

RELATION OF ERB'S PARALYSIS WITH KAKSHADHARA MARMA

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ABSTRACT

Marma is *Shalya-vishayoardh*, which plays an immense role in plan and conductance of surgery. Injury to *Marma* points may lead to different injuries or death. *Kakshadhara Marma* has been correlated to Erb's palsy as the *Viddha Lakshana* of *Marma* is *Pakshaghata* according to *Acharya Sushruta*, and *Kunitwa* according to *Acharya Vagbhatta*. This comes under *Vaikalyakara Marma*, and injury to the *Vaikalyakara Marma* leads to *Vikalta*. Through cadaveric dissection, an observation of structures present and affected during Erb's palsy was done, and through conceptual study regarding the position of the *Kakshadhara Marma* was identified, and through marking of surface anatomy, position of *Kakshadhara Marma* is being explored, along with the symptoms produced due to its *Viddha Lakshana*. According to the fundamental definition of *Marma*, the conglomeration of *Mamsa*, *Sira*, *Snayu*, *Asthi* and *Sandhi* is *Marma* point. Total number of *Marma* points indicated are 107. *Kakshadhara Marma* is situated at *Kaksha* and *Aksha Pradesh*, in the *Sandhi* point of these two, and injury to this *Marma* may result in *Pakshaghata*, which can be co-related to the modern Erb's palsy, known as the paralysis of the arm caused by the injury of the upper trunk of Brachial plexus. Major aim was to study the location of the *Kakshadhara Marma*, its applied aspect, mark the similarity present and correlation in modern and *Ayurveda*.

KEYWORDS: *Marma*, *Kakshadhara Marma*, *Pakshaghata*, Erb's palsy, Brachial plexus.

INTRODUCTION

Marma, a part of *Ayurvedic Sharir Rachana* is of an immense value, plays important role in protection of *Prana* in surgery and traumatic injuries. *Prana* is present all over the body, but still it is embedded in specific location of human composition. *Marma* are designed as the special seat for the *Prana*. As mentioned, *Trimarma* comes under the *Pranaayatana* or the resort of *Prana*. *Marma* is defined as the combination of *Mamsa*, *Sira*, *Snayu*, *Asthi* and *Sandhi*. Description about *Marma* is majorly given in nearly all *Ayurvedic* texts, but is explained in detail by *Acharya Sushruta*. In *Sushruta Samhita*, explained in *Sharira Sthana* under *Pratyekam Marma Nirdesham Shariram*, under *Trimarmiya Chikitsa* of *Charak Chikitsa* by *Acharya Charaka*, under *Marma Vibhaga Adhyay* in *Astang Hridayam* by *Acharya Vagbhatta* and by *Acharya Kashyapa* in *Shariravichaya Shaira Adhyay*. *Acharya Sushruta* has mentioned 107 *Marma* under the group of structural classification as *Mamsa Marma*, *Sira Marma*, *Asthi Marma*, *Snayu* and *Sandhi Marma*. According to the location of *Marma* present in the body, *Acharya* has mentioned *Shakhagata*

Marma, *Koshthagata Marma* and *Urdhva-Jatrugata Marma*. On the basis of injury and effect of injury, *Acharya* mentioned *Sadyah Pranahara Marma* causes sudden death or within 7 days, *Kalantara Pranahara Marma* death occurs after some time due to gradual loss of *Soma*, *Vishalyaghna Marma* death occurs due to extraction of the foreign body, *Vaikalyakara Marma* causes disability as *Soma Guna* is stable, *Rujhakara Marma* pain occur due to presence of *Vaayu* and *Agni*. *Vaikalyakara Marma* leads to *Vikalta*, if get traumatized, as *Kakshadhara Marma* falls under the category, *Viddha Lakshana* to the *Marma* point is *Pakshaghata*. As *Pakshaghata* is a broad classification in *Ayurvedic* and Modern Paralance, pin pointing the Paralysis by exploring the structure present and using *Ayurvedic* literature assets for confirming the position of the *Kakshadhara Marma*.

AIM AND OBJECTIVES

- To find relation between position of *Kakshadhara Marma* and its *Viddha Lakshana* with Erb's paralysis.
- To evaluate, explore the structural anatomy of *Kakshadhara Marma*.
- To collect the textual knowledge about brachial plexus, shoulder joint and Erb's paralysis.

