

## ***AN INSIGHT ON KANTA AS PRANAYATANA***

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### **ABSTRACT**

The term *Prana* which is evident of *ayu* is used in different context like, *dwadashaprana*, *pranayatana*, *pranayama*, *pranavayu*, etc. *Acharya Sharangadara* opines that *samyoga* of *shareera* and *prana* is *ayu*, and *viyoga* of *prana* from *shareera* leads to *marana* (death). *Ayurvedic* classics describes that *prana* is made up of 12 components and their involvement in homeostatic function is responsible to sustain the life of an individual. There are 10 such places in the body where life (*prana*) is situated and are referred as *pranayatana*. By observing the function and structural vitality *Acharya Sushruta* designated these areas as *marmasthana*. Hence critical review is essential to understand the structures involved in the maintenance of homeostasis and can be proved them as sight of *prana*. The term *Kantha* is said to be one among 10 such sites which is designated as *pranayatana*. The paper is based on conceptual review of *Kanta* as *Pranayatana* along with supporting case reports. Structural entity supporting the *Kanta* as *pranayatana* is discussed by identifying related structures by doing neck dissection and exact meaning of various terminologies like *Greeva*, *Jatru*, *Manya*, and *Gala* are differentiated from that of *Kanta*.

**Keywords:** *Kantha*, *Pranayathana*, *Marma*, *Prana*

### **INTRODUCTION**

Body is made of different systems having homeostatic relation between them. Grossly for understanding the Physio-anatomical entity the human body is divided into 6 parts (*Shadanga*),<sup>1</sup> out of which *urdhvaJathru* is one among the subdivision which forms the seat for many vital structures.<sup>2</sup>*Kantha* is one

among them.<sup>3</sup>In other words *Kantha* is the region where *Prana* is situated. *Pranayathana* means seat of *Prana*.<sup>4</sup>and is designated as *Sancharastana* for *Prana* and *Udana Vayu*<sup>5,6</sup>. Further *Neela*, *Manya*, *Matruka*, are *vikalyakara* (*disability*) and *SadyapranaharaMarma* (*immediate death*) mentioned in the region of

*Greeva*. These structures are in the vicinity of neck which is a small area connecting the head to trunk. While reviewing the textorial references regarding *Kantha* it is observed that various opinions have been quoted for the term *kantha*. Structural entities of neck region like jugular veins, carotid arteries, and Vagus nerve etc along with other component of *kantha* which has not been highlighted much has been discussed and their importance related to concept of *pranayatana* (*place of life*) is not elaborated .

As per contemporary science the traumatic injuries like strangulation causes sudden and violent compression on the wind pipe that can cause immediate insensibility and death<sup>7</sup>. In case of hanging, the constriction force of ligature causes compressive narrowing of laryngeal and tracheal lumen, and death may also due to compression over internal jugular vein or carotid artery, and surgical interventions in the neck causing accidental injuries to the vessels in the neck region may cause death<sup>8</sup>. By above description we come to know that neck is vulnerable part of body for both internal and external injury. As it is essential to define the term *Kantha* and to prove its relevancy as *pranayatana* and its regional importance the study has been taken. This will be useful for a surgeons and academicians.

### **Aims and objectives**

To determine the location and structural composition of the *Kantha as pranayatana*.

### **Materials and Method**

The study has been carried out by dissecting of 3 adult cadavers at S.D.M. College of Ayurveda and Hospital, Hassan.

**Conceptual study:** Related *Kantha, Gala, Manya and Greeva* was done are by compiling different classical text books. The data collected from *Ayurvedic* classics in the light of contemporary science with respect to the term *Kantha* was defined and evaluated.

### **Observational Study:**

Location of *Kantha* was determined and dissection was carried out in that area .Structural components are reviewed critically based on available literature as per *Ayurveda* and contemporary science taking support of published articles, e journals and inferences were drawn in determining *kanta as pranayatana*.

