

# A Cadaveric and Applied Study of Urdhva Shakhagata Snayu Marma

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**Abstract**—In Ayurveda classics, Marma is illustrated as the vital points in human body and its knowledge plays an important role in Sharir Rachana. The detailed description of Marma Sharir is available in Sushruta Samhita. Acharya Sushruta focused on every aspect of Marma like definition, types, signs and symptoms related to injury of Marma.

According to Acharya Sushruta, in description of Ekadash Indriya, Hasta and Paad are included under the five Karmendriya and their function are mentioned as Aadan and Vihar respectively and also Hasta (hand) is considered as the most important/superior Yantra among all the Yantras by Acharya Sushruta. Although each and every part of human body is important, extremities possess most importance, as all body activities depend on limbs and without limbs existence of human body is hard to imagine. Acharya Sushruta has also mentioned presence of 11 Marma in each of the extremities. Out of which, 5 are Snayu Marma. Marma, the vital spots on the body need to be protected as Prana resides at this spot and any injury to these points will lead to pain and ultimately death. Though the description and the Viddha Lakshana of these Marma found in the Samhita, an attempt is made to identify the anatomical representation of the structures like Mamsa, Sira, Snayu, Asthi, Sandhi etc. found within the periphery of Marma region via cadaveric dissection.

**Index Terms**—Marma, Snayu, Snayu Marma, Viddha Lakshana

## I. INTRODUCTION:

To explore the treasures of the great science of Ayurveda understanding its basic principles is important. Sharir is being one of them.

The total numbers of Marma as described in Samhitas are 107 in number. According to Acharya Sushruta, each of them fall under different headings

based on Shadanga Sharir (region), Rachana (structure), Pramana (Dimension) and Aghataj Parinaam (prognosis).<sup>1</sup>

Acharya Sushruta believes that Marma Sharir covers the half part of Surgery.<sup>2</sup> In present scenario, due to hectic life style; human beings have become more prone to injuries caused by accidents, sports and may be during daily activities. Marma are very important structure present in the body which causes pain; or even death when they get injured so they should be protected from injuries. The Anatomical interpretation of Urdhva Shakhagata Snayu Marma along with its clinical importance is very much needed in present era. An attempt has been made to explore structures present in Urdhva Shakhagata Snayu Marma through cadaveric dissection.

## II. AIMS AND OBJECTIVES

- 1) A conceptual study on Urdhva Shakhagata Snayu Marma.
- 2) To explore the structures, present in Urdhva Shakhagata Snayu Marma through cadaveric dissection.
- 3) To understand the basic applied part of Urdhva Shakhagata Snayu Marma.

## III. MATERIAL AND METHODS

- 1) Review of Ayurveda literature from Ayurveda classics including relevant commentaries.
- 2) Relevant modern literature has been consulted for comparative study and drawing inference and justification.
- 3) Other print media, online information, journals, books, magazines etc.

- 4) Cadaveric Study: Dissection of *Urdhva Shakha* of cadaver had been carried out in the Dept. of *Sharir Rachana*, National institute of Ayurveda, Jaipur and the structures related to *Marma* were identified. All structures were analyzed and compared on the basis of *Ayurveda* literature of *Urdhva Shakhagata Snayu Marma* with special reference to contemporary science.

#### IV. NEED OF STUDY

The perspective of *Marma*, mentioned in *Ayurveda* literature is not yet clear. In ancient classics, *Marma* has been classified as *Mamsa*, *Sira* etc., but no clear analysis regarding its structure is found. In present era of science, there is a need of scientific descriptions of the *Marma* on the basis of evidences. So, it becomes mandatory to prove the existence of *Marma* on scientific and anatomical basis.

##### MARMA PARIBHASHA:

*Acharya Charka* has not defined *Marma*. He explains these points as places where the sense of pain will be felt more intensely when compared to other parts and the reason is attributed to the presence of “*Chetana*”<sup>3</sup>. According to *Acharya Sushruta*, *Marma* (fatal points) is said to be the sites where there is the conglomeration of *Mamsa*, *Sira*, *Snayu*, *Asthi* and *Sandhi* and at these places *Prana* resides specially by nature; hence when fatal spots are injured, they produce their respective effects.<sup>4</sup> *Ashtang Sangraha* followed the *Acharya Sushruta* while *Ashtang Hrudya* mentioned *Dhamani Marma* as *Marma Vastu*.

