

# Anatomical study of shringataka marma using cadaveric dissection technique

## Research Article

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### Abstract

In *Ayurveda*, the concept of *Marma* describes 107 vital points in the body where *Prana*, or life force, resides. These points are crucial because injury to them can result in sudden pain or even death. Among these, the *Shringataka Marma* is located on the nose and falls under the category of *Urdhwajatrugat Marma* or *Sira Marma*. It measures about 8 cm. ( which is equivalent to four *angula*) and in turn consists of four individual points. Injury to the *Shringataka Marma* is considered potentially fatal. In this study, the *Shringataka Marma* is analysed from the perspective of contemporary anatomy, comparing its location and associated components with insights from both *Ayurvedic* and modern medical literature. The aim is to explore the anatomical structures associated with the *Shringataka Marma* using the cadaveric dissection and also used to assess the relevance of ancient *Ayurvedic* concepts, such as those described by *Sushruta*, in the context of modern medical understanding.

**Keywords:** *Marma*, *Shringataka Marma*, Cadaveric Study, Cavernous Sinus, Intercavernous sinus.

### Introduction

*Ayurveda*, a branch of medical science dedicated to maintaining the balance of body, mind, and soul for optimal health of the individual and it also holds profound influence over human life. The foundational concept of *Marma*, with its 107 vital points strategically located in the body, has been instrumental in advancing *Ayurvedic* understanding. Injury to these critical areas can profoundly diminish overall bodily energy or the vitality of specific organs or systems, thereby leads to potential fatalities.

*Maharshi Sushruta*, a pioneering figure in surgery, detailed a crucial aspect of *Marma* in the *Sharira Sthana* chapter of his *Sushruta Samhita*, titled "*Pratyeka Marma Nirdeshaniya Sharir*". He defined *Marma* as a physical entity whose vitality is intricately linked to the structures present within it. According to *Sushruta*, each *Marma* is a convergence point where muscle tissue (*Mansa*), blood vessels and nerves (*Sira*), ligaments, tendons, and nerve tissue (*Snayu*), bone tissue (*Asthi*), and joints (*Sandhi*) come together. (1)

According to *Acharya Sushruta*, *Marmas* are locations in the body where the three *doshas* (*Vata*, *Pitta*, and *Kapha*) and the three *Mahagunas* (*Satva*, *Raja*, and *Tama*) converge. These *doshas* represent the fundamental energies governing bodily functions, while

the *Mahagunas* are considered supernatural forces influencing the mind and soul.(2)

Anatomically, *Marma* can be categorized into five types based on their structure and location. i.e, (3)

1. *Mansa Marma*,
2. *Sira Marma*,
3. *Snayu Marma*,
4. *Asthi Marma*
5. *Sandhi Marma*

Based on their susceptibility to traumatic impact and the prognosis outlined in *Ayurveda*, *Marma* points are classified into five types. i.e, (4)

1. *Sadhyapranhar Marma*,
2. *Kalantarpranhar Marma*,
3. *Vaikalyakara Marma*,
4. *Vishalyaghna Marma*,
5. *Rujakar Marma*.

### *Shringataka Marma*:

The term "*Shringataka*" translates to "the place where four roads meet." (5)

<b>Location</b>	Intersection of veins between the nose ( <i>ghrana</i> ), ear passages ( <i>shrota</i> ), eyes ( <i>Akshi</i> ), and tongue ( <i>jivha</i> ) (6)
<b>Number</b>	Four (7)
<b>Dimension</b>	four <i>angula</i> (8)
<b>Structural Anatomy</b>	<i>Sira Marma</i> (9)
<b>Prognostic Status</b>	<i>Sadhyapranahar Marma</i> (10)
<b>Injury Results</b>	Serves as an extensive network providing nutrition to the tongue, ears, nose, and eyes. Injury to this vital point can result in instant death (11)

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Located in the nasal region, the *Shringataka Marma* is situated at the intersection of veins between the nose (*ghrana*), ear passages (*shrota*), eyes (*Akshi*), and tongue (*jivha*). This positioning classifies it as a *Sira Marma*. The *Shringataka Marma* plays a vital role in providing nourishment to these anatomical parts.