### **Discussion Regarding Kantha**

That which is present in front of the *Greeva* is called by the name *Kantha*. In other words, it is an area which includes the structures in the neck region involved in passage of air and food as per the references discussed below. Under the composition of *Kantha* two structural entities, one for passage of food and one for passage of air is to be taken into consideration, hence for the location of *Kantha* following quotations are taken as basis

*Kanta* is media for pronunciation .It is said to be present in anterior aspect of *greeva* and is called *gala*. By these references it is inferred that *Kantha* is the structure responsible for production of voice, which is present in front of the *Greeva* and having the synonym of

*Gala*. However the word *Gala* is used for a term that which helps in the process of deglutition. The references regarding enumeration of *Asthi* and *Sandhi* in *Greeva* differ from that of *Kantha* this shows that it has been related to specific structural entity present in front of the *Greeva*. Hence, the term *Kantha* is used in relation to organ of phonation which helps in production of voice and also in relation to structure which helps in deglutition process. As per *Sharangadara*, while explaining the physiology of respiration, there is reference of *Kantha* through which *Pranavayu* is excelled. This shows that the word *Kantha* is also referred to a particular structure involved in both phonation and respiratory process. By this *Kantha* can be inferred for larynx as per contemporary science which is said to be organ of phonation. All the above references support *Kantha* as structural entity responsible for phonation, respiration and deglutition and also forms part of lower respiratory tract.

### CONTEMPORARY VIEW REGARDING NECK

Neck is more or less cylindrical region connecting head to trunk with its relatively small diameter, lack of bony shielding and close association of air digestive tract, spinal cord and major vessels. The human neck is uniquely vulnerable to life threatening compression and distraction injuries. It is limited above by lower border of body of mandible, a line extending from angle of mandible to the mastoid process, superiornucal line, and external occipital protuberance. Lower limits formed from before back word by supra sternal notch of the manubrium sterni, upper surface of the

clavicle ,acromial process of the scapula and a line extending horizontally to the seventh cervical spine.<sup>9</sup>

**Posterior of the neck** composed of ligamentum nuchae, which connects the spinous process of the all cervical vertebra and extends up to the external occipital protuberance.

**Anteriorly** it extend from symphysis menti to supra sternal notch. Important Structures coming in the above vicinity are listed below.

Bones present in the neck --8 cervical vertebrae, hyoid bone

Cartilages -3 paired and 3 unpaired cartilages present in the anterior aspect of neck related with larynx.

Joints-- Intervertebral joints, Cricothyroid joint, Cricoartnoid joint atlantooccipital joint.

**Respiratory structures in the neck –**

Larynx – is the organ for production of voice and also an air passage. It acts as sphincter at the inlet of lower respiratory passage. Located at the vertebral level C3-C6

Cervical part of Trachea-non-collapsible wide tube forming the beginning of lower respiratory passage and at the level of C6.

**Vascular structures in the neck** ---neck contain major arteries and veins on each side of the neck is a common carotid artery, which bifurcate in to internal and external carotid arteries .Vertebral arteries arise from the subclavion arteries which meets to form basilar arteries, and are highly developed vascular supply to the head and neck. Venous drainage travelling through the neck is jugular veins.<sup>10</sup>

**Alimentary structures in the neck –** Laryngopharynx, cervical part of oesophagus, conveys food and forms a part of digestive system. As per the description in the contempo-

rary science the region which lies anterior to the cervical vertebrae is said as anterior aspect of the neck. The anterior extension of the neck lies from symphysis to suprasternal notch. Neck is cylindrical region connecting head to trunk and close association of air-digestive tract, spinal cord and major vessels.

Vascular structures in the neck –

Arteries-2 Common Carotid -2 Internal and 2 External Carotid Arteries

2 Vertebral Arteries

Subclavian Arteries and Veins (2 each)

Veins -- 2 External And 2 Internal Jugular Veins.

2 anterior jugular veins

### **NERVES PRESENT IN THE NECK**

Cervical and Upper Thoracic Part of Spinal Cord.

Vagus nerve, Phrenic Nerves,

Cervical part Sympathetic Trunks (Right and Left)

Cervical Ganglia, Glossopharyngeal nerve, Recurrent Laryngeal nerve, Brachial Plexes and Cervical Plexes, Spinal Accessory nerve, Part of Hypoglossal Nerve

Lymph nodes of head and neck- cervical lymph nodes

Endocrine glands –Thyroid, Parathyroid, part of Thymus, Submandibular Gland.<sup>125,126</sup>

In *urdhwajatru* on either side of the *kanthanaadi* 2 *Neela* and 2 *ManyaDhamani* are there– In case of injuries to these structures it will lead to *Mookata*, *Swaravaikrita*, and *Arasangrahata*. And on either side of the *Greva* there are 4 *MatrukaSira*. If any injuries to these leads to *Sadhyomarana*

According to the reference *KanthaMarma* are *Sira* in nature so this indicates they are vascu-

lar structures present on either side of the *kanthanaadi*.

