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Anatomical study of Amsaphalaka Marma - A Cadaveric Study

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ABSTRACT

Marma is one of the unique part and concept of *Ayurveda* which has been discussed in all the classical texts and deeply elaborated by *Acharya Sushruta* in 6th chapter of *Sharir Sthana*. *Amsaphalaka Marma* is one out of 107 *Marma*, located on *Pristhavansa Ubhayato* (both side of vertebral column) and is related to *Trika*. According to *Rachna* it is a *Asthi Marma*. It is classified as *Vaikalyakar Marma*. Trauma to *Amsaphalaka Marma* results in *Baahuswapa* and *Sosha*. Here, *Marmabhighata Lakshan* can act as predictors of the structures involved. In this study, scholar was trying to find out exact location of *Amsaphalaka Marma* and its relationship with other anatomical entities (in circumference of this *Marma*) with the help of cadaveric study. As a final result the study concludes that *Amsaphalaka Marma* may be considered as spine of the scapula.

Key words: *Marma, Amsaphalaka, Pristhavansa Ubhayato, Baahuswapa*

INTRODUCTION

Marma Sharir is a science of vital anatomical sites which have been established to help the practice of surgery in *Ayurveda*. *Marma* is explained as the anatomical area where the five - principle anatomical structures *Mamsa, Sira, Snayu, Asthi,* and *Sandhi* are collectively present.^[1] It is a site where pulsation is felt and pain on pressure exists. *Marma* are several vital

points on the body where *Prana* resides and traumatic effect to such points can lead to pain, deformity and even death. they are also said to be constituted by three important vital elements *Vayu, Teja,* and *Soma* they also contain *Triguna* namely *Satva, Raja, Tama* and *Bhutatmas* in the body, mind and soul.^[2] Therefore, *Marmas* produce particular complications or desired healing based on how they are manipulated.

Acharya Sushruta has classified these *Marmas* according to the *Shadanga* distribution for the purpose of easy understanding their locations, like *Sakthi Gata* (limbs), *Vaksha* (thoracic), *Udar* (abdominal), *Prishthagata* (back) and *Urdhavajatrugata* (above the clavicular level). *Prishthagata Marmas* are 14 in number; these are further divided into upper division and lower division by *Acharya Ghanekar Marmas* of upper division are *Brihati, Amsaphalak* and *Amsa* while lower division contains *Katikataruna, Kukundar, Nitamba* and *Parshvasandhi Marmas*. *Marmas* can be categorized in five groups, as well as a sixth one as specified by *Vagbhata*.

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SN	Type of Marma	Sushruta	Vridha Vagbhata	Vagbhata
1.	Mamsa	11	11	10
2.	Sira	41	41	37
3.	Snayu	27	27	23
4.	Asthi	08	08	08
5.	Sandhi	20	20	20
6.	Dhamni	-	-	09
	Total	107	107	107

Depending upon traumatic effects and prognosis various types of Marma mentioned in Ayurveda as^[3] *Sadhyapranahar* (Sudden death), *Kalantarpranhar* (Death within short period), *Vaikalyakar* (Deformity due to trauma), *Vishalyaghna* (Person lives until removal of foreign body), *Rujakar* (continuous pain due to trauma). *Sadhyapranhar Marma* are 19, *Kalantar Pranhar Marma* are 33, *Vishalyaghna Marma* are 3, *Vaikalyakar Marma* are 44 and *Rujakar Marma* are 8 in number.

MATERIALS AND METHODS

The study has been conducted in two parts:

1. Conceptual study - Classical literature, modern literature, books, thesis, journal articles, internet materials were reviewed and related information and references were collected and analysed scientifically to determine the anatomical aspect of Amsaphalaka Marma.
2. Cadaveric study - A thorough dissection of shoulder region was carried out on human embalmed cadavers.

CONCEPTUAL STUDY

SN	Name of Marma	Sushruta	Vridha Vagbhata	Vagbhata
1.	Katiktaran	2	2	2
2.	Nitamb	2	2	2

3.	Amsaphalak	2	2	2
4.	Sankha	2	2	2
	Total	8	8	8

Asthi Marma - Amsaphalaka Marma is a type of Asthi Marma.

Vaikalyakar Marma

Marma which causes deformity on getting injured are *Vaikalyakar Marma*. It is predominantly composed of *Soma Tatva* or *Guna*. Due to the effect of stability or coldness brought by *Soma Guna* the *Jala Dhatu* supports the *Pranas* or vital life forces.^[4] These are 44 in number.^[5]

Marma	Sankhya	Marma	Sankhya
Lohitaksha	4	Krukatika	2
Aani	4	Amsa	2
Urvi	4	Amsaphalaka	2
Kurpar	2	Apang	2
Vitap	2	Nilā	2
Kakshadhara	2	Manya	2
Janu	2	Phana	2
Vidhura	2	Aavart	2
Kurcha	4	-	-

Acharya Sushruta has described Amsaphalaka Marma as a *Vaikalyakar Marma* and a *Asthi Marma*. These are 2 in number.

