

## A LITERARY STUDY OF APANGA MARMA WITH SPECIAL REFERENCE TO NEUROANATOMY

Mohd Ashraf Khan<sup>1</sup>, H. H. Awasthi<sup>2</sup>

<sup>1</sup>Senior Resident & Ph.D. Scholar, <sup>2</sup>Professor & Former Head

Department of Rachana Sharir, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi, U.P., India

Email: [ashrafk194@gmail.com](mailto:ashrafk194@gmail.com)

### ABSTRACT

*Ayurveda* literally meaning the ‘science of life’ it believes complete normal state of health. *Marma* is one of the important sciences of treatment; described in various ancient text of *Ayurveda*. Ancient text described various types of *Marma* i.e. *Sadhyapranhara*, *Kalantarpranhara*, *Vaikalyakara*, *Vishalyaghna*, *Rujakara*. *Marmas* are the vital points in the body where the *Prana* (life force energy) is concentrated. The *Marma* points are located where the *Mamsa* (muscles), *Sira* (vessels), *Snayu* (tendons, ligaments and nerves), *Asthi* (bone) and *Sandhi* (joints) meet. They may also be described as the junctions where *Tridosha* i.e. *Vata*, *Pitta* and *Kapha* meet; where *Triguna* i.e. *Satva*, *Raja* and *Tama* meet; or where eternity and relativity meet. *Apanga Marma* is the fatal spots two (one on each side) in number situated at the tail end of the eyebrows, below and outside the eyes. Injury to this *Marma* leads to either blindness or partial loss of vision. *Apanga Marma* is the area over the zygomatic and temporal vessels along with the optic, lacrimal, abducent, trochlear and oculomotor nerve. This paper aims to explore a scientific & therapeutic guideline of *Apanga Marma* & to create a better understanding of *Apanga Marma* among students, health care providers & consumers.

**Keywords:** *Marma*, *Dosha*, *Vaikalyakara*, blindness

### INTRODUCTION

*Acharya Sushruta* has clearly stated the four types *Siras* which nourish the body are present in the *Marma*, so when *Marma* are injured depletion of *Dhatus* takes place due to copious loss which in turn aggravate *Vata* and other *Doshas* leading to severe pain, thirst emulation, delirium, unconsciousness, severe perspiration, lethargy and lastly death<sup>1</sup>.

*Soma* (*JalaTatva*) *Maruta* (*Vayu Tatva*) and *Tejas* (*Agni Tatva*) (representing the three *Doshas* in the

body i.e. *Kapha*, *Vata* and *Pitta* respectively) and three *Maha Gunas* (mental forces) i.e. *Satva*, *Raja*, *Tama* and the *Bhutatma* (supreme power or force controlling the body and *Manas* or life principle), all these resides in the fatal spots, hence when fatal spots are injured living being do not survive<sup>2</sup>.

*Apanga Marma* is a *Vaiklyakara Marma*. The injured person suffers deformities only, if the body is protected by the efficiency of physician<sup>3</sup>. *Vaiklyakara Marma*

has *Soma Guna* property, due to its *Soma* property it is *Sthira* (firm) and *Shaitya* (cold) and sustains life<sup>4</sup>.

*Acharya Sushruta* has described the *Klesha* (distress) and *Ruja* (pain) as the injury result near *Vaikalyakara Marma* after a certain period<sup>5</sup>.

According to *Acharya Sushruta*, *Apanga Marma* is situated at the outer side of the orbits, below the lateral end of the eyebrows, just lateral to the orbital cavity and close to the zygomatic process. *Apanga Marma* is described as *Sira Marma* by *Acharya Sushruta*<sup>6</sup> and *Snayu Marma* by *Acharya Vagbhata*<sup>7</sup>.

### Aim and Objective

- Described *Apanga Marma* according to *Brihatrayi*, *Laghutrayi*, *Ayurveda Samhita*, *Granthas*, commentators, book, journal, seminar, workshop etc.
- Listed neuroanatomical structure found in the *Apanga Marma* on the basis of *Samhitas* and commentators.

### Structures related to Apanga Marma are as follows:

- Ophthalmic artery
- Optic nerve
- Ophthalmic nerve
- Trochlear nerve
- Abducent nerve
- Oculomotor nerve

**Ophthalmic artery:** It is a branch of internal carotid artery. It enters the orbital cavity through optic canal where it lies inferolateral to optic nerve.