The superficial and deep dissection of the neck was carried out and identified the each and every arteries and nerve present in that region were observed in relation to *Kantasira* on the basis of their applied aspects and supportive articles related to those. Those structures are as follows.

In explanation they have used the word *urdwajatru* mean above the clavicular region

When we evaluate this *Sloka*, *Kantha* means organ related to production of sound, *Swasanakriya* and *Annapravesha*. So, *Kanthanadi* is the organ related with the *Kantha*, so that it may be of larynx with upper part of the trachea or pharynx. But in relation to *Neela* and *ManyaMarma* and their *Vikruti* we are taking *KanthaNadi* as trachea because if injuries to these *Marma* result in *Swaravikrita*, *Mookata* and *Arasangrahata* which are produced when injury to structure, related to production of voice. So here we are considering *Kanthanadi* as upper part of trachea, in which we find the larynx as a part of the trachea helps in phonation and also in respiration.

As these *Marma* are *Sira* in nature and *Vaikalyakar* in *Parinama*, situated on either side of the *Kantanadi*, if any injury to these leads to *Mookata*, *Swaravaikruta* and *Arasangrahata*. When we analyse these *ViddhaLakshana* on the basis of clinical aspect of structures present on either side of *Kantanadi* are due to injury to the neurovascular structures of that region. The nerves found in that region are *Ansacervicalis*, *Glossopharyngeal*, *Hypoglossal*, *great auricular nerve* *spinal accessory nerve*, *lesser occipital nerve*, *clavicular nerve*,

Recurrent laryngeal nerve, transverse cervical nerve are present and arteries like, external carotid arteries, and its branches like, anteriorly, superior thyroid artery, lingual, and facial. Posteriorly, occipital, posterior auricular. Medially, ascending pharyngeal and terminal branches like maxillary and superficial temporal arteries during cadaveric dissection.

And when we go through the applied aspect of each and every individual nerves and arteries present in the neck region and by reviewing some of the articles, those nerve supplying to larynx and trachea are responsible for producing those symptoms, they are laryngeal nerve, lingual nerve and glossopharyngeal nerve are coming under the vicinity of the neck region are responsible structures for production of these symptoms.

And arteries like, the superior thyroid artery which gives one important branch i.e. superior laryngeal artery which accompany with the internal laryngeal nerve, which supplies to the larynx. And lingual artery which has got long course from the external carotid artery and supplies to the tongue. So there may be chances of injury to these arteries during surgery or due to external injury so that blood supply to the larynx and tongue may hamper leads to abnormality in voice and the taste perception.

#### **Clinical aspects of important structures in relation to *Neela* and *Manya***

Recurrent laryngeal nerve--- arises from vagus. Run upwards and medially and present in groove between oesophagus and trachea. During thyroidectomy, consequences are Damage to the external laryngeal nerve which causes some weakness of phonation. If both

recurrent laryngeal nerves are interrupted, the voice is completely lost and breathing becomes difficult. If only one recurrent l nerve is paralyzed, opposite vocal cord compensate for phonation but there is hoarseness of voice. The permanent lesion of damaged Recurrent Laryngeal Nerve leads irreversible dysfunction of phonation. Complete division of a recurrent laryngeal nerve causes the cord on the affected side to take up the neutral position between abduction and adduction. Usually the other cord is able to compensate in remarkable way and speech is not greatly affected if both nerve are divided, however the voice is completely lost and breathing becomes difficult through the only partially opened glottis.

**Surgical importance--** During surgery or due to penetrating neck injuries these vessels may get damage (extrinsic or intrinsic factors) leading to impaired blood supply to the larynx and tongue resulting in loss of voice and taste sensation. After seeing the applied aspects and reviewing some of the articles, nerves present in the neck region, supplying to larynx and trachea are responsible for *Swaravaikruta*, *Mookata* and *Arasagrahita*. Those are recurrent laryngeal nerve, and glossopharyngeal nerve present on either side of the cervical part of the trachea and larynx.

So on the basis of above said discussion and studying some important surgeries carried out in the neck region like surgery of thyroid gland, goitre, or any diseases related to that neck region, and by any external injuries there is a chances of injury mainly to laryngeal nerves and superior thyroid artery, lingual artery pharyngeal artery, while legating or approximation during surgery and they become

the responsible for production of above said symptoms. As *Neela* and *Manya* *Marma* are *sira* in nature, *shadanganusara –jatrurdhva, parinamataha-vaikalyakara, pramanataha-chaturangula*.

