

## Conceptual study of the *Matrika Marma* w.r.t Carotid sinus and Carotid body

### Review article

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### Abstract

*Sushruta* has explained the *Marma* i.e vital points of the body. On the basis of consequences, there are five types of *Marma* in which one is *Sadyapranahara Marma* that means injury to these *Marma* leads to sudden death. *Matrika Marmas* are eight in number, lie in the neck on either side of *Kanhnadi* which is a *Sadyapranahara Marma*. In the internal carotid arteries, there is carotid sinus which is a major vital point of the body. It regulates the blood pressure of the body. Carotid body is also situated in common carotid artery which regulates the chemical composition of the body. So *Matrika Marma* can be compared with carotid sinus and carotid body i.e baroreceptor and chemoreceptor. This study will be beneficial for surgery and also for medicine.

**Keywords:** *Matrika Marma*, *Marma*, *Sadyapranahara*, Carotid body, Carotid sinus.

### Introduction:

Ayurveda is an eternal science of life. *Sushruta* has explained the *Marma* i.e vital points of the body which have major importance while doing surgery. These *Marma* should be avoided from injury otherwise fatal consequences may occur. *Marma* are said to be cover half of surgery because persons die immediately if injury at *Marma* point. On the basis of consequences, there are five types of *Marma* in which one is *Sadyapranahara Marma* that means injury to these *Marma* leads to sudden death. *Matrika Marma* is one of the *Sadyapranahara Marma*. *Matrika Marma* are eight in number, lie in the neck on either side of *Kanhnadi* (8).

These measure about four *anguli*. Many peers considered *Matrika Marma* as carotid arteries and jugular veins. But only these arteries are not *Marma* points but also the internal structures of these arteries have to be considered. In the internal carotid arteries, there is carotid sinus which is a major vital point of the body. It regulates the blood pressure of the body (14). Any compressive injury to the internal carotid artery leads to stretching of carotid sinus which contains baroreceptors which give impulses to cardiovascular centre in medulla oblongata. Then inhibitory action takes place.

It lowers the blood pressure and the heart rate. Further compression of this site leads to syncope, unconsciousness and sudden death. Carotid body is also situated in common carotid artery which regulates the chemical composition of the body (14). These two structures are important in body. So *Matrika Marma* can be compared with carotid sinus and carotid body i.e baroreceptor and chemoreceptor. This

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study will be beneficial for surgery and also for medicine.

**Aim:**

To compare *Matrika Marma* with carotid sinus and carotid body.

**Objectives:**

1. To decide the site of *Matrika Marma*.
2. To collect the references of *Matrika Marma* from different ayurvedic texts.
3. To collect the references of carotid sinus and carotid body from different modern texts.
4. To come to a conclusion regarding the site of *Matrika Marma*.

**Materials and methods:**

1. Literature regarding *Matrika Marma*.
2. Literature regarding carotid sinus and carotid body.

**Observation:**

1. *Marmas* consist of aggregate of muscle, blood vessel, ligaments, bones and joint in which particularly *pranas* by nature stay; that is why injury to *marmas* lead to respective consequences (1).
2. *Martika Marma*:  
In neck, on both sides are four blood vessels named *Matrika*. These lead to immediate death (2).
3. Type of *Matrika marma* :  
It is a type *Sira marma* and *Sadhyapranhar Marma marma* (3).
4. Location of *Matrika marma*:  
It is *Urdhvajatrugata*, lies above the clavicle (4). The four different *Sira* going to tounge and nose, on both sides of the *Kanthanadi* are called as *Matrika* and cutting of these *sira* leads to sudden death (8).
5. *Angulipramana* or measurement of *Matrika marma* site ( according to Ayurvedic text)

It measures four fingers (5).

6. Composition of all *Marmas*:

All the four types of *Sira* ( blood vessles / viens) are generally situated in *Marmas* and by nourishing bones, ligaments, muscles and joints maintain body (6).

7. Four types of *sira*:

*Vata, Pitta, Kapha, Rakta*(7).

8. Normal functioning of *Marma*:

There are seven hundred *sira* by which the body is nourished like garden by water carriers and like field by imigating channels and also benefited with activities such as contractions and extension (9).

9. Effect of injury to *Marma*:

Injury to neighbouring part by cutting, breaking, trauma, burning and tearing should be known to have features similar to those of *Marma* (10).

10. Carotid sinus: The termination of the common carotid artery or the beginning of internal carotid artery shows a slight dilation known as the carotid sinus. In this region the tunica media is thin but the adventia is relatively thick and receives a rich innervations from the glassopharongal and sympathetic nerves. The carotid sinus acts as baroreceptor or pressure receptor and regulates blood pressure (11).

11. Carotid body: Carotid body is a small, oval reddish-brown structure situated behind the bifurcation of the common carotid artery. It receives a rich nerve supply mainly from glassopharyngeal nerve bur also from the vagus and sympathetic nerves. It acts as a cheoreceptor and responds to changes in the O<sub>2</sub>, CO<sub>2</sub> and pH content of the blood (11).

