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# An anatomical study of “Utkshepa Marma” using Cadaveric dissection - Case Report

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## ABSTRACT

“Marma” consists of the aggregation of *Mamsa*, *Sira*, *Snayu*, *Asthi* and *Sandhi* in which particularly *Prana* by nature stay that is why injury to *Marma* leads to respective consequences. *Acharya Shushruta* mentioned “*Vishalyaghna Marma*” one of the variety of *Marma* which comes under the *Parinama Prakarena*. There are total three “*Vishalyaghna Marma*” situated in the human body in *Urdhwajatrugat Pradesh*. “*Utkshepa Marma*” situated above the *Shankh Pradesh* (temple) at the hairy margin. Injury to this by foreign body, keeps the person alive as long as it is kept within the wound until it falls down on its own accord. If it is drawn out by force the person dies at once due to sudden loss of *Vayu*, This is the “*Vishalyaghna*” effect of “*Utkshepa Marma*”. Here study explored the “*Utkshepa Marma*” in term of regional and cadaveric anatomical approach to find the anatomical structures at the site of *Marma* which is responsible for “*Vishalyaghnatva*” condition and reassess the applied anatomy of this *Marma* discussed in classics as well as reviewed in the light of modern medical science with the help of cadaveric dissection.

**Key words:** *Marma*, *Prana*, *Vishalyaghna*, *Urdhwajatrugat*, *Utkshepa*.

## INTRODUCTION

“*Marma*” is one of the important subjects of Ayurveda. The word “*Marma*” and its application exist from the *Vedic* period in India. Different school of thoughts analyzed this subject from different angles and developed their own thoughts.<sup>[1]</sup> *Charaka* is the first documentation which has mentioned *Marma* in *Samhita*.<sup>[2]</sup> There are three main treatises *Charak Samhita*, *Sushruta Samhita* and *Ashtanga Samgraha*, which are mentioned as references for

Ayurveda.<sup>[1]</sup> All the *Acharyas* gives descriptions of 107 *Marma* in the human body.<sup>[1],[2],[3]</sup> According to *Acharya Sushruta*, *Marma* is constituted by confluence of *Mamsa*, *Sira*, *Snayu*, *Asthi* and *Sandhi*, where *Prana* rests.<sup>[3]</sup> Total numbers of *Marmas* are categorized depending upon the *Rachna* (structural involved), *Shadanda* (Regional), *Pramana* (dimension), *Parinama* (prognostic) and *Sankhya* (numerical).

“*Vishalyaghna*” is a variety of *Marma*, which is classified under the *Parinama Prakarena* of *Marma*. Total three “*Vishalyaghna Marma*” present in the human body. “*Utkshepa Marma*” one of the “*Vishalyaghna Marma*” situated above the *Sankh Marma* near the hairy margin of the scalp, on both the side of the head. It is half *Angul* in extent with the “*Vishalyaghna effect*”.<sup>[3],[4]</sup>

Here an attempt to find the actual anatomical structure at the site of “*Utkshepa Marma*” which are responsible for “*Vishalyaghna*” condition with the help of cadaveric dissection.

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## MATERIALS AND METHODS

Literary and conceptual study had been done with the help of *Bruhatrayees*, *Laghutrayees* and other *Ayurveda* books including journals, internet websites, previous work done was correlated, analyzed and interpreted with the knowledge of contemporary science on the subject. Dissection of head on cadaver performed to explore the underlying structure on the sites of "Utkshepa Marma". Observations were correlated in the view of *Ayurveda* description of "Utkshepa Marma" with the help of modern medical science.

The plan of research work was subdivided into two phases

### Literary work

Classical and modern medical science books, thesis, journals including those published on the concept related to subject was reviewed and related information was collected and analyzed scientifically.

### Cadaveric study

Cadaveric dissection was conducted as per "Cunningham's Manual of Practical Anatomy" book and with the help of "Grant's Dissector".

