

## A CRITICAL REVIEW ON UNDERSTANDING THE STRUCTURAL COMPOSITION OF AVARTA MARMA

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### ABSTRACT

*Ayurveda* is a traditional system of medical science and its contribution to the medical science is immeasurable. The concept of *Marma* is one among them. *Acharya Sushruta* has introduced the concept of *Marma* which are vital areas or points where *Prana* resides. *Avarta Marma* is one among 107 *Marma* explained by *Acharya*. This *Marma* is *Sandhi Marma*, *Vaikalyakara*, two *Angula Pramana*, and *Jatroordhwagata Marma*. Any injury to this *Marma* causes *Andhatva* and *Drushti Upaghata*. The exact location of *Avarta Marma* is precise. Therefore, this study is done to look for the location, composition, and how its injury effects cause *Andhatva* and *Drushti Upaghata*.

**KEYWORDS:** *Avarta Marma*, *Vaikalyakara*, Fronto-zygomatico-sphenoid suture, middle meningeal artery, middle cerebral artery.

### INTRODUCTION

Knowledge of *marma* is described as half the knowledge of *Shalyatantra*, since persons injured in these *marma* area die immediately; if anyone survive by the efficiency of the physician, he is sure to suffer from deformities.<sup>[1]</sup> Injury to the *marma*, though slight, will produce severe pain; similarly, the diseases localized in the *marma sthana*; hence they should be treated with great care and effort.<sup>[2]</sup> *Acharya Charaka* has mentioned 107 *marma*, but discussed mainly *Trimarma* namely *Hrudaya*, *Shiras* and *Vasti*.<sup>[3]</sup> *Acharya Sushruta* also described 107 *marma*<sup>[4]</sup> in detail with their *Viddha Lakshana*.

*Avarta Marma* is one among the 37 *marma* present in *Shirogreeva*.<sup>[5]</sup> They are two in number<sup>[6]</sup> and measures *Ardhangula Pramana*.<sup>[7,8]</sup> *Acharya Sushruta* has identified *Sandhi* as the predominant structural component present in *Avarta Marma*.<sup>[9,10]</sup> They are *Vaikalyakara marma*<sup>[11]</sup> having *Soumya Guna Pradhana*, as this *Guna* is *Sthira* and *Sheetala* if injured causes *Pranavalambana*.<sup>[12]</sup>

### Review of Literature Related to *Avarta Marma*

#### Etymological description of the word *Avarta*

- The term *Avarta* is formed from आङ्+वत्+घञ्
- In *Shabdakalpadhruma*<sup>[13]</sup>, it is mentioned as
  - स्त्री – आवर्तनं चक्रकारेण भ्रमणं which means revolving around like that of चक्र.
  - पुं – जलभ्रमणं, which means whirlpool of water.
- In *Apte*<sup>[14]</sup> description for *Avarta* is given as प्रदक्षिणावर्तशिखः which means turning around, winding, revolving. Further there is an explanation as the two depressions of the forehead above the eyebrows.
- According to Monnier-William's dictionary, the word meaning is turning, winding, turning around, revolving.<sup>[15]</sup>

#### Description of *Avarta Marma* in *Samhita*

According to *Acharya Sushruta*, *Avarta Marma* is situated in *Bhruvopari Nimna*<sup>[16]</sup>, injury to this causes *Andhatva* and *Drushti Upghata*.<sup>[17]</sup> For this *Acharya Dalhana* comments as, it is *Sandhi Marma*<sup>[9]</sup>, *Ardhangula Pramana*<sup>[7]</sup> and *Vaikalyakara Marma*.<sup>[11]</sup>

In *Ashtanga Hrudaya*, *Acharya Vagbhata* explains the location of *Avarta Marma* as *Bhruopari nimna*.<sup>[18]</sup> For this *Acharya Arunadatta* comments as, the location of *Avarta Marma* as *Bhru pucchantayorupari*, if injured causes *Andhatva*.<sup>[19]</sup>

In *Ashtanga Sangraha*, *Acharya Vagbhata* mentions the location as *Bhruvopari nimna*. If injury to this causes *Andhya* and *Drushtiupghata*.<sup>[20]</sup>

#### *Panchavidha* classification of *Avarta Marma*

*Shadanganusara* (Region wise) classification - *Jatrurdhwagata Marma* (Head and Neck) precisely it is present in the norma lateralis of skull.