##### TYPES OF MARMAS: -

Among the classification of *Marma*, *Snayu Marma* classified as 27 in number by *Acharya Sushruta*. Among 27 *Snayu Marma*, five are located in *Urdhva Shakha*, these are - *Kshipra*, *Kurcha*, *Kurchshira*, *Ani* and *Kakshadhara*.<sup>5</sup>

##### SANAYU MARMA OF URDHVA SHAKHA:

- *KSHIPRA MARMA*: *Kshipra* takes its root from the word ‘*kship*’ and has been assigned with the synonyms *Sheeghra* and *Twarita* in *Shabdhalpadruma*.

*Kshipra Marma* is located between the *Angushta* and *Anguli* (index finger) of the hand and injury to this leads to death from convulsion.<sup>6</sup>

- *KURCHA MARMA*: According to *Shabdkosh*, the literal meaning of *Kurcha* is said to be: A bundle, a bunch, brush like, peacock’s feather, having a common base, where these structures are close together and held together and spreading as they move distally.

Above the *Kshipra*, on either side is present *Kurcha Marma*; injury to this will produce reeling/unsteadiness of hand and tremors.<sup>7</sup>

- *KURCHASHIRA MARMA*: *Kurchshira* means the head of *Kurcha* so the position of *Marma* should be near the head of *Kurcha*. The head of *Kurcha* should be the proximal end of *Kurcha* where all structures are held together.

Just below the *Manibandha Sandhi* (wrist joint) is *Kurchshira Marma*, its injury causes pain and swelling.<sup>8</sup>

- *ANI MARMA*: Three *Angula* above on either side of the *Kurpar* are the *Ani*, its injury causes swelling and stiffness of the arm.<sup>9</sup>

- *KAKSHADHARA MARMA*: According to *Amarkosha*, the meaning of *Kaksha* word is *Bahumoola*. It means the arm root and root of the arm (armpit).

In between the *Kaksha* and *Vaksha* (chest) is *Kakshadhara*, its injury also causes distortion of arm.<sup>10</sup>

##### CADAVERIC STUDY:

*KSHIPRA MARMA* IN CADAVERIC DISSECTION: The structure found in the region between the thumb and index finger at  $\frac{1}{2}$  *Angula Pramana* as follows-

- Adductor pollicis muscle of thumb (thenar muscle)
- First dorsal interosseous and first lumbrical muscle
- Princeps pollicis artery and Radialis indicis artery
- Palmar digital branch of median nerve
- Dorsal digital artery and Dorsal metacarpal artery of radial artery

- Dorsal digital nerve of radial nerve

**KURCHA MARMA IN CADAVERIC DISSECTION:**

The structure found in the region just above the *Kshipra Marma* on both side *Chaturangula Pramana* as follows

- Palmar aponeurosis dividing into central, medial and lateral part.
- Tendon of extensor and flexor pollicis longus
- Tendon of flexor digitorum superficialis (sublimus) and profundus
- Tendon of extensor digitorum, and Extensor Indicis
- Carpometacarpal ligaments
- Branches of Median and Radial nerve
- Thenar muscles.



**KURCHA MARMA IN CADAVERIC DISSECTION:**



- 1- Extensor retinaculum
- 2- Extensor digitorum
- 3- Extensor digit minimi
- 4- Extensor pollicis longus
- 5- Extensor pollicis brevis
- 6- Extensor carpi ulnaris

The structure found in below the wrist joint on both side at *Ek Angula Pramana* as follows

- Extensor retinaculum
- Flexor retinaculum (Transverse carpal ligament or anterior annular ligament)
- Branches of Radial and median nerve
- Intercarpal ligaments (Dorsal and palmar ligaments)
- Tendon of flexor digitorum superficialis and profundus
- Tendon of extensor digitorum

**ANI MARMA IN CADAVERIC DISSECTION:**

The structure found in 3 *Angula* above the elbow joint on both side at *Ardhangula Pramana* as follows

