

## RELATION BETWEEN AVEDHYA SIRAS OF VAKSHA-PRADESHA AND VAKSHA-PRADESHGATA MARMAS

Dubey Deepti<sup>1</sup>, Kajale Omkar<sup>2</sup>

PG Scholar, Professor, Department of Rachna Sharir,  
Rani Dullaiya Smriti Ayurved PG College & Hospital, Bhopal, Madhya Pradesh, India

### ABSTRACT

*Acharya Sushruta* has mentioned that puncturing of *Avedhya Siras* may cause disability or death of the person. Although the references regarding these sites are available in the classics but the exact location and anatomical description is not described. In 21<sup>st</sup> century the complexities of surgeries have increased greatly and the mode of injury have become complex. These modes of injuries were unknown in the period of *Sushruta* and *Vagabhata*. But in today's world these are an important aspect which makes this study even more relevant, so a research work is elaborate the relation between *Vaksha-Pradeshgata Siras* and *Vaksha-Pradeshgata Marmas*.

**Keywords:** *Avedhaya Sira, Vaksha-Pradesa, Marma.*

### INTRODUCTION

*Acharya Sushruta* has mentioned 700 *Siras*<sup>1</sup> Out of these *Siras*, 98 *Siras* are *Avedhya*<sup>2</sup>. There are 40 *Siras* in *Vaksha-Pradesha* of which 14 *Siras* are *Avedhya*<sup>3</sup>, from which two *Siras* belong to *Hridaya*, four *Siras* belong to *Stanamula*, eight *Siras* belong to *Stanarohit*, *Aplap*, *Apstambha* of both side. *Acharya Vagbhata* has also mentioned that there are total 98 *Avedhya Siras*. Along with this, contracted, minute, curved, knotted *Siras* and those, which are located in joints, are termed as "*Avedhya*"<sup>4</sup>.

In ancient *Ayurveda* science, *Marma-Vigyana* received utmost importance especially in the field of surgery because it was the need of the hour during that period. This was so because it was the period in which numerous huge wars were happened and many persons were injured or died, so for the sake of the life of a soldier, the person who could save the life was only the surgeon. The surgeon had to have the

knowledge of anatomy in order to treat the injured. The *Marma* are classified in many categories like - according to the symptoms produced after *Marmaghata* etc. There are certain vital spots in the body which when injured have serious consequences when compared to other parts. These spots were especially target during wars in ancient period to either kill the person or deform the functionality of a particular part of the individual. These vital spots are known as '*Marma*'.

The relationship between *Vaksha-Pradeshgata Siras* and *Vaksha-Pradeshgata Marmas* is neither explained in the *Samhitas* nor in any research work yet done. But they do have surgical as well as clinical importance, so a research work is needed to elaborate the relation between *Vaksha-Pradeshgata Siras* and *Vaksha-Pradeshgata Marmas*.

**AIM AND OBJECTIVES:**

The present study has been planned to accomplish the following objectives:

1. To make the comprehensive study on *Vaksha-Pradeshgata Avedhya Siras*, as mentioned in *Ayurveda* texts.
2. To study the relation between *Vaksha-Pradeshgata Avedhya Siras* and *Vaksha-Pradeshgata Marmas*.
3. To study the anatomical structures pertaining to the *Avedhya Siras* of *Vaksha-Pradesha* by human cadaver dissection.

#### **MATERIAL AND METHODS:**

The work is carried out by 2 stages; Literary Study & Cadaveric Study. Cadaver study was conducted in Department of *Rachana Sharir*, Rani Dullaiya Smriti Ayurved P.G. College & Hospital, Bhopal (M.P.).

#### **Literary Study:-**

- (a) Various classical Ayurvedic literatures had been studied and related references of *Avedhya Siras* of *Vaksha-Pradesha* and *Vaksha-Pradeshgata Marmas* were collected from the following ancient Ayurvedic literature: *Brihatrayi*, *Laghutrayi*, Upanishads, Commentary of *Ghanekar*, *Dalhan*, *Indu*, *Arundutta*, etc.
- (b) Various modern textbooks were also studied for blood vessels of the thorax.
- (c) Comparative study of various structure which can better understanding of *Avedhya Siras* of *Vaksha-Pradesh*, and all other structure that can be included in *Marma* of *Vaksha-Pradesh*.

**Cadaveric Study:-** The study was done on 5 cadavers and specimen study was conducted in department of *Rachna Sharir* of *Rani Dullaiya Smriti Ayurveda P.G.College & Hospital*, Bhopal, as per *Cunningham's Manual of Practical Anatomy Book*.