In the orbit it at first runs lateral to optic and medial to oculomotor and abducent nerves, ciliary ganglion and lateral rectus muscle. Then it crosses optic nerve superficially from lateral to medial side and reaches the medial wall of orbit and passes between superior oblique and medial rectus and reaches the medial end of upper eyelid.

It terminates at the medial end of upper eyelid by dividing into supratrochlear and dorsal nasal branches.

It gives central artery of retina. The blockage of this artery is followed by loss of vision in the corresponding part of the visual field of that eye<sup>8</sup>.

**Optic Nerve:** It is special sensory nerve known as nerve of vision.

**Characteristics** - It has no neuro lemma (Schwann) sheath. So, it cannot regenerate when damaged.

Its fibers origin from ganglionic layer of retina and form stratum opticum and converge in the optic disc and pierce the choroid and sclera of eyeball about 3 mm towards the nasal side from fovea centralis (central depressed area of macula lutea which is an oval yellowish area whose visual sense is perfect and acute and where only cones are present but no rods)<sup>9</sup>.

**Ophthalmic Nerve:** It is a sensory nerve and one of the divisions of trigeminal nerve.

In the anterior part of cavernous sinus, it terminates by dividing into (i) Frontal, (ii) Lacrimal, (iii) Nasociliary.

**Frontal nerve** – It is a sensory nerve and largest branch of ophthalmic nerve.

It enters the orbit through lateral part of superior orbital fissure outside the annulus tendinous communis (ring) lateral to trochlear nerve. In the orbit the nerve passes forward between roof of orbit and levator palpebrae superioris. It terminates in the midway between base and apex of the orbit by dividing into (i) Supratrochlear and (ii) Supraorbital branches.

**Lacrimal nerve** – It is a sensory nerve and smallest branch of ophthalmic nerve.

It passes to orbit through lateral compartment of superior orbital fissure outside annulus tendinous ring and lateral to frontal nerve. In the orbit it passes above lateral rectus accompanied by lacrimal artery and receives a twig from zygomatico-temporal branch which carries post ganglionic secretomotor fibres of lacrimal gland.

**Nasociliary nerve** – It is a sensory nerve and one of the three branches of ophthalmic nerve.

It enters the orbit by passing through the middle compartment of superior orbital fissure within the annulus tendinous communis and then through the two heads of lateral rectus muscle. Within superior orbital fissure it lies between two rami (divisions) of oculomotor nerve and abducent nerve lies inferolateral to inferior ramus.

**Within orbit** - It at first lies lateral to optic nerve and then crosses above it from lateral to medial side and passes below superior rectus and superior oblique

muscle and finally passes towards the medial wall of orbit.

It gives long ciliary branches - two or three in number and arise during crossing of optic nerve and distribute to ciliary body, iris, cornea and usually contains post ganglionic sympathetic fibres for dilator pupillae<sup>10</sup>.

**Trochlear nerve:** It is a motor nerve and the fourth cranial nerve which supplies superior oblique muscle of eyeball.

Nucleus of the trochlear nerve lies in the grey matter of lower part of the floor of cerebral aqueduct at the level of inferior colliculi.

It runs forward in the lateral wall of cavernous sinus below oculomotor nerve and above ophthalmic and maxillary nerve (lying below ophthalmic). Then it crosses the oculomotor nerve laterally and enters the orbit by passing through lateral part of superior orbital fissure outside the annulus tendinous communis. Here the relation being from medial to lateral trochlear, frontal and lacrimal nerve.

In the orbit it passes forward and medially above the levator palpebrae superioris and terminates by supplying orbital surface of superior oblique muscle<sup>11</sup>.

**Abducent nerve:** It is a motor nerve and the sixth cranial nerve which supplies lateral rectus muscle.

**Origin** - The fibers arise from a small nucleus situated in the dorsal aspect of the pons in the floor of fourth ventricle close to the median plane and beneath the facial colliculus.

It enters cavernous sinus where it at first lies laterally and then inferolateral to internal carotid artery. After that it enters orbital cavity through middle part of superior orbital fissure within annulus tendinous communis. Here it lies inferolateral to inferior ramus of oculomotor nerve. It terminates by supplying ocular surface of lateral rectus muscle<sup>12</sup>.