- Tendon of biceps brachii muscle and triceps brachii muscle

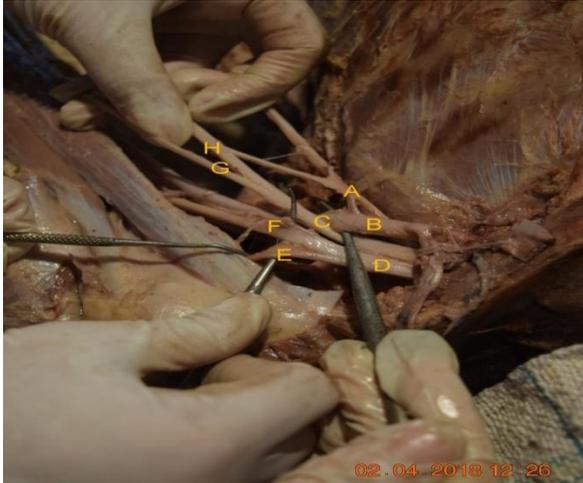


- A-Tendon of biceps brachii
- B-Brachial artery
- C-Median nerve
- D-Tendon of 3<sup>rd</sup> head of biceps brachii

**KAKSHADHARA MARMA IN CADAVERIC DISSECTION:**

The structure found in between *Kaksha* and *Vaksha* on both side at *Ek Angula Pramana* as follows

- Pectoralis major and Pectoralis minor
- Axillary artery and vein
- Cords and branches of brachial plexus



- A- Medial cord
- B- Axillary artery
- C- Lateral cord
- D- Posterior cord of brachial plexus
- E- Axillary nerve
- F- Radial nerve
- G- Musculocutaneous nerve
- H- median nerve

#### V. APPLIED ANATOMY:

##### SNAYU MARMA VIDDHA LAKSHANA

Humping, debility of body parts, inability to perform their actions, sever pain, wound healing after a long time should be understood as caused due to injury to *Snayu Marma*.<sup>11</sup>

According to *Astang Hridya* when *Snayu Marma* are injured, there will be bending of the body, convulsion, very severe pain, inability for riding, sitting etc., distortions or even death.<sup>12</sup>

##### KSHIPRA MARMA

*Kshipra Marma* is classified as *Kalanatara Pranahara Marma* and sometimes may become *Sadhyopranahara*. In case of injury to this *Marma* the death takes place due to convulsions. The convulsions are produced in the conditions like bleeding or in clostridium tetani infection. The immediate death generally happens in severe bleeding. Excessive blood loss may lead to lack of oxygen in the brain, persons may appear rigid or stiff, may jerk violently. But in case of tetanus, it takes place in few days.

##### KURCHASHIRA MARMA

*Kurchashira Marma* is present below the wrist joint on both sides. It is a *Rujakara Marma*. Its injury causes pain and inflammation. *Kurchashira Marma* can be considered as the Intercarpal ligaments, flexor retinaculum, tendons of flexor and extensor digitorum. Any Injury to all structures related to *Kurchashira Marma*, such as Intercarpal ligaments (Scapholunate ligament) may cause inflammation and pain.

##### KURCHA MARMA

*Kurcha Marma* can be considered as Carpometacarpal ligaments, palmar/dorsal metacarpal ligaments, flexor digitorum and extensor digitorum tendons and recurrent branch of median nerve. If *Kurcha Marma* is injured, it causes reeling/unsteadiness and trembling of hand. Any Injury to all structures related to *Kurcha Marma*, such as recurrent branch of median nerve may impair coordination of the hand. This injury destroys the stability of the carpometacarpal joint hence the gripping capacity of hand is lost (ape-like hand)

##### ANI MARMA

Biceps & triceps brachii tendon is interpreted as the site of *Ani Marma*. Rupture of the tendon of these two muscles will disturb the flexion & extension of the elbow respectively and causes inflammation and stiffness of the hand.

##### KAKSHADHARA MARMA

If *Kakshadhara Marma* is injured it causes paralysis. We can compare *Kakshadhara Marma* to cords and branches of Brachial plexus and *Kakshadhara Marma Viddha Lakshana* to brachial plexus injury. Injury to Lateral cord, musculocutaneous nerve, posterior cord, radial nerve axillary nerve and Medial cord may cause paralysis.