### "UTKSHEPA MARMA" IN AYURVEDA

Above the *Sankha Asthi* (temporal bone) and at the end of the hair "Utkshepa Marma" is situated on each side.<sup>[1-3]</sup> these are two in number.<sup>[3]</sup> "Utkshepa Marma" is predominance of "Vayu Mahabhuta".<sup>[3],[4]</sup>

On the basis of *Rachna*. "Utkshepa Marma" is a "Snayu Marma".<sup>[3]</sup> Measurement of this Marma is "Ardhangul".<sup>[3]</sup> Acharya Dalhana explained about "Utkshepa Marma" that in structurally it is lack of *Mamsa* and *Sandhi*. Rest of three (*Sira*, *Snayu* and *Asthi*) union is an "Utkshepa Marma".<sup>[3],[4]</sup> About "Utkshepa Marma", Acharya Sharangdhar mentioned in *Purva Khanda* of *Sharangdhar Samhita* same as Acharya Sushruta.<sup>[1]</sup>

### UNDERLYING ANATOMICAL STRUCTURES AT THE SITE OF "UTKSHEPA MARMA"

#### Superficial temporal region

It is the area between the superior temporal line and the zygomatic arch. This area contains the following seven layers.<sup>[7],[8]</sup>

1. Skin
2. Superficial fascia
3. Thin extension of epicranial aponeurosis with gives origin to extrinsic muscle of the auricle.
4. Temporal fascia
5. Temporalis muscle
6. Loose areolar tissue.
7. Pericranium.

Above layers covers the pterion point, which is situated in temporal region.

#### Blood supply of scalp and superficial and deep temporal region

In scalp and superficial temporal region there is superficial temporal artery and Posterior auricular artery, which are the branches of the external carotid artery.

In the deep temporal region the blood supply by the maxillary artery and its branch middle meningeal artery and venous drainage by the middle meningeal vein (sinus).<sup>[7],[8]</sup>

#### DISSECTION WORK

The dissections of five cadavers were carried out at P.G. department of Rachna Sharir in Pt. Khushilal Sharma Government (Autonomous) Ayurveda College and Institute, Bhopal as per Cunningham's manual of practical anatomy and Grant's dissector.

The temporal region (*Sankh Pradesh*) is the area between the temporal line and the zygomatic arch. The bony tissue of this region was thin and very delicate. The temporalis muscle, the temporal fascia and a thin extension of the epicranial aponeurosis covered this part. In the temporal region behind the lateral end of the eyebrow and behind 2.5 cm from the frontozygomatic joint and 4 cm above from the midpoint of the zygomatic arch was marked. Here the pterion point situated. A 4-inch long and 1 mm thick nail had been inserted at marked point in the temporal region with the help of the drainer, until the resistance had stopped. Resistance stopped means nail had been pierced the internal table of the skull

bone and reached the level of the middle meningeal vessels.<sup>[9],[10]</sup>

Whole process of dissection, study of superficial and deep structures at the site of "Utkshepa Marma" had been completely done with the help of dissectors.



Photograph showing the duramater.



Photograph showing the temporal fascia and temporalis muscle



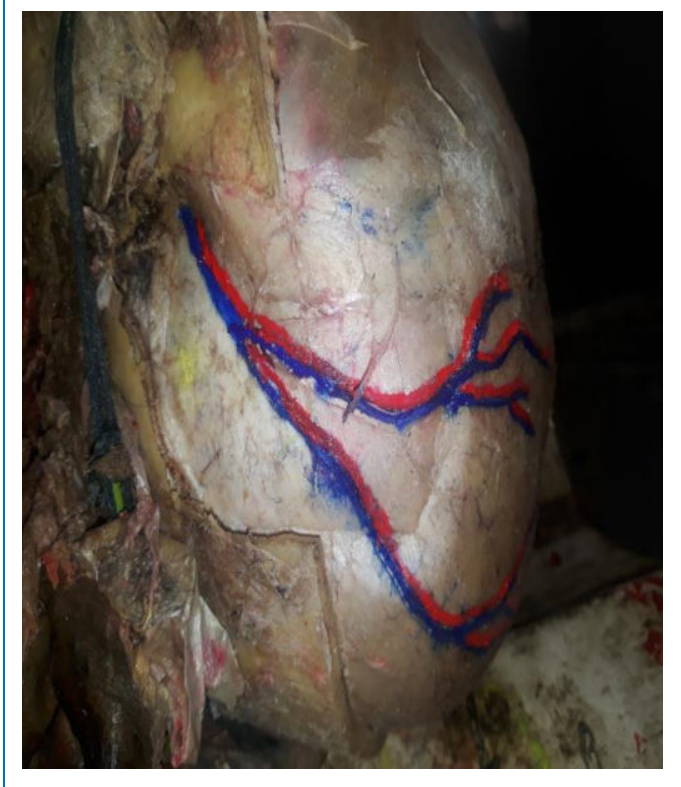
Photograph showing the incision at the site of Utkshepa Marma



