



An Anatomical Basis Of Sira, Dhamani, And Srotas In The Light Of Modern Vascular Anatomy: A Critical Integrative Review

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Abstract: Background: Sira, Dhamani, and Srotas are three fundamental anatomical entities described in Ayurvedic literature. Although these structures play a pivotal role in understanding the physiology and pathology of the human body, their precise anatomical interpretation remains a subject of scholarly debate. Modern vascular anatomy provides a detailed description of blood vessels and microcirculation, creating opportunities for a critical comparative analysis. **Objective:** To critically analyze the anatomical concepts of Sira, Dhamani, and Srotas described in classical Ayurvedic texts and examine their possible correlations with modern vascular anatomy. **Methods:** A narrative review was undertaken using classical Ayurvedic texts, including Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya, together with contemporary anatomy, histology, embryology, and vascular biology literature. The review emphasizes conceptual similarities and differences rather than direct structural equivalence.

Results: Classical descriptions indicate that Sira, Dhamani, and Srotas represent distinct yet interconnected anatomical and physiological entities. Sira primarily relates to vascular channels involved in transport and venous drainage, Dhamani denotes pulsatile vessels associated with distribution from the heart, and Srotas represents a broader physiological network responsible for transport, exchange, and tissue nourishment. Modern vascular anatomy describes arteries, veins, capillaries, lymphatic vessels, and the microcirculation as integrated components of systemic circulation. While certain functional similarities exist, the Ayurvedic concepts encompass broader physiological dimensions that extend beyond identifiable anatomical structures. **Conclusion:** The concepts of Sira, Dhamani, and Srotas should be interpreted as comprehensive functional systems rather than exact anatomical counterparts of arteries, veins, or capillaries. Integrating Ayurvedic knowledge with modern vascular anatomy may enhance anatomical education and stimulate interdisciplinary research.

Index Terms - Sira, Dhamani, Srotas, Rachana Sharira, Vascular Anatomy, Integrative Anatomy, Ayurveda

I. Introduction

Rachana Sharira provides the structural framework of Ayurveda and describes numerous anatomical entities responsible for maintaining life. Among these, Sira, Dhamani, and Srotas occupy a central position due to their involvement in circulation, nourishment, and physiological regulation. Although these concepts have been extensively discussed in classical literature, differences in terminology, interpretation, and translation have resulted in varying opinions regarding their anatomical identity.

Modern vascular anatomy has evolved through detailed investigations using dissection, microscopy, radiological imaging, and molecular biology. The cardiovascular system is now understood as an integrated network of arteries, veins, capillaries, lymphatics, and endothelial structures that facilitate transport and homeostasis.

II. Aims: To critically evaluate the anatomical basis of Sira, Dhamani, and Srotas in relation to modern vascular anatomy.

III. Objectives:

- Review classical descriptions of Sira, Dhamani, and Srotas.
- Analyze their structural and functional characteristics.
- Compare these concepts with modern vascular anatomy.
- Identify similarities, distinctions, and research gaps.
- Explore their relevance in anatomical education and clinical practice.

IV. INTRODUCTION

The structural understanding (Rachana) of **Sira**, **Dhamani**, and **Srotas** occupies a central position in Ayurvedic anatomy. Although classical Ayurvedic literature describes these structures according to their morphology, origin, distribution, and physiological functions rather than through microscopic anatomy, several of their characteristics exhibit noteworthy similarities with components of the modern vascular and lymphatic systems. However, these correlations should be interpreted as anatomical and functional analogies rather than exact equivalents, because the Ayurvedic concepts encompass broader physiological and pathological dimensions.

Sira and Veins

In Ayurveda, **Sira** are described as elongated tubular structures that originate from the **Nabhi** and ramify throughout the body in a manner comparable to the venation of leaves. Sushruta Samhita classifies **700 Sira**, distributed to every organ and tissue, emphasizing their extensive branching pattern and their role in maintaining structural integrity and nourishment. The etymology of the term "Sira," derived from the Sanskrit root *sr* (to flow or move), reflects their function as conduits for circulating body fluids.

From a structural perspective, the Ayurvedic description closely resembles the venous system. Modern veins are thin-walled, compliant vessels that collect blood from peripheral tissues and return it to the heart. They possess relatively larger lumina, thinner muscular walls, and numerous anastomoses, allowing efficient drainage from various body regions. Their widespread distribution and branching architecture closely parallel the Ayurvedic description of Sira as delicate channels extending throughout the body.

Histologically, veins consist of three concentric layers: the tunica intima, tunica media, and tunica adventitia. Compared with arteries, veins contain less smooth muscle and elastic tissue but possess valves that prevent retrograde blood flow, particularly in the limbs. Although classical Ayurvedic texts do not describe microscopic tissue organization, the emphasis on the soft, compressible nature of Sira and their susceptibility to injury corresponds well with the structural characteristics of veins. This correlation is further supported by the classical therapeutic procedure of **Siravyadha** (venesection), which is anatomically feasible only through superficial veins because of their accessibility and relatively low intraluminal pressure.