Amsaphalaka Marma

Etymology

The word *Amsaphalaka* is formed by the union of the two words i.e., *Amsa* and *Phalaka*.

Amsa - अंस् + अच् = अंस

The word *Amsa* is formed from when the *Dhatu Amsa* gets mix with *Pratyaya 'Ach'*. Word *Amsa* means shoulder *Skandha*.

Phalaka - the meaning of word *phalaka* is “*Asthikhandam Iti*”

Location

- पृष्ठोपरि पृष्ठवंशमुभयतस्त्रिकसंबद्धे अंशफलके नाम, तत्र बाहोः स्वापशोषो । सु.शा.6/26
- ग्रीवाया अंशद्वयस्य च ये संयोग सा त्रिक । उल्हण (सु.शा. 6/26)
- बाहुमूलाभिसम्बद्धेपृष्ठवंशस्य पार्श्वयोः ।
- अंसयो पलकें बाहुस्वापशोषौ तयोव्यधात । (अ.ह.शा 4/24-25)
- पृष्ठवंशमुभयता बाहुमूलसम्बद्धे अंशफलके, तयोबाहुमूलसम्बद्धे अंशफलकेतयो बाहुस्वापशोषौ । (अ.स.शा.7/1)

Amsaphalaka Marmas are located one on either side of the upper part of the *Prushta Vamsha* (vertebral column). They are located in the region of *Trika*. *Trika* is a place where 3 parts meet. Categories in which the *Amsaphalaka Marma* is included.

a) *Prushtagata Marma*

b) *Asthi Marma* - *Amsaphalaka Marma* is predominantly made up of *Asthi* i.e., bones, which form the structural component of this *Marma*. The other elements namely *Snayu* (ligaments), *Sira* (blood vessels, veins), *Sandhi* (bony joints) and *Mamsa* (muscles) are also present but in a lesser proportion.

c) *Vaikalyakara Marma* - *Amsaphalaka Marmas* when injured are said to produce deformity of the body or part of the body wherein the *Marma* is damaged

Basis of Classification	Types
Structural (<i>Rachananusara</i>)	<i>Asthi Marma (Sushruta)</i> <i>Asthi Marma (Vagbhata)</i>
Prognostic (<i>Aghata Parinamanusara</i>)	<i>Vaikalyakara Marma</i>
Regional (<i>Shadanganusara</i>)	<i>Prishthagatagata Marma</i>
Dimensional (<i>Parimananusara</i>)	1/2 <i>Angula</i>
Numerical (<i>Sankhyanusara</i>)	2

Based on qualitative attributes (<i>Gunanusara</i>)	<i>Soumya</i>
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Amsa Marma according to authors

Dr. Ghanekar	J. N. Mishra	Dr. D. G. Thatte	Dr. A. K. Pathak	Dr. S. K. Joshi
Part of scapula above the spine of scapula which includes suprascapular nerve and muscle.	suprascapular notch	scapular region and suprascapular nerve are representative of <i>Amsaphalaka Marma</i> .	spine of scapula	spine of scapula

CADAVERIC STUDY

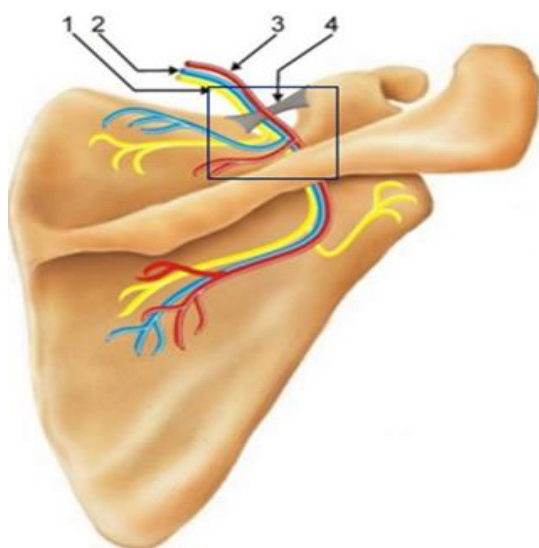
The dissection of back was carried out on human cadaver following the guidelines of Cunningham's practical anatomy, Grant's dissector and other applicable manuals. The cadaveric study was carried out on the 2 cadavers in the department of Rachna Sharir at Pt. Khushi Lal Sharma Government (Autonomous) Ayurveda College & institute, Bhopal.