Photograph showing the nailing at the site of Utkshepa Marma



Coloured Photograph showing the maxillary artery and superficial temporal artery.



Coloured Photograph showing the middle meningeal vessels at the site of Utkshepa Marma.

**DISCUSSION**

According to Acharya Sushruta, the Marma situated above the Sankh Pradesh (temporal area) at the hair margin (“Shankhyopari Keshante”) are known as “Utkshepa Marma”.<sup>[3]</sup> Description of “Utkshepa Marma” mentioned in other Ayurveda literatures is similar as proclaimed by Acharya Sushruta. One survives if the Shalya remains inside the Marma or it comes out after suppuration but dies if the Shalya is taken out immediately.<sup>[1],[3]</sup> Observation during dissection it is found that the pterion point at the site of “Utkshepa Marma”.

When Shalya (foreign body) injuries the site of “Utkshepa Marma” or if the Shalya penetrates the site of “Utkshepa Marma”, During dissection from superficial to deep level researcher had found many probable anatomical structures which may be damaged. Superficially, these are the scalp, temporal fascia, temporalis muscle, suamous part of the temporal bone and pterion point, superficial temporal artery and vein etc.<sup>[9]</sup>

Within the calvaria at temporal region researcher found following anatomical structures i.e. anterior branch of middle meningeal artery and middle meningeal vein, diploic veins and outer fibrous endosteal and inner meningeal layer of duramater etc.<sup>[9],[10]</sup>

The middle meningeal vein is a sinus which is connected with the other dural venous sinuses and is responsible for the severe epidural haemorrhage.<sup>[8]</sup>

Middle meningeal atery is also responsible for haemorrhagic condition but severity is less than middle meningeal vein.

Acharya Sushruta has considered “Utkshepa Marma” as a Snayu Marma, which seems to be correct due to presence of fibrous endosteal layer of duramater and presence of fibrous temporal fascia. This duramater, due to presence of fibrous layer and fibrous temporal fascia can retain Shalya (foreign body) within it.

The Parimana of “Utkshepa Marma” is Ardhangul which is nearer to 1 cm.<sup>[6]</sup> during dissection researcher had been used nail and vernier caliper for

the measurement the depth of anatomical structures which lies within this range. During observation researcher found that all responsible anatomical structures i.e. middle meningeal vessels, duramater, temporal fascia and other related structures within *Ardhangul Parimana*.

## CONCLUSION

Based on location, "*Utkshepa Marma*" can be compared with the structure "*Pterion*". *Parimana* of "*Utkshepa Marma*" is "*Ardhangul*", which is one cm. approximately; Responsible anatomical structures for "*Vishalyaghna*" like condition lie within this range. As ancient literature opines, that "*Utkshepa Marma*" is "*Snayu Marma*". The fibrous endosteal layer of duramater and temporal fascia resembles with the structures of "*Snayu*". Traumatic injury at the site of "*Utkshepa Marma*", the middle meningeal vein, which histologically is a sinus, more prone to laceration, can cause severe haemorrhage leads to death. Middle meningeal artery and anterior temporal diploic vein also responsible for haemorrhage which leads to death. Due to location of middle meningeal vessels, surgical intervention is difficult.

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