Nevertheless, Sira cannot be regarded as merely synonymous with veins. Ayurvedic literature attributes broader functions to Sira, including the transportation of various bodily constituents and participation in maintaining systemic homeostasis. Thus, the venous system represents the closest structural analogue rather than an absolute anatomical equivalent.

Dhamani and Arteries

The term **Dhamani** originates from the Sanskrit root *Dham*, meaning "to pulsate," "to blow," or "to expand." This etymological interpretation reflects one of the most distinguishing anatomical characteristics of arteries—their palpable pulsation resulting from rhythmic cardiac contractions. Classical Ayurvedic texts describe **24 Dhamanis** originating from the heart, which subsequently divide and distribute throughout the body, supplying nourishment and sustaining vital physiological activities.

Structurally, arteries are thick-walled blood vessels specialized to withstand high intravascular pressure generated by cardiac systole. Their walls contain abundant elastic fibers and smooth muscle, enabling expansion during ventricular contraction and recoil during diastole. Histologically, arteries possess a prominent tunica media, which distinguishes them from veins. Elastic arteries such as the aorta facilitate pressure buffering, whereas muscular arteries regulate regional blood flow through vasoconstriction and vasodilation.

The Ayurvedic description of Dhamanis demonstrates several similarities with arterial anatomy. Their origin from the heart corresponds with the arterial outflow tract of modern cardiovascular anatomy, while

their pulsatile nature aligns closely with arterial pulse transmission. Classical descriptions of upward, downward, and transverse Dhamanis supplying various organs also parallel the branching distribution of the arterial tree to the head, trunk, and extremities.

In addition to nutrient transport, Ayurveda attributes diverse physiological functions to Dhamanis, including the conveyance of Prana, maintenance of vitality, perception, speech, and sensory functions. These descriptions extend beyond the anatomical role of arteries and integrate circulatory function with broader physiological processes. Consequently, while arteries provide the strongest structural correlation with Dhamanis, the Ayurvedic concept encompasses a wider functional spectrum than arterial blood vessels alone.

Srotas and the Lymphatic System

Among the three anatomical entities, **Srotas** represent the broadest and most comprehensive concept. Derived from the Sanskrit root *Sru* (to flow), Srotas are described as innumerable channels responsible for the transportation, transformation, and exchange of various bodily substances. They extend from gross anatomical passages to subtle physiological pathways and collectively maintain tissue nourishment and systemic equilibrium.

Although Srotas include multiple organ systems and physiological channels, several structural features correspond closely to the modern lymphatic system. Lymphatic vessels originate as blind-ended capillaries within connective tissues, where they absorb interstitial fluid, macromolecules, immune cells, and dietary lipids before returning lymph to the venous circulation. Their thin endothelial walls, discontinuous basement membrane, and overlapping endothelial cells facilitate efficient fluid uptake.

The extensive distribution of lymphatic vessels throughout nearly all tissues mirrors the Ayurvedic description of Srotas as pervasive channels permeating the body. The gradual convergence of lymphatic capillaries into collecting vessels, lymph nodes, trunks, and ducts resembles the branching and interconnected nature of Srotas described in classical literature. Furthermore, the physiological functions of maintaining fluid balance, tissue nutrition, immune surveillance, and waste clearance parallel several Ayurvedic functions attributed to Srotas, particularly the transportation of nutritive substances and elimination of metabolic by-products.

However, Srotas cannot be restricted solely to lymphatic vessels. Ayurvedic texts describe numerous categories of Srotas, including channels related to respiration, digestion, reproduction, excretion, and metabolism. Therefore, the lymphatic system represents only one anatomical expression of the broader Srotas concept. Modern interpretations increasingly regard Srotas as a functional network incorporating vascular, lymphatic, glandular, ductal, and interstitial communication pathways.

Comparative Structural Perspective

When interpreted collectively, Sira, Dhamani, and Srotas constitute an integrated anatomical network responsible for circulation, nourishment, and physiological communication throughout the body. Modern anatomy distinguishes these structures into veins, arteries, lymphatic vessels, capillary networks, and interstitial pathways based on embryological origin, histological organization, and physiological specialization. Ayurveda, in contrast, conceptualizes them as interconnected channels whose structural characteristics are inseparable from their physiological functions.

The correspondence between Sira and veins is primarily supported by similarities in morphology, branching pattern, and the clinical practice of venesection. Dhamani exhibits its closest anatomical parallel with arteries because of its cardiac origin, pulsatility, and systemic distribution. Srotas demonstrate substantial structural resemblance to the lymphatic network through their diffuse distribution and role in fluid transport and tissue homeostasis, although their scope extends beyond the lymphatic system to encompass multiple physiological channel systems.

