An Anatomical Study of Neela and Manya Marma With Special Reference to Lingual and Laryngeal Vessels

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Abstract-

Ayurveda is the science of life. In Ayurveda, *Marma* is one of the important subjects of concern. Neela and Manya Marmas, two important Marmas, are located on both sides of the *Kanthanadi*. Any damage to these specific sites can result in speech impairment and loss of taste. The controversy is itself raised that this *Marma* is *Sira* in nature and its trauma leads to neurological symptoms. Given the scarcity of detailed references in classical Ayurvedic texts and the ambiguity surrounding their anatomical basis, this study has been undertaken to find out the probable structural correlation of Neela and Manya Marma. The approach involves a review of literature, aiming to link the classical symptoms of trauma (Viddha Lakshana) with contemporary anatomical knowledge.

Keywords- *Neela Marma, Manya Marma, Kanthanadi, Lingual vessels, Laryngeal vessels.*

Introduction -

Ayurveda is the science of holistic well-being, emphasizing utmost importance on understanding the human body's structural concepts. In this traditional medical system, the concept of Marma holds great significance. The term 'Marma' and its usage date back to the Vedic period.[(1)] Acharya Charaka was the first to document Marma in the Ayurved Samhitas.[(2)] As a core and unique principle of Ayurveda, Marma continues to maintain its importance even in contemporary times. It requires thorough investigation to validate its scientific basis.[(3)] Marma is a specific point in the body characterized by an unusual pulsation and a sensation of discomfort when pressure is applied. There are two *Neela Marmas* and two *Manya Marmas*, located on both side of the *Kanthanadi.* Any injury over this *Marma Sthana* may lead to *Mookata, Swaravaikrita* and *Arasagrahita.*

The neck serves as a connection between the head and the rest of the body, situated between the mandible and the clavicle, and contains several vital structures.[(4)] In Charak Samhita's Sutra Sthana, *Dash Pranayatan* have been mentioned, which also include '*Kantha*' as one of them showing its importance in human body.

Aim-

To Establish the Anatomical structure of Neela and Manya Marma.

Materials and Method-

Method - Literature Study

The Literary material related to Marma and Sira has been collected from Sharir Sthana of Charak Samhita, Sushruta Samhita, Ashtang Hridaya, Ghanekar teeka. Modern Anatomy books like BD Chaurasia's Human Anatomy, Gray's Anatomy etc, along with few journals and search engines. Critically reviewed and correlated with modern terminology.

Neela and Manya Marma-

The Brihat trayi consists of three principal texts: The Charaka Samhita, the Sushruta Samhita, and the Asthang Hridya. These texts are regarded as the most authentic and standard references within the field of Ayurveda. Charak and Sushrut have contributed their original concepts whereas Vagbhatta has produced his revised version of Charak and Sushrut.[(5)] According to Acharya Sushruta, *Marma* is constituted by the confluence of Mamsa, Sira, Snayu, Asthi, and Sandhi, which is the seat of Prana. Ayurveda identifies a total of 107 Marmas, categorized as 44 in the limbs (Shakhagat), 26 in the trunk (Madhya Sharir), and 37 above clavicle region (Urdhwajatrugat). Neela and Manya Marma are mentioned under Urdhwajatrugat marma specifically in Greeva pradesh. Neela and Manya belong to neck region situated bilaterally on both the sides of the *Kanthanadi*. They have been classified under Sira Marma, Vaikalyakar in Parinam causing phonic dysfunction and loss of taste.[(6)]

There are 44 Vaikalyakara Marma in total. These Marma are primarily composed of the *Soma* guna. Due to their *Somya* nature, which is characterized by the predominance of the *Aap mahabhuta* (water element), they contribute to sustaining life through qualities such as stability (*Sthiratva*) and coolness (*Shaitya*). As a result, injury to these Marma does not lead to death but does result in deformity or functional impairment.

[7]The word'Neela' denotes the color blue, while 'Manya' refers to the posterior region of the neck.[8] The Neela and Manya marma are located beside the Kantha Nadi and are categorized as sira marma. However, Acharya Sushruta described both as dhamani marma. Despite the debate over whether they are sira or dhamani, it is generally accepted that the Neela and Manya marma represent vascular structures.[9]

In Ashtang Hridaya, it has been stated that these Marma are Sira in structure and they are situated in mandibular region *(Hanu Samashritah),* which causes phonic dysfunction and loss of taste. Ashtanga Hridaya has a separate classification of Marma named as Dhamani Marma, but still Neela Manya Marma is categorized under Sira Marma. Also, in *Indu teeka of Ashtanga Sangraha, Neela Manya Marma* are said to be *Sira Marma* not *Dhamani Marma.*[10]

Dr. Ghanekar has commented that all the signs of injury to these Marma are narrated as neurological. They could be produced by damage to the nerves supplying larynx and tongue or the arteries supplying to these structures. The nerves are superior laryngeal, glossopharyngeal and hypoglossal nerve. The involved arteries are the superior thyroid artery and the lingual artery.