Anatomical location is in *manya* (either side of *greeva*) structure related are external carotid artery and internal jugular vein are the responsible structures through their branches like superior thyroid artery and vein supplies to the larynx and tongue long with the recurrent laryngeal nerve and glossopharyngeal nerve which are also coming in the vicinity of *Neela* and *Manya* *Marma* which is having 4 *Angula-Pramana* and responsible for *Swaravaikruta* and *Arasangritha* and *Mookata*

## DISCUSSION

Along with these *Neela* and *Manya*, *Kanta* is having *KantaSiras* (*Astamatrukas*) also which are 8 in number and *Sadhyopranahara* in nature. These *KantaSira* may be the structural entities present on either side of the *Greeva* as they are *Sira* in nature we can infer that, these are may be of some of the important vascular structure present in the vicinity of neck region. It includes, common carotid artery, internal jugular vein external jugular vein, internal carotid artery, external carotid artery, anterior jugular vein subclavian artery vertebral artery what we have seen during cadaveric dissection.

When we go through the etymologically of the word *Matrika*, it is derived from *Maata* means that provides nourishment. In relation to *Astamatruka*, of the neck region, means which are mother to the head, in nourishment and these are *Sadhyapranahara* in *Parinama*, and

*Sira* in *Rachana*. On the basis of this we can include probable structures like, common carotid artery, vertebral artery, jugular veins subclavian artery which are coming in the vicinity of *kanta* region, and main vascular structures of the head and neck. Among these, carotid arteries are the main arterial supply to the head and neck are often injured relatively frequent in shot wounds and other penetrating injuries of the neck: and in internal jugular or external jugular vein are susceptible for dangerous air embolism and if any injury to these may leads to visual disturbance, head ache papilledema, and at last death

We collected 10 post-mortem reports among those in 3 post-mortem reports death is due to hanging, next 3 are due to throttling, and other 4 are due to strangulation in all these cases common cause for imminent death is due to injury to major neurovascular structures and compression over the air digestive tract. And fracture of hyoid bone, and displacement of atlanto-occipital joint By these reports we can say that structures present in front of the *Greeva* like larynx, and trachea, and neurovascular structures like carotid arteries jugular veins and its branches, vagus nerve and its branches are more vulnerable for the external injuries and leads to imminent death.

On the basis of reviewing the classics, contemporary view, cadaveric dissection, some of the important clinical aspect told in our text and on the basis of some retrospective study, *Astamatruka* are

2 common carotid arteries, 2 internal jugular vein, 2 external jugular veins and 2 vertebral arteries



Run in the anterolateral aspect of the neck on the basis of their importance in the body and these are very superficial structures found around the vicinity of neck region are susceptible for dangerous situation. As per the etymological meaning and definition, *Kantha* is referred to a specific structure or a part which is present in front of the *Greeva*. It is also referred to the structure which helps in production of speech or acts as an organ of phonation (*swarayantra*). On the basis of review of literature it is having a synonym as *Gala* and the references related to *KanthagataRoga* are supportive of identifying a specific structure that which helps both in the process of respiration, phonation (during the expiratory phase of respiration) and also deglutition. As per the review of contemporary science, the most suitable structure identified in the anterior aspect of the neck, in front of cervical vertebrae and that which is acting both as respiratory passage and as an organ of phonation (during the expiratory phase of respiration) along with portion of pharynx that aids in the process of deglutition and passage for food and water is taken as larynx and upper part of laryngopharynx.

## CONCLUSION

*Kantha* as predominant structural entity present in front of the neck related to both *PranavayuSancharaPatha* (respiratory passage larynx) and partially related with *SancharaPatha* of *Anna* and *Udaka* (food passage –laryngopharynx) extending from upper border of the epiglottis to lower border of cricoid cartilage(C3—C6). Specific structure as Larynx and Laryngopharynx .

Based on vital *marma*, present on either side of *kantanaadi* substantiating *kantha* as *mahamarma* are identified as follows.

*Astamatruka*–

2 Common carotid arteries

2 Vertebral arteries (arising from first part of subclavion artery.

2 Internal jugular veins

2 External jugular veins on either side of *Greeva*

*Neela and Manya* -

2 External carotid arteries

2 Internal jugular vein and associated Glossopharyngeal, and vagus nerve branches.

All these neurovascular structures around and along with larynx (organ of phonation), cervical part of laryngotracheal tube and laryngopharynx (food-way) in *Kantha* (as *Pradeshavishsha*) makes the region most vital to say *kantha* as *pranayatana*.

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