According to the teachings of the ancient scholars (*acharyas*), *Sadhyapranahar Marma* is a type of vital point in the body that, when injured, leads to immediate death.(12)

It has been noted that the *Shringataka Marma*. From a functional perspective, this *Marma* can be likened to a cavernous sinus. The location of the *Shringataka Marma* can be correlated with the area of the cavernous sinus and intercavernous sinus. Described as a cavernous nutrition network, this *Marma* provides nourishment to the tongue, ears, nose, and eyes. Conceptually, it can be understood as analogous to a cavernous sinus. The cavernous sinus receives venous blood from the brain, meninges, and skull bones, and contains cerebrospinal fluid (CSF). It connects with veins outside the skull via emissary veins. Occasionally, the central vein of the retina and the superior ophthalmic vein drain into the cavernous sinus.

The cavernous sinus drains into the facial vein through the superior ophthalmic veins. The facial vein, which is the largest vein in the face, collects blood from the mouth, nose, and ears. This anatomical arrangement clarifies the concept of "*Santarpan*" (nutrition) for the structures of the ear, nose, and mouth. According to *Ayurvedic* principles, any medication administered through the nasal route reaches the *Shringataka Marma*. From there, it uses the blood vessels (*Siras*) to nourish the structures of the ear, eye, nose, and throat. This process highlights how *Nasya* medication in *Ayurveda* is absorbed and distributed via the *Shringataka Marma*, influencing both local and systemic circulation.

The *Shringataka Marma* located on the brain's surface is associated with nerve centers. From this point, substances used in *Nasya* therapy disperse into various channels (*Strotasas*) comprising vessels and nerves, helping to eliminate imbalanced *Doshas* from the head region. These nerve cells and fibers play essential roles in functions such as speech, hearing, taste, smell, and vision.

According to Dr Avinash Lele, Supraorbital Artery, Frontal diploic vein, Superior Sagittal Sinus, Occipito Frontalis muscle and Ophthalmic nerve are considered as the important structures associated with the *Shringataka Marma*. (13)

According to Dr. Sandip Sahmrao Lanje, following structure can be considered under the area of *Shringataka Marma* which are Cavernous sinus, inter-cavernous sinuses, ophthalmic nerve and supra orbital artery.(14)

According to Dr. A. K. Pathak, the anatomical structures underlying the *Shringataka region* are Cavernous Sinus and Inter-cavernous Sinus.(15)

Modern Perspective(Practical anatomy) of *Shringataka Marma* the structures falling under the area of *Shringataka Marma* are Speech(motor) centres of the brain, Visual centres of the brain(sensory and

psychic), Auditory centres of the brain, Gustatory centres of the brain and Olfactory centres of the brain. (16)

## Materials and Methods

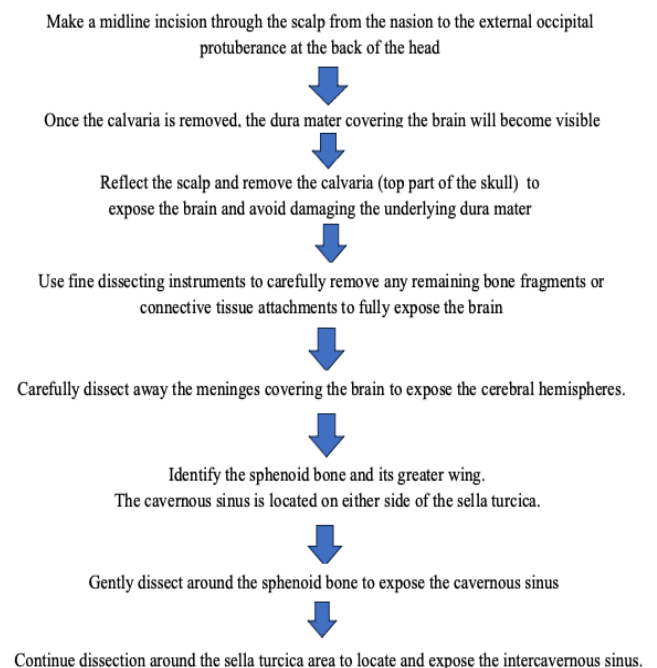
This article will gather information from primary *Ayurvedic* texts known as *Samhitas*, as well as modern anatomy books, national and international journals, and various databases.