The cadaver is placed in prone position. The upper limb was Abducted to 45°. Skin incision in the midline from the external occipital protuberance to the tip of the coccyx is made. a transverse skin incision from superior to the scapula and superior to the acromion is made towards the mid line. At the level of the inferior angle of the scapula, a transverse skin incision from the midline to the midaxillary line is being made. the skin is removed from medial to lateral side. The superficial muscles of the back i.e., the trapezius, latissimus dorsi, rhomboid major, rhomboid minor, and levator scapulae were cleaned and reflected. The deltoid muscle was detached from its proximal attachments and reflected laterally. The borders of the supraspinatus muscle was Cleaned and defined. The medial attachment of the supraspinatus muscle is found on the supraspinous fossa of the scapula. The lateral attachment of the supraspinatus muscle is on

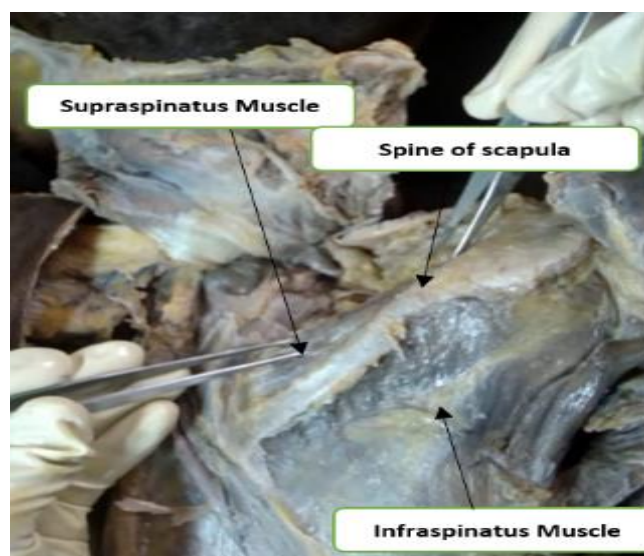
the highest facet of the greater tubercle of the humerus. The supraspinatus muscle initiates abduction of the humerus.

The borders of the infraspinatus muscle were defined using a probe. The medial attachment of the infraspinatus muscle is found on the infraspinous fossa of the scapula. The suprascapular artery and the suprascapular nerve were found deep to the supraspinatus muscle. To see them, the supraspinatus muscle is reflected. Scalpel is used to transect the supraspinatus muscle about 5 cm lateral to the superior angle of the scapula but medial to the suprascapular notch. Blunt dissection is used to loosen, from the supraspinous fossa, the portion of the supraspinatus muscle that is distal to the transection. Reflect it laterally. The suprascapular artery and nerve that lie on the posterior surface of the scapula. The artery and nerve is followed superiorly. The suprascapular artery passes superior to the superior transverse scapular ligament and the suprascapular nerve passes inferior to it. The infraspinatus muscle was transect about 5 cm lateral to the medial border of the scapula. Blunt dissection is used to loosen from the infraspinous fossa—the portion of the infraspinatus muscle that is distal to the transection is Reflected laterally.

The suprascapular artery contributes to the collateral circulation of the scapular region.



1: suprascapular nerve; 2: suprascapular vein; 3: suprascapular artery; 4: superior transverse scapular ligament (STSL).



DISCUSSION

Acharya Sushruta^[6] stated that, the *Marma* situated in upper part of the *Prishtha* (back) on both sides of *Prishthavansha* (vertebral column) and attached or near to *Trika* are known as *Amsaphalaka Marma*. Description of *Amsaphalaka Marma* mentioned in other *Ayurveda* literatures is similar as proclaimed by Acharya Sushruta. Acharya Dalhana has given an entirely different opinion and mentioned that major constituent of *Amshaphalaka Marma* is *Asthi* and *Sira* (*Mansa Snayu Sandhi Hino*).^[7] According to him the word *Trika–Sambadha* can be interpreted as the region between two scapulae near the *Greeva* (neck). *Amsaphalaka Marma* is *Asthi Marma* based on *Rachna* and *Vaikalyakar Marma* on the basis of *Parinama*. This *Marma* is *Ardhangula* in *Parimana*, which are two in

numbers. An injury on the *Amsaphalaka Marma* causes *Baahuswapa* and *Shosha*.