#### VI. DISCUSSION

##### DISCUSSION ON PRAMANA SHARIR:

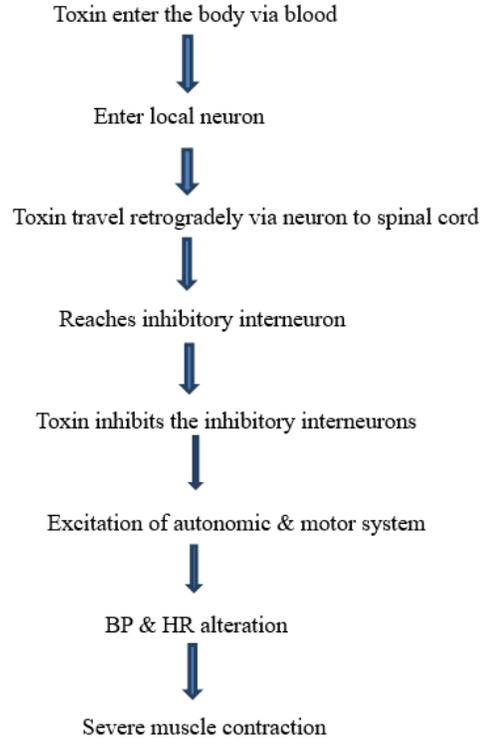
In the present study, the *Pramana* of all the *Marma* is taken as the length, width and depth from a presumed center. Also, the width of the *Madhyama Parva* of the *Madhyama Angula* is taken as *Angula*.<sup>13</sup>

### DISCUSSION ON SNAYU

There are many structures like tendons, ligaments, nerves, muscle fibers etc. which can be related to *Snayu*. ‘Sinew’ meaning “a fibrous tissue which supports and gives strength” has similar meaning to that of *Snayu*. Sinew term is also used for nerve which means a band, bandage, ribbon or bundle. Nerves are like creepers and have branching pattern. While dissection the nerves were seen as whitish in appearance and this resembles to the definition given by *Acharya Dalhana* as *Shanakara*.<sup>14</sup> Since, nerve has not been clearly described in *Ayurveda* text, and cannot be included in any other categories mentioned by *Acharya Sushruta*; it has been included under *Pratanavati Snayu*. Thus, while dissection, all the nerves found in the periphery the *Marma* region are also considered as *Snayu*, for this study.

### DISCUSSION ON KSHIPRA MARMA:

In between thumb & index finger, palmar digital branch of median nerve and dorsal branch of radial nerve are present. The traumatic result of the *Marma* is death due to *Akshepaka* (convulsion). *Akshepaka* is one of the common symptoms of *Vata Vikara* mentioned by *Acharya Sushruta* and *Vagabhata*. When aggravated *Vata* invades all the *Dhamani* (ligament, tendon or nerves in this context) then it gives rise to vigorous movements of the body; since movements of the body (or its parts) occur again and again, the disease is called *Akshepaka*.<sup>15</sup> In this context *Dalhana* has interpreted *Dhamani* as *Naadi* which possibly indicates the involvement of nervous system in *Vata Vyadhi*. The convulsions and spasm caused by an injury due to blood loss has similar signs and symptoms as found in tetanus such as *Aayam* (opisthotonos) which is mentioned in *Snayu Viddha Lakshana* by *Vagabhata*.



### DISCUSSION ON KURCHA MARMA:

On the basis of *Rachana* and *Aghataja Parinaam* The region of the *Kurcha Marma* is above the *Kshipra Marma*. The *Marma* is of *Swapanitala Pramana*. Here, mainly Carpometacarpal ligaments, palmar/dorsal metacarpal ligaments, flexor digitorum and extensor digitorum tendons and recurrent branch of median nerve are found. According to *Aghataja Parinaam* *Kurcha Marma* is *Vaikalyakara Marma*. The word *Vaikalyata* is derived from ‘*Vaikalya*’ which means deprived of some part or abnormality or deformity or disability to do something. Thus, the *vaikalyakara Marma* are those points in the human body, injury to which can result in structure or functional deformity. Due to injury in carpometacarpal ligament and branch of median nerve there is difficulty in gripping, loss of stability, reeling in hand & tremors.

### DISCUSSION ON KURCHASHIRA MARMA:

On the basis of *Rachana* and *Aghataja Parinaam* The situation of *Kurchashira* below the wrist joint may be taken as a point from where the tendons of the muscle particularly digitorum tendons terminate with their respective phalanges after splitting and diversion. *Kurchashira Marma* can be considered as

flexor retinaculum, intercarpal ligaments, flexor and extensor digitorum tendon.

