

Anatomical Correlation of Kandara with the Fibromusculoskeletal Structures of the Human Hand

An Integrative Ayurvedic and Modern Anatomical Perspective

¹Dr. Anil Kumar Varshney, ²Dr. Parul Rani, ³Dr. Shridev Phondani

¹RESEARCH SCHOLAR, ²Associate Professor, ³Professor

¹³DEPARTMENT OF AYURVEDA RACHNA SHARIR

¹³Deshbhagat University Gobindgarh, ²DMAC Bareilly

Abstract—Background: Rachana Sharira (Ayurvedic anatomy), as codified by Acharya Sushruta, describes a class of cord-like fibrous structures termed Kandara — described as a rounded (Vritta) variety of Snayu and classified as an Upadhatu (secondary tissue product) of Rakta Dhatu (the blood tissue). Sixteen Kandara are enumerated across the body, of which four are specifically located in the Hasta (hand and forearm region), two on each side. Modern descriptive and clinical anatomy, by contrast, characterises the hand as a fibro-osseous and musculotendinous unit built around long flexor and extensor tendons, retinacula, pulley systems, and fascial septa.

Objective: This review attempts a structured correlation between the classical concept of Kandara and the fibromusculoskeletal architecture of the human hand as understood in contemporary gross anatomy, with a view to bridging Ayurvedic Sharira Rachana with evidence-based anatomical science.

Methods: Classical Ayurvedic compendia (Sushruta Samhita Sharirasthana, with supporting references from Ashtanga Sangraha, Ashtanga Hridaya, Bhavaprakasha and Sharangdhara Samhita) were reviewed alongside standard anatomical texts and peer-reviewed anatomical literature on the flexor and extensor apparatus of the hand and wrist.

Findings: The functional description of Kandara — cord-like, contractile-relaxable (Aakunchana–Prasarana), continuing distally toward the Nakha (nails), and structurally distinct from the broader, flatter Prithula Snayu and porous Sushira Snayu — corresponds closely with the long flexor and extensor tendons of the digits, their retinacular pulleys, and the fibrous digital sheaths of the modern hand.

Conclusion: Kandara of the Hasta Pradesha may be reasonably correlated with the flexor digitorum superficialis/profundus and extensor digitorum tendon complexes together with their stabilising retinacula, offering a physiologically coherent bridge between classical Ayurvedic terminology and modern hand anatomy, with relevance to the pathophysiology of Vata-predominant disorders such as Vishvachi and Vatakantaka.

Index Terms—Kandara, Snayu, Sharira Rachana, hand tendons, flexor retinaculum, Ayurvedic anatomy, Sushruta Samhita

I. Introduction

Ayurveda regards the accurate knowledge of Sharira Rachana (structural anatomy) as a prerequisite for rational surgical and medical practice. Acharya Sushruta, often regarded as the father of surgery, dedicated the Sharirasthana section of his Samhita to a systematic enumeration of bodily structures — bones (Asthi), joints (Sandhi), ligaments and connective bands (Snayu), muscles (Mamsa Peshi), and a distinct category of tendon-like cords called Kandara.

Kandara occupies a special place in this classification. It is described not merely as a subtype of Snayu but as an Upadhatu of Rakta Dhatu, reflecting the Ayurvedic view that tissue structures arise sequentially from the metabolic transformation (Dhatu Paka) of more fundamental tissues. Functionally, Kandara is credited with two properties central to movement — Aakunchana (contraction/flexion) and Prasarana (relaxation/extension) — a description that anticipates, in classical language, the modern understanding of tendons as passive force-transmitting structures acted upon by muscle contraction to produce joint motion.

The present article undertakes a focused, region-specific correlation: it examines the four Kandara described in the Hasta Pradesha (hand and forearm region) and relates them to the corresponding fibromusculoskeletal elements of the modern hand — principally the extrinsic flexor and extensor tendons, their retinacula, and the fibro-osseous canals through which they travel.