MATERIAL AND METHODS**1. Conceptual study**

Asserting the most appropriate position of *Kakshadhara Marma* on the basis of text collected from different *Ayurvedic* classics, *Ayurvedic* literature, commentaries of modern period.

| | |
|---|--|
| 1. Name of <i>Marma</i> | <i>Kakshadhara Marma</i> |
| 2. Number | 02 |
| 3. Site | Between the <i>Kaksha</i> and <i>Vaksha</i> |
| 4. According to structural dominance | <i>Snayu Marma</i> |
| 5. According to result of injury | <i>Vaikalyakara Marma</i> |
| 6. According to measurement | One <i>Angula Pramana</i> |
| 7. <i>Viddha Lakshana</i> of <i>Marma</i> | <i>Pakshaghata</i> according to <i>Acharya Sushruta</i> <i>Kunitwa</i> according to <i>Acharya Vagbhata</i> . |

As per the description, the exact location of *Kakshadhara Marma* is mentioned in between *Kaksha* (axilla) and *Vaksha Pradesha*(chest), the *Kaksha* region belongs to the axilla tip where the joint which connects the arm to the shoulder is known as *Kaksha Sandhi*. *Vaksha* is the region above the *Hridayam*(heart) and below the *Kantha*(neck). It can be considered as the region on the lateral one-third of clavicle, two fingers beneath nearer to the *Kaksha Sandhi* The word *Dhara* means to hold or bearing, hence *Marma* is named as *Kakshadhara Marma*. The muscle, ligaments, blood vessels, nerves in clavicular region and brachial plexus regions in this *Sthana*, are related to the *Kakshadhara Marma*. Any injury to this particular *Marma Sthana* will lead to *Pakshaghata* or paralysis. As mentioned by *Acharya Sushruta*^[2]:-

कक्षधरे पक्षाघातः ॥ सु. शा ६ /२६

As per the description, *Marma* are the conglomeration of the five elements of body namely; *Mamsa*, *Sira*, *Snayu*, *Asthi*, and *Sandhi*. *Prana* is embedded specifically at *Marma Sthana*.

Brachial plexus^[3]

I. Roots

Roots are formed by anterior primary rami of spinal nerves C5, C6, C7, C8, and T1.

II. Trunk

Roots C5 and C6 join to form Upper trunk or the superior trunk. Root C7 forms the middle trunk. Root C8 and T1 joins to form lower trunk or the inferior trunk. These trunk then traverse laterally after crossing the

2. Cadaveric study

To understand the structural presentation of *Kakshadhara Marma*, cadaveric study on brachial plexus is carried out along with whole of upper limb and thorax, at the P.G. Department of *Rachana Sharir*, *Rishikul* campus, *Haridwar*, by following the procedure from *Cunningham's* manual of practical anatomy.

REVIEW ON KAKSHADHARA MARMA

Position of *Kakshadhara Marma*, according to *Acharya Sushruta*^[1] is:-

“वक्षः कक्षायोः मध्ये कक्षधरम्” ॥ सु. शा ६ /२६

posterior triangle of the neck.

III. Divisions

Each trunk divides into ventral and dorsal division. There are three ventral and three dorsal nerve fibres. These divisions now leave the posterior triangle and now enters the axilla. these division joins to form cord.

IV. Cord

- The lateral cord is formed by the union of ventral division of upper and middle trunk.
- The medial cord is formed by ventral division of the lower trunk.
- The posterior cord is formed by union of the dorsal divisions of all the three trunks.

V. Branches

BRANCHES OF THE CORD.

❖ **Branches of lateral cord**

Lateral pectoral (C5-C7), Musculocutaneous (C5-C7), Lateral root of median(C5-C7).

❖ **Branches of medial cord**

Medial pectoral (C8, T1), Medial cutaneous nerve of arm(C8, T1), Medial cutaneous nerve of forearm (C8,T1), Ulnar (C7, C8, T1), Medial root of median (C8, T1).

❖ **Branches of posterior cord**

Upper subscapular (C5, C6), Nerve to latissimus dorsi (thoracodorsal) (C6, C7,C8), Lower subscapular (C5,C6), Axillary (circumflex) (C5,C6), Radial (C5-C8, T1).

