sense organs.

Dictionary meaning of word ‘srotas’ 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 (dhatus) of organism.

Srotamsi of body are channels of different kinds. It includes all cannels - 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]

- Srotamsi- channels
- Sira- veins
- Dhamanis- arteries
- Rasayanis- lymphatics, ducts
- Rasavahinis- capillaries
- Nadis- tubular conduits
- Panthanasis- passages
- Margas- pathways, tracts
- Sharirchhidranis- body orifices, openings, cavities
- Samvrutta- asamvrutani- open or blind passages
- Sthanani- sites, locus
- Ashayas- repertories
- Niketas- 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 dhatus. 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, ‘Bhetta hi bhedyam anyatha bhinnati’- categorization of srotas is done different ways.

They are structurally similar to their corresponding tissues they transport (svadhatussamavarnani), but the size may differ as per morphology of dhatu- some of them may be round (vrtta), 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
      1. akshi (eyes)
      2. nasika (nose)
      3. karna (ears)
      1. mukha (oral cavity)
   ii. Antarmukha (opening inside):
      These are thirteen in number
      Pranavahasrotas
      Annavahasrotas
      Udakavahasrotas
      Raktavahasrotas
      Mamsavahasrotas
      Medovahasrotas
      Ashtivahasrotas
      Majjavahastrotas
      Shukravahasrotas
      Mutravahastrotas
      Purishavahasrotas
      Swedovahasrotas

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. 

Physiological Significance of Srotas

There is much diversity in the srotamasi, 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 (allevation) of sharira doshas. 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. 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 shayidhatu. 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 ayanmukhas of mamsavaha srotas. 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 (transportation)**
  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 dhatus 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 replenished 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 are seldom without malas. E.g. Mala of Asthidhatu is Kesha (hair) and shmashru (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 have power of selective absorption. Nutrients of different dhatus are present in ahararasas while travelling through it. But only concerned srotas’s nutrient gets selectively absorbed there. E.g. In the moootra-nirmiti process (urine formation), at the site of pakkavashaya only moootraposhaka 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 undergo paka by ushma (agni) of dhatus. They are then made available to dhatus through their own srotas. [12]

**Mulasthanes of Different Srotas**

In classical Ayurvedic texts, concept of srotomula is focused. Although they have different opinions regarding mulasthana, 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 mulasthana 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 Srotodoshti**

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. **Atipravrutti**

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

2. **Sanga**

   | Site of Biotransformation | **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 replenished 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 are seldom without malas. E.g. Mala of Asthidhatu is Kesha (hair) and shmashru (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 have power of selective absorption. Nutrients of different dhatus are present in ahararasas while travelling through it. But only concerned srotas’s nutrient gets selectively absorbed there. E.g. In the moootra-nirmiti process (urine formation), at the site of pakkavashaya only moootraposhaka part gets absorbed and it oozes in basti (urinary bladder) where urine is stored. |
Sanga means obstruction/retention or holding up. Due to vitiated dosha, srotas gets affected functionally. It cannot perform its routine function of srananam/transport. The flow is obstructed and leads to diseased condition. E.g. In case of mutrakruchha, 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 jwaraayadhi 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 undergo paka by the ushma (agni) of dhatu. This kind of agniyapara 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 sammurchhana. 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 bhettam’. [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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