1.1 Need for Integrative Study

A precise structure-to-structure correlation between Ayurvedic terminology and modern anatomical nomenclature serves several purposes: it aids standardisation of anatomical teaching in Ayurvedic curricula, provides an anatomical substrate for understanding Vata-dominant Vyadhis (disorders) of the hand such as Vishvachi (brachial/upper-limb neuralgia) and Vatakantaka, and allows clinicians trained in both systems to communicate findings using a shared structural framework.

II. Aims and Objectives

- To review the classical Ayurvedic description of Kandara, with emphasis on the Hasta-Pradesha (hand) Kandara, as described in the Sushruta Samhita and allied Samhitas.
- To review the modern anatomical description of the tendinous and fibrous structures of the human hand and wrist.
- To establish a comparative, structure-wise correlation between Kandara and the fibromusculoskeletal elements of the hand.
- To discuss the clinical relevance of this correlation for Vata-predominant disorders affecting the hand.

III. Materials and Methods

This is a descriptive, literature-based review. Classical sources consulted include the Sharirasthana of the Sushruta Samhita (with the commentary Nibandhasangraha of Dalhana), relevant portions of Ashtanga Sangraha and Ashtanga Hridaya, Bhavaprakasha, and Sharangdhara Samhita. Contemporary sources include standard gross-anatomy references (regional and applied anatomy of the upper limb) and peer-reviewed anatomical and clinical literature on the flexor and extensor tendon apparatus, retinacula, and fibrous digital sheaths of the hand. Comparative tables were constructed by mapping each classical structural and functional descriptor of Kandara onto its closest modern anatomical counterpart.

IV. Review of Literature

4.1 Kandara in Classical Ayurvedic Texts

Acharya Sushruta, in the Sharira Sankhya Vyakarana Sharira Adhyaya (Sharirasthana, Chapter 5), enumerates sixteen Kandara distributed through the body: four in the Pada (feet, two on each side), four in the Hasta (hands, two on each side), four in the Griva (neck, two on each side), and four in the Prishtha

(back, two on each side). Each Kandara is further described as tapering distally — the terminal continuations of the Hasta and Pada Kandara are said to form the Nakha (nails), while other Kandara are described as binding the neck to the chest, and the pelvis to the back, with their descending tips contributing to the Bimba (gluteal) region.

Classically, Snayu (the broader category to which Kandara belongs) is subdivided into four types on the basis of shape: Pratanavati Snayu (creeper-like, spreading structures, corresponding loosely to fascial expansions), Vritta Snayu — synonymous with Kandara — described as rounded, cord-like structures, Prithula Snayu (broad, flat structures, correlated with aponeuroses and flat ligamentous sheets), and Sushira Snayu (porous, hollow structures found around visceral orifices such as the Amashaya, Pakvashaya, and Basti).

Kandara is further classified as an Upadhatu of Rakta Dhatu — a secondary tissue derived from blood tissue during its metabolic transformation — placing it within the Ayurvedic Dhatu-Upadhatu framework that links tissue formation to nutritional and circulatory physiology.

4.2 Functional Attributes of Kandara

- Aakunchana — the capacity for contraction, permitting flexion at a joint.
- Prasarana — the capacity for relaxation/extension, permitting the joint to return to or move into extension.
- Structural continuity toward the digits, culminating distally in the Nakha (nail bed/matrix region).
- Vulnerability to vitiated Vata Dosha, rendering Kandara a Dushya (pathologically involved tissue) in several Vata Vyadhi.

4.3 Kandara in the Pathogenesis of Disease

Several Vata-predominant conditions described in the Nidanasthana of the Sushruta Samhita implicate Kandara in their Samprapti (pathogenesis). Gridhrasi (a condition with clinical features resembling sciatica) is described as arising along a course extending from the heel to the toes, implicating the Kandara of the lower limb. Vishvachi, a condition affecting the upper limb and often correlated with brachial neuralgia or related upper-limb neuropathic pain, lists Kandara as a Dushya. Vatakantaka, a painful heel/foot condition, is likewise described as affecting Kandara through abnormal bony change. In each of these, vitiated Vata Dosha is understood to lodge in and afflict Kandara, producing Sankocha (contracture/stiffness), Ruk (pain), and impaired Prasarana.