### **Oculomotor nerves**

The oculomotor supplies five of the seven muscles (all except the superior oblique and the lateral rectus) and is composed largely of voluntary motor fibers. It also contains, however, preganglionic autonomic fibers that synapse in a small ganglion, the ciliary ganglion, located within the orbit. Through this ganglion, the oculomotor nerve controls the smooth muscle that is

responsible for constriction of the pupil of the eye and for accommodation of the lens to close vision.

The oculomotor nerve leaves the floor of the midbrain just in front of the pons, through the medial part of the cerebral peduncle. It runs forward through the subarachnoid space and pierces the dura over the cavernous sinus just anterolateral to the posterior clinoid process. It then runs forward in the wall of the sinus and enters the orbit through the superior orbital fissure<sup>13</sup>.

## **DISCUSSION**

The basics science of *Ayurveda* lies in *Panchamahabhutas* and *Tridoshas* i.e. *Vata*, *Pitta* and *Kapha* their principles which influence the body in healthy and unhealthy conditions. *Vata* plays an important role as mentioned by *Acharya Charaka* “*Tantra Yantra Dhara*”. where “*Vata*” can be compared with nervous system (in the living bodies) of the contemporary sciences<sup>14</sup>. *Acharya Sushruta* has described *Apanga Marma* as *Sira Marma* because *Sushruta* has said that the four types of *Sira* lies at the *Marma* site. In the region of *Apanga Marma* the *Vata Vaha Sira* lie which carries impulses as it is related to nervous system. *Acharya Vagbhatta* has said it as a *Snayu Marma* and here *Snayu* relates to nerve.

The entire description of *Sharira Vayu* imparts an impression that we are dealing with an invisible, self-generating, self-propagative energy, which is responsible for all movements (motor activities), knowledge from exterior and interior (sensory activities) and integrative activities (higher cerebral functions).

The *Vata* in terms of modern physiology very closely resembles, to the nerve impulse, which is also an invisible self-originated disturbance and is propagated as metabolic reaction sequence bringing about all activities of central nervous system, namely motor, sensory and integrative activities.

So, *Apanga Marma* is related to nerve not to blood vessels as cranial nerves lie underneath this *Marma* in abundance like optic nerve, oculomotor, trochlear, abducent etc.

As per the view of surface anatomy, *Apanga Marma* is present lateral to the eye just lateral to orbital cavity

and close to the zygomatic process. Injury will lead to blindness or partial loss of vision.

Injury at this *Marma* site will damage the anatomical structure and it will lead to formation of haematoma resulting in refractive error defect and finally may cause blindness, at later stage depending upon the severity of the trauma.

Central artery of retina is the branch of ophthalmic artery. The blockage of this artery is followed by loss of vision in the corresponding part of the visual field of that eye.

Optic nerve has a characteristic that it has no neurolemmal (Schwann) sheath. So, it cannot regenerate when damaged.

If trochlear nerve is injured, downward and lateral movement of eyeball will not be possible while there is no difficulty when the patient looks above the horizontal level. Double vision will occur if he looks downward and the patient has a pathetic look and so this nerve is known as pathetic nerve.

Oculomotor nerve injury will lead to ptosis, lateral strabismus, dilation of pupil, slight prominence of eyeball.

Abducent nerve is liable to be damaged during fracture of skull, when intracranial pressure increases, pons is pushed backwards and downwards, and this nerve may get stretched and may lose its function. The paralysis will lead to convergent squint due to unopposed action of medial rectus and often diplopia with convergent squint will be present<sup>15</sup>.

According to Mishra J.N. traumatic effect should be strictly related to the structural status of the *Marma*. The lacrimal artery is the largest branch of the ophthalmic artery which lies on the lateral wall of the orbit lateral to the rectus lateralis muscle. The injury to the right side of the face at about the lateral canthus may cause pressure or suppuration of the eye within which may produce complete loss of vision within the injured orbit indicating evisceration or enucleation<sup>16</sup>.

## CONCLUSION

*Apanga Marma* is situated at the outer side of the orbits below the lateral end of the *Bhrupuchha* (eyebrows-super ciliary arches), just lateral to the orbital

cavity and close to the zygomatic process. Injury will lead to blindness and partial loss of vision. This description appears to be reliable because at the same anatomical line the optic nerve and associated vascular and nerve structures lie and an injury at this may cause blindness or partial loss of vision. So, it can be concluded that *Apanga Marma* is the area over the zygomatic and temporal vessels along with the optic, lacrimal, abducent, trochlear and oculomotor nerve.

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