Thus, rather than establishing rigid one-to-one equivalence, contemporary integrative anatomy supports viewing Sira, Dhamani, and Srotas as traditional anatomical concepts that substantially overlap with the venous, arterial, and lymphatic systems while preserving distinct theoretical frameworks unique to Ayurveda. Such an interpretation respects both classical Ayurvedic principles and current biomedical evidence, providing a scientifically balanced basis for interdisciplinary anatomical research.

Comparative Anatomical Analysis of Sira, Dhamani and Srotas

- The structural characteristics of Sira resemble the venous system because of their extensive distribution, transport function, and clinical association with bleeding. However, some descriptions may also encompass smaller vascular channels that do not fit exclusively within the modern definition of veins.
- Descriptions of pulsation and origin from the heart closely align with major arteries. The branching pattern described in Ayurvedic literature conceptually parallels arterial distribution, although numerical descriptions differ from modern anatomical classification.
- Srotas is a broader physiological concept than blood vessels alone. It may be understood as representing integrated transport pathways that include vascular, lymphatic, interstitial, and cellular exchange systems. This interpretation better reflects current understanding of tissue physiology than restricting Srotas to a single anatomical structure.

V. Clinical Relevance:

- Understanding these concepts may contribute to:
- Improved interpretation of Marma anatomy.
- Better integration of Ayurvedic anatomy with modern medical education.
- Development of interdisciplinary research methodologies.
- Enhanced understanding of vascular disorders from an integrative perspective.
- Application of imaging techniques to investigate anatomical correlations.

VI. Research Gaps

- Current literature reveals several limitations:
- Lack of standardized anatomical interpretation.
- Few cadaveric correlation studies.
- Limited imaging-based investigations.
- Insufficient morphometric evaluation.
- Minimal interdisciplinary collaboration between anatomists, Ayurvedic scholars, and vascular specialists.
- Future studies should combine cadaveric dissection, radiological imaging, histological analysis, and computational anatomical modeling to evaluate these concepts systematically.

VII. Conclusion

Sira, Dhamani, and Srotas represent sophisticated anatomical and physiological concepts that reflect an advanced understanding of bodily transport systems in classical Ayurveda. While certain features demonstrate similarities with arteries, veins, and vascular networks described in modern anatomy, these concepts should not be interpreted as exact structural equivalents. Their broader functional significance provides a valuable framework for integrative anatomical research. High-quality cadaveric, imaging, and histological studies are required to establish evidence-based correlations and strengthen the scientific foundation of Rachana Sharira.

REFERENCES

1. Sushruta Samhita. Murthy KRS, translator. Sushruta Samhita. Vol. I. Varanasi: Chaukhambha Orientalia; 2017.
2. Charaka Samhita. Sharma RK, Dash B, translators. Charaka Samhita. Vol. II. Varanasi: Chaukhambha Sanskrit Series Office; 2015.
3. Ashtanga Hridaya. Murthy KRS, translator. Ashtanga Hridaya. Varanasi: Chaukhambha Krishnadas Academy; 2019.
4. Gray's Anatomy: The Anatomical Basis of Clinical Practice. Standring S, editor. 43rd ed. London: Elsevier; 2025.

5. Clinically Oriented Anatomy. Keith L. Moore, Arthur F. Dalley II, Anne M. R. Agur. Clinically Oriented Anatomy. 9th ed. Philadelphia: Wolters Kluwer; 2023.
6. Netter's Atlas of Human Anatomy. Frank H. Netter. Philadelphia: Elsevier; 2022.
7. Junqueira's Basic Histology. Anthony L. Mescher. New York: McGraw-Hill; 2021.
8. Kumar BMN, Awasthi HH. Anatomical considerations on Sira in Ayurveda with special reference to Sushruta Samhita. International Journal of Ayurvedic Medicine. 2013;4(4).
9. Agawane KS, Metkar K. Conceptual study of Dhamani: A critical review. Journal of Ayurveda and Integrated Medical Sciences. 2020.
10. Jain S, Kumar S, Sharma R. A meticulous study between Sira, Dhamani and Srotas. International Research Journal of Ayurveda & Yoga. 2021.
11. Kag S, Jamra N. Conceptual interpretation of Sira, Dhamani and Srotas as a synonym. Indian Journal of Medical Research and Pharmaceutical Sciences. 2022.
12. Verma R, Sakshi, Manohar J. Anatomical considerations on Sira in Ayurveda with special reference to Sushruta Samhita: A review. International Journal of AYUSH. 2022
Verma R, Sakshi, Manohar J. Anatomical considerations on Sira in Ayurveda with special reference to Sushruta Samhita: A review. International Journal of AYUSH. 2022.