Kanthanadi as Larynx-

To identify the possible anatomical counterparts of the Neela and Manya Marma, it is first essential to understand the structure referred to as *Kanthanadi*. Acharya Sushruta mentions the presence of a Mandala Sandhi in the Kantha region, which is further elaborated by Dalhana as comprising three Mandala Sandhi within the *Kanthanadi*.[11] The *Kantha* is recognized as the site of voice production, while 'Nadi' denotes a tubular formation. The *Swarayantra,* involved in generating various sounds, is enveloped by cartilage (*Tarunaasthi*) and connects superiorly with the base of the tongue (*Jihvamoola*) and inferiorly with the windpipe (*Swasa nalika*). In contemporary anatomical terms, this corresponds to the larynx — the primary organ of phonation — situated between the third and sixth cervical vertebrae (C3–C6), encased in cartilage, and is connected to the oropharynx and to the trachea above and below respectively. Therefore, *Kanthanadi* can be equated with the larynx, as it is a hollow, tubular organ located in the throat that plays a primary role in sound production.

Neela Manya as Avedhya Sira-

Acharya Sushrut has mentioned the concept of Avedhya Sira (the vessels which should be avoided or saved while surgery or Vedhan karma) in seventh chapter of Sharira Sthana.

Out of the 98 Avedhya Siras described, 16 are believed to be situated in the neck region.[12] Both Neela and Manya are classified as *Avedhya Sira* of *Greeva pradesh*, meaning vessels that must be avoided during surgical procedures. Injury to these vessels is considered potentially life-threatening or may result in the loss of functional integrity. Also, there are two Rasvahe and two Vaagvahe Sira which are Avedhya Siras of Jihva located at inferior region of tongue.

Nerve involvement-

The vocal folds receive their main nerve supply from branches of the Vagus nerve, specifically the superior laryngeal nerve and the recurrent (inferior) laryngeal nerve. The superior laryngeal nerve branches into the external and internal laryngeal nerves. It provides motor innervation to the cricothyroid muscle and sensory innervation to the mucosa of the larynx. Cricothyroid muscle rotates the major laryngeal cartilages, in turn passively stretches and tightens the vocal folds. The recurrent laryngeal nerve innervates all intrinsic muscles of the larynx, excluding the cricothyroid muscle, and provides sensory input to the larynx below the vocal cords. Taste sensation is mediated by three nerves: the chorda tympani branch of the facial nerve (VII), which innervates the anterior two-thirds of the tongue; the glossopharyngeal nerve (IX), which supplies the posterior third; and the vagus nerve (X), which provides innervation to the epiglottic region. Since, the above discussion shows that nerve innervation of tongue and larynx is not dependent on any single nerve root, and due to multiple nerve innervation any one or two nerve injury cannot lead to complete functional loss of these organs, therefore nerves cannot be considered here as structural entity for Neela & Manya Marma.

Vessels involved –[13]

Oxygenated blood supply to the brain and face is primarily done by the Carotid arteries.[14] The external carotid artery provides blood to the head and neck regions outside the cranium. It enters the parotid gland and divides into two terminal branches, the superficial temporal and maxillary arteries. This artery gives off six branches: the superior thyroid, ascending pharyngeal, lingual, facial, occipital, and posterior auricular arteries.

The lingual artery arises from the external carotid artery, and is located anteromedially between the superior thyroid and facial arteries. It travels toward the tongue, passing over the hypoglossal nerve (CN XII). The lingual artery supplies blood to the tongue and floor of the mouth, with branches including deep lingual, sublingual, and dorsal lingual arteries.[14]

The internal jugular vein runs superficially in the neck and is unprotected by bone or cartilage. It runs below the sternocleidomastoid muscle, and prone to both blunt and penetrating injuries. It is the vein which drains deoxygenated blood from the skull, brain, superficial areas of the face, and the majority of the neck. The internal jugular vein receives blood from several tributaries, including the inferior petrosal

sinus, facial, lingual, pharyngeal, and the superior and middle thyroid veins. The lingual vein is a paired blood vessel that drains deoxygenated blood from the tongue, formed by the union of sublingual, deep lingual, and dorsal lingual veins, and it runs alongside the lingual artery and ultimately drains into the internal jugular vein. The lingual veins are clinically significant due to their ability to rapidly absorbing drugs, because of which nitroglycerin is administered sublingually in angina pectoris.

Lingual vessel damage can manifest as tongue numbness, loss of taste, difficulty in speaking, pain, and in severe cases, bleeding or airway compromise. Damage to laryngeal vessels, or the blood vessels in the larynx (voice box), can cause symptoms like hoarseness, difficulty in swallowing, and pain in the throat or neck, potentially leading to breathing difficulties.