4.4 Modern Anatomy of the Fibromusculoskeletal Structures of the Hand

The extrinsic musculature acting on the hand originates in the forearm and inserts via long tendons that cross the wrist to reach the digits. On the flexor (palmar) aspect, the flexor digitorum superficialis and flexor digitorum profundus contribute four tendons each to the medial four digits, while flexor pollicis longus supplies the thumb; these nine tendons, together with the median nerve, pass beneath the flexor retinaculum through the carpal tunnel. On the extensor (dorsal) aspect, the extensor digitorum, extensor indicis, extensor digiti minimi, and the thumb extensors pass beneath the extensor retinaculum through separate fibro-osseous compartments before fanning out over the dorsum of the hand as the extensor expansion (dorsal digital expansion).

The flexor retinaculum (transverse carpal ligament) is a strong fibrous band attached laterally to the scaphoid tuberosity and trapezial crest, and medially to the pisiform and hook of hamate; it converts the concave anterior surface of the carpal bones into the closed osteofibrous carpal tunnel. The extensor retinaculum performs an analogous stabilising role dorsally, preventing bowstringing of the extensor tendons during wrist extension. Distal to the palm, each flexor tendon runs within a digital fibrous sheath reinforced by annular and cruciate pulleys, which keep the tendon closely applied to the phalanges throughout flexion — functionally converting a straight pull into efficient, curved digital flexion, and terminating near the distal phalanx close to the nail bed.

Functionally, this system operates as a contraction–relaxation couple entirely analogous to the Aakunchana–Prasarana described for Kandara: active muscular contraction transmitted through the flexor tendons produces Aakunchana (flexion) of the digits, while the extensor apparatus, aided by the elastic recoil of the flexor system, produces Prasarana (extension).

V. Comparative Correlation: Kandara and Modern Hand Anatomy

Table 1 summarises the structure-wise correlation between the classical description of Hasta Kandara and its probable modern anatomical counterparts.

Classical (Ayurvedic) Feature	Description in Samhita	Probable Modern Correlate
Kandara (general)	Vritta Snayu; cord-like, rounded structure; Upadhatu of Rakta	Long flexor/extensor tendons of the digits (rounded, cord-like fibrous connective tissue)
Number in Hasta	Four Kandara in the hand region (two on each side)	Paired flexor (FDS/FDP complex) and extensor (ED complex) tendon groups on each hand
Aakunchana (contraction)	Property enabling joint flexion	Action of flexor digitorum superficialis and profundus tendons producing finger flexion
Prasarana (relaxation/extension)	Property enabling joint extension	Action of extensor digitorum tendon and dorsal extensor expansion
Distal continuation to Nakha	Tips of Hasta Kandara said to form/continue into the nails	Terminal insertion of flexor/extensor tendons near the distal phalanx and nail bed (matrix region)
Stabilising band at the wrist	Not separately named but implied in the confluence of Kandara at the wrist/palm	Flexor retinaculum and extensor retinaculum forming the carpal tunnel and dorsal compartments

Classical (Ayurvedic) Feature	Description in Samhita	Probable Modern Correlate
Prithula Snayu (contrast structure)	Broad, flat Snayu, distinct from Kandara	Palmar aponeurosis / broad fascial and aponeurotic sheets of the hand
Vata Vyadhi association	Kandara cited as Dushya in Vishvachi and related Vata disorders of the upper limb	Tendinopathies, tenosynovitis, and nerve-entrapment syndromes (e.g., carpal tunnel syndrome) affecting the tendon–retinaculum complex

VI. Acknowledgment

The correlation proposed above rests on convergent structural and functional criteria rather than on nomenclature alone. Structurally, both Kandara and the long digital tendons are described as rounded, cord-like, fibrous bands distinct from broader aponeurotic sheets (Prithula Snayu / palmar aponeurosis) and from porous visceral supports (Sushira Snayu). Functionally, the Aakunchana–Prasarana couplet maps directly onto the flexion–extension couple produced by the flexor and extensor tendon groups of the digits. Topographically, the Acharya's description of Kandara tapering toward the Nakha corresponds well with the anatomical fact that the flexor digitorum profundus tendon inserts at the base of the distal phalanx, immediately proximal to the nail bed, and that the extensor mechanism likewise terminates near the germinal matrix of the nail.