Surface landmarks^[4] of brachial plexus**Structure found at the root of brachial plexus**

| Muscles | Vessels | Nerves |
|---|---|---------------|
| Scalenus anterior, scalenus medius, scalenus posterior, longus colli, longus capitis. | Vertebral artery, internal jugular vein | Phrenic nerve |

Structure found at trunk of brachial plexus

| Muscle ^[5] | Vessels | Nerves | Bone and other structure |
|--|--|------------------------------------|--|
| Scalenus anterior, scalenus medius, inferior belly of omohyoid, subclavius, pectoralis minor, sternocleidomastoid, upper trapezius | Transverse cervical artery, sternocleidomastoid branch of superior thyroid artery, suprascapular artery, thyrocervical trunk, subclavian artery, subclavian vein, anterior jugular vein. | Phrenic nerve, long thoracic nerve | First rib, clavicle, prevertebral fascia, carotid sheath |

Structure found at division of brachial plexus

| Muscle | Vessels | Bone |
|--|--------------------------------|---|
| Anterior scalene muscle, deltoid, trapezius, sternocleidomastoid | Axillary artery, Axillary vein | Clavicle, first rib, part of second rib |

Structure found at cord of brachial plexus

| Muscle | Vessels | Nerves | Bone |
|---|--------------------------------|--|-----------------------------|
| Pectoralis major muscle, pectoralis minor muscle, intercostal muscles | Axillary artery, axillary vein | Long thoracic nerve, thoracodorsal nerve | Coracoid process of scapula |

Structures found at the branches of brachial plexus

| Muscles | Vessels | Nerves | Bone |
|--|-----------------|--|-----------------------|
| Deltoid, coracobrachialis, short head of biceps, long head of biceps, pectoralis major, brachialis, pronator teres, flexor pollicis longus, plexor carpi ulnaris | Brachial artery | Intercostobrachial nerve, Medial pectoral nerve, long thoracic nerve | Humerus, radius, ulna |

As per the description, Marma are formed by conglomeration of the five elements as *Mamsa*, *Sira*, *Snayu*, *Asthi*, and *Sandhi*.

Mamsa:- Scalenus anterior, scalenus medius, inferior belly of omohyoid, subclavius, pectoralis minor, pectoralis minor, sternocleidomastoid, upper trapezius, deltoid, are the muscle observed in this region.

Sira:- Acharya Sushruta explained that *Sira* (vessels) as nurtures of muscles, joint, bones and ligament. Transverse cervical artery, sternocleidomastoid branch of superior thyroid artery, suprascapular artery, axillary artery, axillary vein, thyrocervical trunk, subclavian artery, subclavian vein, anterior jugular vein, superficial cervical artery.

Snayu:- According to modern paralance, ligaments found are known as *Snayu* as they are known as *Anga Bandhanas*. Presence of acromio-clavicular ligament, coraco-arcomial ligament, superior-middle-inferior glenohumeral ligament, capsular ligament, transverse humeral ligament. The fascia covering are deep fascia

covering the deltoid, subscapular fascia, clavipectoral fascia.

Asthi and Sandhi:- One *Asthi* present in *Baahu Pradesh* known as *Pragandaasthi* (humerus), gives attachment to *Amsaphalaka* (scapula) forming the *Kaksha Sandhi* (shoulder joint), and medial side of *Akshak Sandhi* (clavicle) forms *Akshakor Sandhi* (sterno-clavicular joint) and laterally forms acromio-clavicular joint.

Nerves:- Phrenic nerve, long thoracic nerve, thoracodorsal nerve, Medial and lateral pectoral nerve are observed in this area.

ERB'S PARALYSIS^[6]

Site of injury:- one region of the upper trunk of the brachial plexus is called Erb's point. six nerves meet here. Injury to the upper trunk causes Erb's paralysis.

Causes of injury:- undue separation of the head from the shoulder, which commonly encountered in the following-
i. Birth injury; excessive pulling on shoulders during cephalic presentations.

- ii. Fall on the shoulder
- iii. During anaesthesia

Nerve root involved :- mainly C5 and partly C6.

Muscles paralysed:- mainly biceps brachii, deltoid, brachialis and brachioradialis. Partly supraspinatus, infraspinatus and supinator.

Deformity and position of the limb

Arms= hang by the side; it is adducted and medially rotated.

Forearm= extended and pronated.

The deformity is known as policeman's tip hand or waiter's tip hand or porter's tip hand.

Disability= the following movements are lost.