### Cadaveric Study

#### Methodology

- The anatomical analysis of the *Shringataka Marma* is done through studying relevant *Ayurvedic* and modern textbooks.
- Dissection of a selected female cadaver was conducted using a dissection kit over the region considered specific to the *Shringataka Marma* at the dissection hall of the Department of Rachana Sharir, Faculty of Ayurveda, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
- The identification of the *Shringataka Marma* on the cadaver was based on findings from the literary study.
- The area around the *Shringataka Marma* point was marked according to proportions specified in the *Samhitas*.
- Detailed dissection focused on specific anatomical landmarks.
- Through precise dissection, structures related to the *Shringataka Marma*, including Cavernous Sinus and Inter-cavernous Sinus and their surrounding related structures like Oculomotor Nerve, Trochlear Nerve, Ophthalmic Nerve, Maxillary Nerve, etc are identified.
- The findings from the dissection were interpreted in relation to *Ayurvedic* principles concerning the composition of the *Shringataka Marma* under the categories of *Mamsa*, *Sira*, *Snayu*, *Asthi*, and *Sandhi*.

### Steps of Dissection (17)

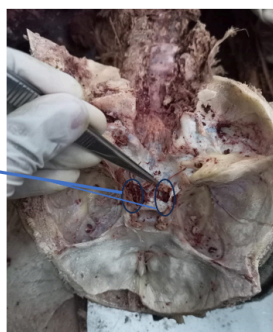


### Dissected Anatomical Structures:

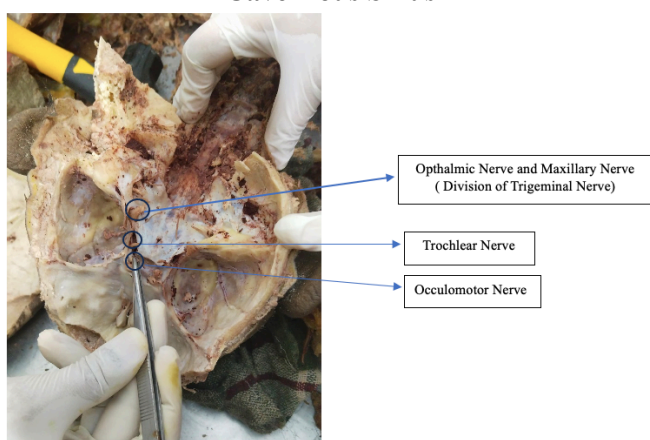
**Fig 1: Cavernous Sinus**



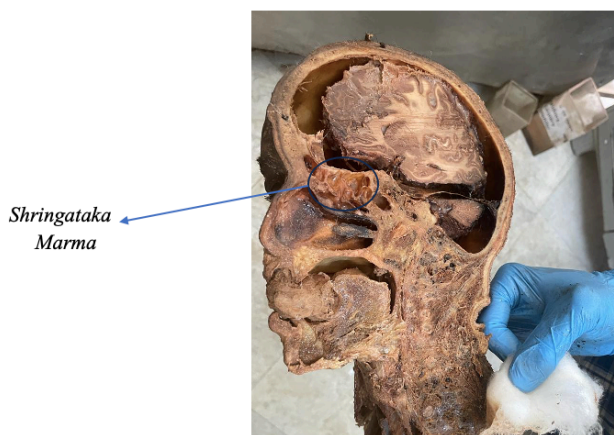
**Fig 2: Right and Left Cavernous Sinus**