The classification of Kandara as an Upadhatu of Rakta Dhatu may be interpreted, in modern physiological terms, as an acknowledgement of the vascular dependence of tendon nutrition and healing — tendons, though relatively hypovascular compared with muscle, rely on a paratenon and vincular blood supply derived from surrounding vessels for their metabolic maintenance and repair, a dependence broadly consonant with the Rakta (blood-tissue) linkage proposed in the Samhita.

Clinically, the involvement of Kandara in the Samprapti of Vishvachi offers an anatomical explanation consistent with modern entrapment and overuse tendon pathologies of the upper limb — for example, flexor tendinopathy, tenosynovitis, and median-nerve compression within the carpal tunnel — all of which produce pain, stiffness, and restricted Aakunchana-Prasarana at the wrist and digits, mirroring the classical clinical picture of Vata-vitiated Kandara.

This correlation should be read as an interpretive bridge rather than a precise one-to-one anatomical equivalence. The Samhitas were composed prior to the development of fascicular and histological tendon anatomy, and some overlap likely exists between what is termed Kandara and adjoining structures such as retinacula, digital sheaths, and even collateral ligaments. Future cadaveric and imaging-based studies, following the dissection-based approach explicitly recommended by Sushruta himself, would help refine this correlation further.

VII. Clinical Relevance

- Provides an anatomical rationale for Ayurvedic management (Snehana, Swedana, Basti, and local Vata-pacifying therapies) directed at the hand in Vishvachi and related conditions.
- Offers a shared vocabulary for correlating classical Vata-Kandara Vyadhi with modern tendinopathies, tenosynovitis, and carpal tunnel syndrome.
- Supports integration of Ayurvedic Sharira Rachana teaching with cadaveric and radiological demonstration of hand tendon anatomy in academic curricula.

VIII. Conclusion

Kandara, as described in the Sushruta Samhita, represents a physiologically and structurally coherent classical counterpart to the long flexor and extensor tendons of the human hand, together with their stabilising retinacula. The shared attributes of cord-like structure, contraction-relaxation function, and distal continuity toward the nail unit support a meaningful anatomical correlation between the two systems of description. Such integrative correlation strengthens the scientific foundation of Ayurvedic Sharira Rachana and offers a useful conceptual bridge for the combined clinical understanding of Vata-predominant hand disorders.

References

- [1] Sushruta Samhita, Sharirasthana, Chapter 5 (Sarira Sankhya Vyakarana Shariram) with Nibandhasangraha commentary of Dalhana. Chaukhamba Sanskrit Sansthan, Varanasi.
- [2] Thakur MU, Balutkar PD. A Conceptual Study of Kandara Sharir from Ayurvedic Samhita. AYUSHDHARA. 2023.
- [3] Rachanatamaka Vivechana of Amashayasthit Sushir Snayu — comparative study of Snayu types in Sushruta Samhita. JETIR, 2024.
- [4] A Conceptual Study of Snayu Sharir. International Journal of Creative Research Thoughts (IJCRT).
- [5] Standard textbook of Human Anatomy — Regional and Applied, Upper Limb and Thorax (B.D. Chaurasia), CBS Publishers, New Delhi.
- [6] Anatomy, Shoulder and Upper Limb, Wrist Flexor Retinaculum. StatPearls, National Center for Biotechnology Information.
- [7] Anatomy and function of the carpal tunnel. Kenhub anatomy reference library.
- [8] Cobb TK, et al. Anatomy of the flexor retinaculum. Journal of Hand Surgery (American volume).