- i. Abduction and lateral rotation of arm at shoulder joint.
- ii. Flexion and supination of the forearm.
- iii. Biceps and supinator jerk are lost.

- iv. Sensation are lost over a small area over the lowest part of deltoid.

Erb's point; form by meeting point of these six nerves

1. C5 root
2. C6 root
3. Suprascapular nerve
4. Nerve to subclavius
5. Anterior division
6. Posterior division

C5 and C6 root joints to form upper trunk, suprascapular nerve originates from upper trunk and provide sensory innervation to glenohumeral and acromioclavicular joint and motor innervation to supraspinatus and infraspinatus muscle, and nerve to subclavius originates from upper trunk, supplies the subclavius muscle. Anterior and posterior division of upper trunk also joins and makes it a erb's point.

Structures involved in *Kakshadhara Marma* and Erb's palsy

| Structures | <i>Kakshadhara Marma</i> | Erb's palsy |
|------------|---|---|
| Muscles | Scalenus anterior, scalenus medius, inferior belly of omohyoid, subclavius, pectoralis minor, pectoralis minor, sternocleidomastoid, upper trapezius, deltoid, | biceps brachii, deltoid, brachialis and brachioradialis. Partly supraspinatus, infraspinatus and supinator. |
| Vessels | Transverse cervical artery, sternocleidomastoid branch of superior thyroid artery, suprascapular artery, axillary artery, axillary vein, thyrocervical trunk, subclavian artery, subclavian vein, anterior jugular vein, superficial cervical artery. | Axillary artery, axillary vein |
| Nerves | Phrenic nerve, long thoracic nerve, thoracodorsal nerve, Medial and lateral pectoral nerve | Brachial plexus upper trunk injury. |
| Symptoms | <i>Vichetanam, Saharstangta, Dehaprasupti, Ayama, Akshepa, Sthambha, tivrarujha, Vaikalyata in Anga, Sthana Asakti</i> | Pain, loss of sensation, muscle weakness, paralysis of some or muscle of arm. |
| Nerve root | | C5 C6 |
| Position | Between <i>Kaksha</i> and <i>Vaksha Pradesh</i> | In the scalene triangle between anterior scalene and middle scalene muscle |

DISCUSSION

हते वैकल्यजनने केवलं वैदयनैपुणात्। शरीरं क्रियया युक्तं विकलत्वमवाप्नुयात् ॥ सु.शा ६/४०

Injury to all these *Marma* does not result in death but always cause a deformity that may persist forever. As *Kakshadhara Marma* falls under the category of *Vaikalyakara Marma*, injury to this *Marma* does not result in death but causes *Pakshaghata* according to *Acharya Sushruta* or *Kunitvam* according to *Acharya Vagbhatta*. The blood vessels related to *Kakshadhara* if get injured causes in severe blood loss and lack of blood supply to muscle of arm. It causes paralysis. Symptoms^[7] of *Pakshaghata* are *Sharirardha Akarmanyata /Cheshta Nirvritti, Paksha Hanan, Ardhakaya Vichetana/Shariraardha Achetana, Anyatara Pakshavimoksha, Rujha, Vakstambh, Shoola*. Erb's palsy structure concerned are upper trunk of brachial plexus,

involving muscles as biceps brachii, deltoid, brachialis and brachioradialis. Partly supraspinatus, infraspinatus and supinator and vessels as Axillary artery, axillary vein and shows symptoms of Pain, loss of sensation, muscle weakness, paralysis of some or muscle of arm. Which shows a relation with the *Kakshadhara Marmabhighata*.

CONCLUSION

From the above classical description and its co-relation with modern anatomical science.can conclude that *Pakshaghata* observed at *Kakshadhara Marma* can be co-related with Erb's palsy. The structures affected in Erb's palsy are upper trunk of brachial plexus (C5-C6), suprascapular nerve, nerve to subclavius and anterior and posterior division of C5-C6. The *Viddhalakshana* documented by *Acharyas* at the *Kakshadhara Marma* shows similarity with the signs and symptoms of Erb's palsy. The affected part is the brachial plexus which situated in between the *Vaksha* and *Kaksha* region. At

this site, *Acharya Sushruta* have stated the site of *Kakshadhara Marma*. Finally, we can conclude that in *Viddhalakshana* of *Kakshadhara Marma* is injury to brachial plexus and in Erb's palsy, there is trauma to upper trunk of brachial plexus.

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