*Kurchashira Marma* is *Rujakara Marma*. *Rujakara Marma Sthal* should be predominant of tendons, ligaments and fibrous band as compared to muscle, vessels and other soft tissue, which have a low threshold. According to interpretation on *Sushruta's* version *Rujakara Sthal* is rich of nociceptor nerve ending which are found abundantly in ligaments, tendons, periosteum and apophyseal joints, therefore sprain is more intensely painful than bony fracture.<sup>16</sup> Any injury to the structures related to the *Kurchashira Marma* due to lunate/perilunate dislocation, injury of scapholunate interosseous ligament may lead to deformities such as the swelling of the wrist and painful movements. These symptoms can be correlated to the injury of *Kurchashira Marma*.

#### DISCUSSION ON ANI MARMA:

On the basis of *Rachana* and *Aghataja Parinaam*:  
The location of *Ani Marma* is three *Angula* above on either side of the *kurpar* as mentioned in Classics. Its *Pramana* is  $\frac{1}{2}$  *Angula*. Here, mainly biceps tendon and triceps tendon are present at this site. Due to predominance of tendon, it is considered as *Snayu Marma*.

According to *Aghataj Parinaam*, *Ani Marma* is *Vaikalyakara Marma*. Any injury such as tearing of biceps tendon and triceps tendon, may lead to inflammation and stiffness of the arm with deformities such as extension and flexion of the elbow and supination of the forearm. All these symptoms or deformity have very much close resemblance with the *Ani Marma Viddha Lakshana*.

#### DISCUSSION ON KAKSHADHARA MARMA:

On the basis of *Rachana* and *Aghataja Parinaam*:  
*Kakshadhara Marma* is situated between *Vaksha* and *Kaksha*. Its *Pramana* is 1 *Angula*. *Kakshadhara Marma* can be correlated with cords and branches of brachial plexus. Due to presence of brachial plexus *Kakshadhara Marma* may be consider as *Snayu Marma*.

According to *Aghataj Parinaam* *Kakshadhara Marma* is *Vaikalyakara Marma*. Any injury to all structures related to *Kakshadhara Marma* such as injury to the cords of the brachial plexus in prolonged hyper abduction of the arm, injury to the radial nerve

i. e. wrist drop, crutch paralysis, axillary nerve injury due to shoulder dislocation, musculocutaneous nerve injury may lead to impairments such as inability to flexion of elbow and depression of the shoulder joint, Nerve injury may also lead to paralysis and wasting of the muscles of the arm.

#### VII. CONCLUSION

##### *KSHIPRA MARMA:*

Any injury over *Kshipra Marma*, results in death due to convulsions, following structures cause these convulsions i.e., palmar digital branch of median nerve, dorsal digital branch of radial nerve.

Hence based on the *Viddha Lakshana*, the above-mentioned structures are included. As in all these structures *Snayu* is predominant; so, *Kshipra Marma* is considered as *Snayu Marma*.

##### *KURCHA MARMA:*

Any injury over this *Marma*, result in *Bhramana* and *Vepana* of the hand, following structures cause these symptoms i.e., Carpo metacarpal ligaments (Anterior and posterior oblique ligaments, collateral ligaments), palmar/dorsal metacarpal ligaments, flexor digitorum and extensor digitorum tendons and recurrent branch of median nerve.

Hence based on the *Viddha Lakshana*, the above-mentioned structures are included. As in all these structures *Snayu* is predominant; so, *Kurcha Marma* is considered as *Snayu Marma*.

##### *KURCHASHIRA MARMA:*

Any injury over this *Marma*, result in *Shopha* (inflammation) and *Ruja* (pain), following structures cause these symptoms i.e flexor retinaculum, extensor retinaculum, intercarpal ligaments, flexor and extensor digitorum tendon.

Hence based on the *Viddha Lakshana*, the above-mentioned structures are included. As in all these structures *Snayu* is predominant; so, *Kurchashira Marma* is considered as *Snayu Marma*.

##### *ANI MARMA:*

Any injury over this *Marma*, result in *Shopha* (inflammation) and *Stabdhatta* (stiffness), following structures cause these symptoms i. e. biceps tendon and triceps tendon.

Hence based on the *Viddha Lakshana*, the above-mentioned structures are included in it. As in all these structures *Snayu* is predominant so *Ani Marma* is considered as *Snayu Marma*.

**KAKSHADHARA MARMA:**

Any injury over this *Marma*, result in paralysis, following structures cause these symptoms i. e. cords and branches of brachial plexus.

Hence based on the *Viddha Lakshana*, the above-mentioned structures are included. As in all these structures *Snayu* is predominant; so, *Kakshadhara Marma* is considered as *Snayu Marma*.

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