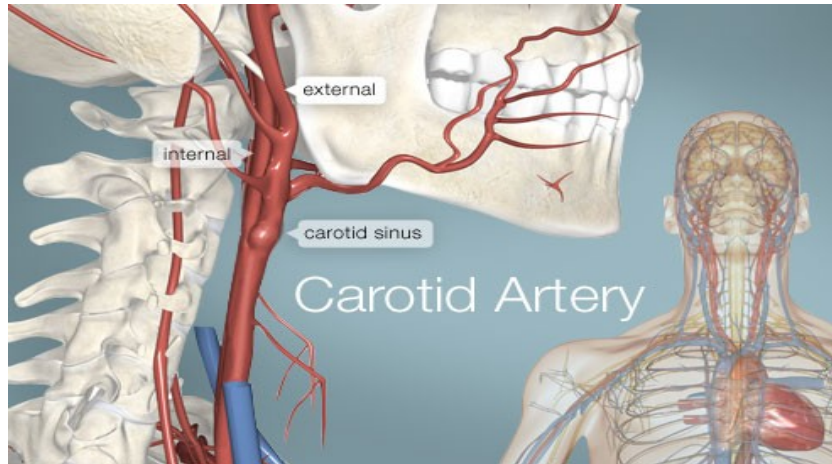


Diagram 1: Showing Carotid sinus

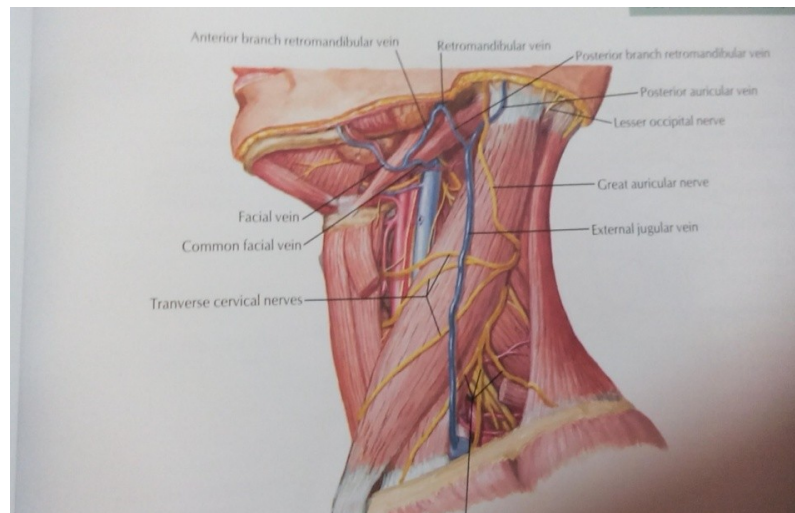


Diagram 2: Carotid triangle of neck

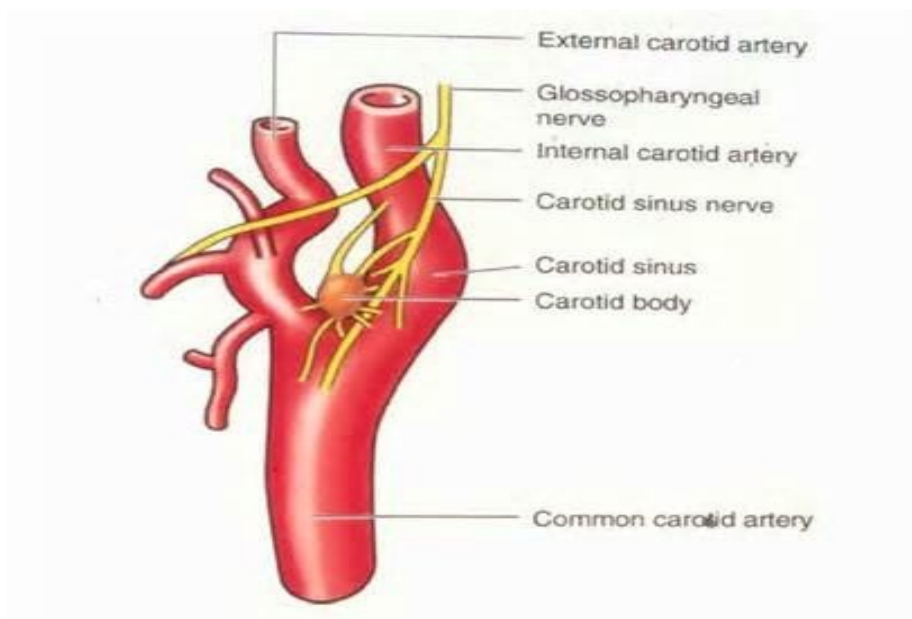


Diagram 3: Carotid Sinus and associated network of sensory fibres of Glossopharyngeal nerve (IX)

**Discussion:**

*Matrika Marma* is located in the neck on both side of *Kanathanadi* (8). These are eight in number i.e four on one side and four on other side. It's measurement is four *Anguli Pramana*.