**Figure 3: Important Structures related with Cavernous Sinus**



**Figure 4: Shringataka Marma**



### Regional Anatomy of *Shringataka Marma* (18)

The cavernous sinus is located on each side of the sella turcica, above the sphenoid body which houses the sphenoid sinus. It consists of a network of very thin-walled veins extending from the petrous portion of the temporal bone at the apex posteriorly to the anterior superior orbital fissure. Venous blood from various sources such as the sphenoparietal sinus, superficial middle cerebral vein, and superior and inferior ophthalmic veins enters the cavernous sinus. These sinuses communicate with each other through intercavernous sinuses located anterior and posterior to the pituitary gland's stalk, and occasionally through

veins below the pituitary gland. The pterygoid plexuses receive drainage from the posterior and inferior aspects of the cavernous sinuses via the superior and inferior petrosal sinuses as well as emissary veins. Inside each cavernous sinus lie the internal carotid artery and its smaller branches, surrounded by the abducent nerve (CN VI) and sympathetic nerve fibers of the carotid plexus. Embedded in the lateral wall of the sinus are the oculomotor (CN III), trochlear (CN IV), and two divisions of the trigeminal nerve (CN V). The cavernous sinus also serves as a site for heat exchange, cooling arterial blood as it passes through the sinus loaded with cooler venous blood returning from the body's periphery. In animals such as horses and cheetahs, the carotid artery takes a longer, more convoluted path through the cavernous sinuses during sprinting to aid in cooling blood before it enters the brain, although this mechanism is less significant in humans. Gravity and arterial pulsations within the cavernous sinus assist in the drainage of venous blood from the sinus.

### Discussion

Upon anatomical and cadaveric analysis, the sites described by *Acharya Sushruta* converge at the junction of the cavernous and intercavernous sinuses near the base of the brain. *Sushruta* identifies the *Shringataka Marma* as the meeting point of four crucial veins—the nasal, auditory, optic, and lingual—within an area measuring four *angulas*. This precise location aligns with the anatomical convergence of the cavernous and intercavernous sinuses. The cavernous sinus is located on either side of the sella turcica and the intercavernous sinus is a small venous channel that connects the two cavernous sinuses across the midline. Due to its critical nature, this *Marma* is classified as a *Sadyah Pranhara Marma*, where injury can lead to immediate death, particularly if the cavernous sinus is ruptured.

Functionally, the *Shringataka Marma* corresponds closely with the cavernous sinus. It is surrounded by cranial nerves III, IV, and VI, which control eye movements, and cranial nerve V (Trigeminal nerve), responsible for sensory and motor functions of the face. The internal carotid artery passing through this region underscores its anatomical significance beneath the *Shringataka Marma*. The cavernous sinus, formed by the convergence of the superior and inferior ophthalmic sinuses along with the superior pterygoid sinus, has a triangular shape. Blows to the front or back of the head can transmit force to the cavernous sinus, potentially leading to complications such as cerebral hemorrhage or neurogenic consequences, with severe outcomes including death.

### Conclusion

The *Shringataka Marma* is anatomically critical, located where the cavernous sinus and intercavernous sinus converge. Positioned at the junction of the tongue, nose, eyes, and ears on the soft palate, it sits approximately half an inch above the *sthapani* (forehead). This *Marma* regulates *Prana*, *Bodhaka*

*Kapha* (one of the subtypes of Kapha associated with taste), and the sense organ of taste. Described as a vast nutritional network, the *Shringataka Marma* provides nourishment to the tongue, ears, nose, and eyes. Injury to this *Marma* can result in severe hemorrhage and is therefore termed as a *Sadyah Pranahara Marma*, indicating its potential to cause immediate death.

#### Acknowledgement

I wish to extend my heartfelt gratitude to my mentors and Banaras Hindu University, Varanasi, for their invaluable support throughout this endeavour.

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