*Parinamanusara* (Effect of injury) classification - *Vaikalyakara*, injury to this *Marma* causes *Andhatva* and *Drushti Upaghata*

*Pramananusara* (Measurement) classification - Two *Angula*

*Sankhyanusara* (Numerical) classification - 2 in number

*Rachananusara* (structural) classification - *Sandhi Marma*

### **Review on Location of Avarta Marma**

*Acharya Sushruta* has mentioned the location of *Avarta Marma* as *Bhruvopari Nimna*<sup>[16]</sup> which means this area is situated just above the *Bhru*(eyebrow). *Acharya Vagbhata* has mentioned *Bhruopari nimna*<sup>[18]</sup> for which *Arunadatta* comments as *Bhru pucchantayorupari* which can be considered as the area above the tail end of eye brow in the norma lateralis of the skull. *Rachananusara* it is *Sandhi Marma*, if injured caused *Andhatva* and *Drushti Upaghata*.

### **Review As Per Recent Authors**

Some of the recent authors have quoted difference of opinion regarding the location of this *Marma* and as per one, it is situated on the depression above the eyebrow<sup>[21]</sup>, as per other it is situated at the point of articulation of sphenoid bone with the orbital plate of frontal bone and only in the frontal bone<sup>[22]</sup>, one of the authors has correlated it with junction of frontal and sphenoidal bone<sup>[23]</sup> and also there is a reference that it is present at point of fronto-zygomatico-sphenoidal suture.<sup>[25]</sup>

### **Review of Related Structures as Per Contemporary Science**

Structures related to the region of *Avarta Marma* are

- Frontal bone
- Sphenoid bone
- Zygomatic bone
- Middle meningeal artery
- Middle cerebral artery

### **Orbital Plate of Frontal Bone<sup>[25]</sup>**

Frontal bone forms the forehead, most of the roof of orbit, and most of the floor of anterior cranial fossa. Its parts are squamous, orbital and nasal bones.

**Orbital Parts:** Orbital plates are separated from each other by a wide gap—the ethmoidal notch. Orbital or inferior surface of the plate is smooth and presents lacrimal fossa, anterolaterally and trochlear spine, anteromedially. Ethmoidal notch is occupied by cribriform plate of ethmoid bone. On each side of notch are small air spaces which articulate with the labyrinth of ethmoid to complete ethmoidal air sinuses. At the margins are anterior and posterior ethmoidal canals.

### **Orbital Plate of Sphenoid Bone<sup>[26]</sup>**

Sphenoid (Greek wedge) bone resembles a bat without stretched wings. It comprises:

- A body in the centre
- Two lesser wings from the anterior part of body.
- Two greater wings from the lateral part of body.
- Two pterygoid (wing-like) processes, directed downwards from the junction of body and greater wings.

**Orbital Surface-** Forms the posterior wall of the lateral wall of orbit. Its medial border bears a small tubercle for attachment of a common tendinous ring for the origin of recti muscles of the eyeball. Below the medial end of superior orbital fissure, the grooved area forms the posterior wall of the pterygopalatine fossa and is pierced by foramen rotundum. Borders are surrounding the greater wing of sphenoid.

### **Orbital Plate of Zygomatic Bone<sup>[132]</sup>**

These are two small quadrilateral bones present in the upper and lateral part of face. The bone forms prominence of the cheeks. Orbital surface is also smooth and concave one or two zygomatico-orbital foramen on this surface and this leads to zygomaticofacial and zygomatico temporal foramina.

### **Middle Meningeal Artery**

It is the branch of first part of maxillary artery which passes upward from the infratemporal fossa, enters skull through the foramen spinosum, accompanied by the meningeal branch of mandibular nerve. In the cranial cavity, it passes forward and laterally in a groove on the squamous part of temporal bone and divides into a frontal and a parietal branch. The frontal or anterior branch crosses the greater wing of the sphenoid and lodges in a groove or bony canal at the sphenoidal angle of parietal bone beneath the pterion and then divides into

branches which spread upwards between the dura mater and inner surface of the skull as far as the vertex.