In neck, major vessels are carotid arteries and jugular vein. These are also eight in number; four on one side and four on other side of the neck. These lie in neck triangle. The major structure which lies in the carotid arteries is carotid sinus and carotid body. Carotid sinus acts as a baroreceptor and carotid body acts as a chemoreceptor. These two have major function in regulation of blood pressure and O<sub>2</sub>, CO<sub>2</sub>, H<sup>+</sup> ion content of blood respectively (14).

Carotid sinus lies at the termination of common carotid artery or the beginning of internal carotid artery which is a slight dilation i.e carotid sinus may be located in either common carotid artery or internal carotid artery. Carotid body is a small reddish-brown structure situated behind the bifurcation of the common carotid artery (12).

Measurement of *Matrika Marma* is four *Anguli Pramana*. Carotid sinus lies at the termination of common carotid or in internal carotid artery and carotid body lies before the bifurcation that means there is a distance between carotid body and carotid sinus which measures within four *Anguli Pramana*. Considering this structure there is an associate structure, internal and external jugular veins which have also a major importance. Hence situational point of view we can consider *Matrika Marma* is nothing but carotid sinus and carotid body which lie in carotid vessels. So Sushruta should have considered the vessel as *Matrika Marma*.

*Matrika Marma* is a *Sadyapranahara Marma* that means any injury to this lead to sudden death. Many ayurved peers consider that injury to *Matrika Marma* leads to bleeding from carotid and jugular vessel which leads to

death but this happen due to bleeding. Any major vessel injury or cut leads to major bleeding. So can any major vessel be considered as a *Marma*? No, Sushruta has given only countable number of *Marma*. So we have to consider other causes of death due to injury to the *Matrika Marma*. Considering this, major structures are carotid sinus i.e baroreceptor and carotid body i.e chemoreceptor responsible for death.

Carotid sinus is responsive to changes in arterial blood pressure leading to reflex haemodynamic of brain which accounts for its role as baroreceptor in control of intracranial pressure (12).

Activation of carotid sinus baroreceptors give rise to impulse carried through the nerve of hearing, a branch of glossopharyngeal nerve to the medulla oblongata. These efferent impulses activate efferent sympathetic nerve fibres to heart and blood vessels, cardiac vagal efferent nerve fibres or both. These responses may cause sinus arrest or AV block (cardioinhibitory response), vasodilatation or both (17).

Blood pressure stretches the wall of the carotid sinus which stimulates the baroreceptors. Nerve impulses propagates from the carotid sinus baroreceptor over sensory axon in the glossopharyngeal nerve (IX) to the cardiovascular centre in medulla oblongata. Then nerve impulse from aortic baroreceptor reaches the cardiovascular centre through sensory fibres of Vagus nerve (X) which is parasympathetic i.e inhibitor. Those impulses lower the heart rate and vasodilatation takes place to lower the blood pressure. If the stretching of wall continues again and again, the heart rate continues to lower again and again. Vasodilatation takes place again that leads to the lowest blood pressure. This continuous lowest blood pressure leads to syncope, unconsciousness and death.

In hanging one cause of death is vagal inhibition from pressure on carotid

sinus. Compression of carotid arteries result in rapid loss of consciousness and death. Carotid arteries are occluded by a tension of 3.5 kg and also another cause is cerebral congestion due to compression of the jugular vein (13).

The carotid sinus is close to the anterior surface of neck. So anything that stretches or pressure on carotid sinus such as hypertension of head, tight collars, carrying heavy shoulder loads may also slow heart rate and may cause syncope (14).

From above discussion, we can say that any compression of carotid arteries is fatal or leads to death within few minutes following the steps syncope, unconsciousness and death. So carotid sinus is a part of *Sadyapranahara Marma* which we can consider as part of *Matrika Marma*.

Carotid body contains chemoreceptors which is responsible for detecting changes in blood chemistry primarily oxygen content and is innervated by branches of glossopharyngeal (IX) and vagus (X) nerve. (15)

In hypoxia, acidosis (H<sup>+</sup> increase) hypercapnia (CO<sub>2</sub> increase) stimulates the chemoreceptors to send impulses to the cardiovascular centre. In response this centre increases sympathetic impulses to vessels which produces vasoconstriction and an increase in blood pressure (16).

Sushruta has told that injury to the neighbouring part by cutting, breaking and trauma, burning and tearing should be known to have features similar to those of *Marma* (18).

Similarly injury to above and below or nearby the carotid sinus and carotid body may fatal or may lead to death by destroying its normal function.

#### **Conclusion:**

Thus from above brief study of the *Marma*, an important point while doing treatment it is evident that our ancient texts do contain valuable information regarding

the emergency medicine like in *Sushrutasamhita* and *Ashtangahridaya*. The study correlates the *Matrika Marma* with the carotid sinus and carotid body by giving various evidences in the ancient and modern texts. *Matrika Marma* is a structure lie in carotid arteries which are carotid sinus and carotid body that is baroreceptor and chemoreceptor respectively and jugular veins.

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