Dr. Ghanekar has stated that, although the whole scapula can be interpreted from *Amsaphalaka Marma*, it would be appropriate to take the upper part of the spine from it. This part has suprascapular nerve and insertion of shoulder muscles, which can lead to *Baahuswapa* and *Bahushosha*. Proff. D. G. Thatte has described that scapular region and suprascapular nerve are representative of *Amsaphalaka Marma*. Which are responsible for atrophy and loss of sensation in the upper extremities. Dr. Ashutosh K. Pathak has also correlated the spine of scapula to this *Marma*. Dr. Ramraksha Pathak and Prof. J N Mishra mentioned that, this *Marma* is formed by scapula, related muscles, and vessels. Dr. Patil estimated the whole scapula under the heading of this *Marma*. He also considers the nerve of bell supplying the serratus anterior as part of this *Marma*.

In modern science, on the back, the following structure found at the site of *Amsaphalaka Marma*– scapula bone, spine of scapula, supraspinous fossa, infraspinous fossa, suprascapular notch, spinoglenoid notch, suprascapular nerve and vessels, supraspinatus muscle, infraspinatus muscle, trapezius muscle, deltoid muscle.^[8-10]

According to *Samhitas* and modern commentators, the location of *Ansaphalak Marma* has been described, on observing that scholar has understood the upper part of the back from *Prishathopari*, vertebral column from *Prishthavasha* and spine of scapula from *Triksambaddhe*. Some modern commentators have considered the whole scapula from *Triksambaddhe*, if *Ansaphalak Marma* is correlated with the scapula as many of the commentators did it, doesn't go accordance with the *Pramana* of *Amsaphalaka Marma* stated in Ayurvedic classics that is *Ardhangula Pramana*. Hence scholar concluded that the site of *Amsaphalaka Marma* can be correlated with the spine of scapula.

As already said, that *Acharya Dalhana* has mentioned *Amsaphalaka Marma* '*Mansa Snayu Sandhi Hino*', unite with *Asthi* and *Sira*. *Acharya* has also counted the

Amsaphalaka Asthi under the *Asthi Sankhya*. According to modern anatomy in this *Marma*, scholar has assumed spine of scapula as an *Asthi* and suprascapular vessels as a *Sira*. Because of the injury over suprascapular vessels causes blood supply of the supraspinatus and infraspinatus muscles is hampered which lead to the wasting of the supraspinatus and infraspinatus causing numbness and wasting of the arm. In cadaveric study these structures are taken into around it. Scholar has concluded that *Asthi* and *Sira* are main component in this *Marma*, which proves the opinion of *Dalhana* ('*Mansa Snayu Sandhi Hino*').

In the *Samhita*, *Amsaphalak Marma* is *Ardhangula* in *Parimana*. On the basis of classical description and practical observation it is revealed that the part of spine of scapula and emerging point of suprascapular nerve and vessels are coming within the circumference of *Ardhangula*. Thus, a dimension of this *Marma* is rationalized. Injury at the site of spine of the scapula will also structures damage around it. Trauma at this site will cause damage to the suprascapular artery which leads to massive haemorrhage and intraluminal thrombosis may occur, and will disrupt blood circulation to the supraspinatus and infraspinatus muscles and cause wasting of muscles, which subsequently causes numbness and wasting of the arm. The winging of scapula which is caused by injury of spinal accessory nerve, severe wasting of trapezius is seen. Which can lead to drooping of the shoulder, weakness, numbness and wasting in the arm.^[11]

Numbness and wasting of the arm are usually caused by damage or compression of the suprascapular nerve leading from spinoglenoid notch. When there is some kind of disruption within the suprascapular nerve, it supplies the muscles (supraspinatus and infraspinatus) lose their innervations and wasting will occur in these muscles. Initially main complaints are pain, weakness in shoulder, numbness in the arm and wasting in the arm.

In modern science, *Bahuswapa* can be understood as numbness and *Bahushosha* by wasting of the arm due to injury of the suprascapular nerve and vessels.

CONCLUSION

Based on the literary, cadaveric studies, and discussion, it has been concluded that the *Amsaphalaka Marma* can be considered as the spine of scapula in modern science. Two *Amsaphalaka Asthi* denote the two scapulae respectively. Based on the cadaveric study, it has been concluded that *Asthi* and *Sira* are main component in this *Marma* which proves the opinion of *Dalhana* ('*Mansa Snayu Sandhi Hino*'). In modern science *Baahuswapa* can be concluded with numbness of the arm and *Bahushosha* with wasting of the arm. *Baahuswapa* and *Bahushosha* can be claimed as *Vikalta* which upholds *Amsaphalaka Marma* as *Vaikalyakar Marma*. Hence scholar concluded that it seems appropriate to place *Amsaphalaka Marma* under *Vaikalyakar Marma*.

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