Trauma over neck region could be lethal as per severity and it can also lead to hematoma formation in carotid arteries or its branches further presenting derangement of speech and taste functions along with other symptoms as per severity. On either side of Larynx, the carotid sheath is present which surrounds the Internal jugular vein (IJV), Common carotid artery (CCA), Internal carotid artery (ICA) and Vagus nerve.[17]

External Carotid Artery (ECA) and Internal Jugular Vein (IJV) supplies and drains the blood from particular structures concerned with speech and taste. If any disarray occurs in vascular supply, it affects those particular structures and cannot perform their proper function.

Discussion-

In the view of above literature, we can say that the particular structures concerned with phonation and gustation are supplied by External Carotid Artery and drained by Internal Jugular Vein. Any disruption in the vascular supply affects those particular structures and cannot perform their proper function, because nerve damage leads to complete loss of function of these organs & *Vaikalyakar Parinaam Marma* is said to have Vikalta i.e. proper functional loss, therefore vessels are the relevant structures for this Marma.

There are two concepts regarding the term Neela Manya, one is described under Marma in chapter 6 of Sushrut Samhita's Sharir Sthana and other is described under Avedhya Sira in chapter 7 of the same.

In *Marma prakrana*, *Neela Manya* are *Urdhwajatrugat marma* having *Vaikalyakar Parinaam*. When we talk about Neela Manya as Marma Sthana then the consideration should be according to the site which leads to vikalta after trauma.

According to modern science, there are several branches and tributaries of ECA and IJV, which supply and drain blood from the pharynx, tongue, ear, larynx, etc. Here, the Vaikalyakar Parinaam of Neela Manya Marma damage is related to the tongue and larynx only. If the whole ECA and IJV is considered as the structural entity for this marma, then there should be affected functions of all the organs that are supplied by ECA and IJV. Since, no symptoms of other supplied organs are mentioned in Marmabhighat Lakshan of Neela Manya Marma, therefore, we can say that the Lingual and Laryngeal branches of ECA and IJV, which are responsible for Phonation and Gustation, show the Parinaam of Neela Manya Marma that is mookata, swaravaikrita, arasagrahita. If obstruction of these blood vessels occurs by trauma, leads to poor blood supply to the organ, further causing atrophy and diminished function, leading to vikalta (i.e., mookata, swaravaikrita, arasagrahita). It is also seen by the presence of 4 Avedhya siras below the tongue as 2 Rasvahe and 2 Vaagvahe, which corresponds to the lingual and laryngeal branches of ECA and IJV.

In Marma Prakaran, Neela Manya Marma is said to be present on both sides of Kanthanadi – "*KanthaNadi Ubhayatah*".[10] Dr. Ghanekar has said that Kanthanadi is the respiratory passage, including the Larynx And Trachea. The larynx is situated between vertebral levels C_3-C_6, while the trachea lies between C_6-T_4.

The ECA arises from the common carotid artery at the level of the upper border of the thyroid cartilage, which corresponds to the C_3-C_4 intervertebral disc. The lingual branch of the external carotid artery (ECA) originates around the C3 vertebral level, while the laryngeal branch arises at approximately the C3-C4 levels. The IJV emerges from the skull at the jugular foramen, which is at vertebral level C_1, then it descends through the neck, eventually joining with the Subclavian vein. Lingual vein drains into IJV at the level of C_3-C_4, and the Laryngeal vein drains into it at approximately C_4-C_5 level. This shows that all these vessels emerge between vertebral levels C_3-C_6, which corresponds to the level of Larynx and not the trachea. Hence, here Kanthanadi is considered as the Larynx.[16]

On the other hand, when we say Neela Manya as Avedhya Sira, then we are talking about Vedhan karma, which is done over the Sira, as it is clearly said in Ayurveda by Acharyas that these vessels should not be punctured therapeutically. Being a major blood vessel, its Vedhan could be lethal in terms of severe blood loss. According to modern science, we can say that the course of the external carotid artery and internal jugular vein is Neela Manya Avedhya Sira, because Vedhan Karma results in blood loss and subsequent hypovolemic shock, which can ultimately lead to death.

Conclusion-

Neela and Manya Marma are Sira marma, of Vaikalyakar Parinaam & four Angul Parimaan having Mookata,

Swarvaikrita, Arasagrahita as its marmabhighataj lakshan. After analyzing all points of discussion, we can consider that, Neela Manya Marma is the Lingual & Laryngeal vessels which are the tributaries of the major vessel Internal Jugular Vein & External Carotid Artery. The Neela Manya Avedhya Sira extend along the entire length of the external carotid artery (ECA) and internal jugular vein (IJV). Kanthanadi is considered as Larynx. The Marmabhighat lakshan is due to these vessels damage, directly or indirectly.

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