### Middle Cerebral Artery

The Middle cerebral artery is the larger terminal branch of the Internal carotid artery. It runs first in the lateral cerebral fissure, then posterosuperiorly on the insula. Middle cerebral artery supplies most of the parts of optic pathway of the cerebrum. Optic tracts obtain their blood supply partly from the posterior communicating artery and branches of middle cerebral artery. The blood supply to the optic radiations is predominantly from the posterior and Middle cerebral arteries. The Middle cerebral artery may supply the posterior aspect of the calcarine sulcus with an anastomosis between posterior and middle cerebral arteries accounting for sparing of the macula in cases of posterior cerebral occlusion.<sup>[28]</sup>

## DISCUSSION

### Discussion Based on Location of *Avarta Marma*

As per the available references from the Samhita, the location of *Avarta Marma* is '*Bhruvorupari nimnayoravarta*' or '*Tathopari Bhruvornimnavarta*' or '*Bhruviho Pucchantayorupari Nimnavarta*' that is, it is said to be located in the region just above the tail end of *Bhru*. In Sanskrit, *Bhru* is the term used for eye brow and these are located above the eye, in between the forehead and upper eyelid on the lower margin of brow ridge and the term *Puchcha* is given for tail end of anything. This *Marma* is half *Angula* in dimension. From the description in the Samhita, it can be understood that it is situated posterolateral to the tail end of the eyebrow.

### Discussion Based on Dimension of *Avarta Marma*

The measurement of *Avarta Marma* is mentioned as half *Angula*, the measurement of *Marma* was considered as 1cm circumference and 1cm depth from the skin surface.

### Discussion Based on *Sankhya* of *Avarta Marma*

In classics, *Avarta Marma* are mentioned as 2 in number—दो अवर्तौ and is located in the area posterolateral to the tail end of eyebrow on either side of temporal region.

### Discussion Based on *Avarta Marma* Categorised Under *Sandhi Marma*

As per *Acharya Sushruta*, if *Sandhi Marma* are injured it leads to profuse swelling, severe pain, loss of strength in the joints, splitting pain. Oedema, and functional loss of the joints.

On either side of the median plane with the range of extension of more or less *Ardhangula Pramana* area, the predominant part of *Avarta Marma* can be related with *Asthi sandhi* i.e., Fronto-Zygomatico-Sphenoid Suture.

#### **Discussion Based on *Avarta Marma* Categorised Under *Vaikalyakara Marma***

Any injury to *Avarta Marma* also leads to *Viakalata* causing *Andhatva*(blindness) and *Drushti Upaghata* (visual impairment). As the region of *Avarta Marma* lies at the approximation of three bones – frontal, any injury to *Avarta Marma* also leads to *Viakalata* causing *Andhatva*(blindness) and *Drushti Upaghata* (visual impairment).

As the region of *Avarta Marma* lies at the approximation of three bones – frontal, zygomatic and sphenoid. Injury to this region leads to disturbed sutural joint affecting the soft tissues in the orbital canal and this also affects the arteries related to this region – Middle meningeal artery and middle cerebral artery. This causes *Vikalata* resulting in blindness and visual impairment.

#### **Discussion Based on *Viddha Lakshana* of *Avarta Marma***

In classics *Acharyas* have mentioned *Andhatva* and *Drushti Upaghata* as the *Viddha Lakshana* of *Avarta Marma* keeping certain things in mind such as the war fares, uneven pathways, modalities available for travelling. During these instances, if the region of *Avarta Marma* is greatly injured causes dislocation of bony ends causing injury to the related structures in the optic canal and surrounding vascular structures which leads to blindness and visual impairment.

This area is related with lateral sulcus, the junctional area between frontal and temporal cortical areas of cerebrum. The vascular structure present is Middle cerebral artery that passes in the posterior horizontal ramus of lateral sulcus that supply the area like angular gyrus, supramarginal gyrus and other functional areas. The angular gyrus is the supplementary somatosensory area and damage of which as per review result in word blindness and related visual impairments which can be correlated with *Andhatva* and *Drushti Upaghata*. This revalidates the concept of *Acharya Sushruta* quoting *Avarta Marma* injury causing *Viddha Lakshana* in terms of *Andhatva* and *Drushti Upaghata*.

## CONCLUSION

As per the description in *Samhita*, the location of *Avarta Marma* can be considered as the depressed area above the tail end of the eyebrow in the norma lateralis of the skull. *Avarta Marma* is *Sandhi Marma* which can be related with junctional area between frontal, zygomatic and sphenoid bones. Any injury to this area causes *Andhatva* and *Drushti Upaghata*. In half the *Angula* radiance of this area can be seen frontal, sphenoid, and zygomatic bones in the form of sutures. Vascular structures that can also be seen in this region are the middle meningeal artery and the middle cerebral artery.

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