#### **RESULTS:**

By the study it is realized that the *Avedhya Siras* given by the *Acharya Susruta* are true as *Avedhya* in modern perspective. Results are shown in Table below.

#### **DISCUSSION**

In case of *Vaksha-Pradeshgata Avedhya Siras* knowledge of *Vaksha-Pradeshgata Marma* is necessary. Specific positions of *Avedhya Siras* are not described in the classics and as the *Marmas* and *Avedhya Siras* are similar in their result because trauma to any of these two causes deformity and/or death. So here, on the basis the position of *Marmas*, the positions of *Avedhya Siras* are to be understood in the same manner.

So here, discussion of the *Avedhya Siras* of *Vaksha-Pradesha* and thier correlation with the *Marmas* of *Vaksha-Pradesha* was made.

#### **1. Hridaya Avedhya Sira:**

According to the *Samhitas* there is difference in description of *Hridaya Marma* and *Hridaya Avedhya Sira*. *Hridaya Marma* is one in number as described in *Swapaditala (Chaturangul)* while there are two *Avedhya Siras* in *Hridya*. There is no description regarding relations of two *Avedhya Siras* in *Hridya* in various *Samhitas* thus we can understand that *Vaksha-Pradesha Siras* and *Marmas* are different so the heart as described in *Hridaya Avedhya Siras* should not be considered as single heart but it is the vessels which supply the heart i.e. coronary arteries .

Thus, Gunshot injuries of the heart may be left open for discussion so far as its management is concerned but the involvement of coronary vessels during the trauma is a matter of debate because it can be managed if the patient is transported to the trauma surgeon without delay. The matter of

two *Avedhya Sira* in consideration to *Hridaya* probably is coronary arteries. This critical review indicates that *Sushruta* and others have very well considered coronary arteries during the chapter of *Siravedha* while dealing with its surgical aspect. Thus, the *Avedhya Sira* of *Hridaya* are right and left coronary arteries.

## 2. Stanamula Avedhya Sira:

There are 2 *Stanamula Siras* on each side according to *Sushruta* and *Vagbhata*, which are to be avoided during surgery. According to *Ghanekarji* they may be internal mammary vessels as suggested in *Marma Sharir*, but he did not clarify this under *Avedhya Siras*<sup>5,6,7</sup>. The location of *Marma* is two fingers below the nipples on both the side. Two fingers below the nipple mean somewhat in sixth intercostal space that is in between sixth and seventh costal ribs. Its traumatic result is delayed death due to filling of thorax with *Kapha*.

The vessels responsible for bad prognosis are internal mammary vessels at their termination in sixth and seventh intercostal spaces. The internal mammary arteries at the level of sixth intercostal space divide into the musculophrenic and the superior epigastric arteries.

Injury to this vessel may also cause tearing of pleural cavity which makes a room for the blood from the vessels into the pleural cavity. The presence of blood in pleural recess produces pain and shock due to pleural irritation and later on cause considerable pleural effusion. The pain, shock and collapse of the lung produce respiratory distress resulting to delayed death if immediate surgical intervention is not done. This observation is important probably from *Stanamula*,

*Avedhya Sira* point of view. Nothing very clear has been said in any classical literature about the existence and exact location of *Stanamula Avedhya Siras*. However this observation definitely correlates with the findings of classical notes of *Ayurveda*.

The internal mammary vein is small in caliber and have valves, therefore bleeding from the vein is not to the amount that may cause any hazardous complication but the artery since coming directly from the subclavian artery, has high pressure and bleeds in a large amount so much so that it enters the pleural recess if pleura is involved and can lead to death if not treated in time.

In the description of *Marma* the *Stanamula Marma* are two in number while there are four *Avedhya Siras* in this region. Therefore, it can be said that *Avedhya Siras* are musculophrenic artery and superior epigastric artery, which are terminal branches of internal mammary artery.

## 3. Stanarohita Avedhya Sira:

The *Stanarohita Marma* is *Kalantar Pranahara Marma* and the structural status of the *Marma* is *Mamsa* (muscle). It is measured *Ardhangula*. The mode of death is hemorrhage with cough and dyspnoea. The surface anatomy of this *Marma* is 2 fingers above the nipple. This is about second intercoastal space. The second intercostal space is met across the skin, fascia, pectoralis major muscle, the intercostal muscles. The prominent structure of this region is the pectoralis major muscle. By the consciousness of *Sushruta* and *Vagbhata* regarding haemothorax in the name of *Stanarohita Marma* still holds the traumatic significance. The possible amount of hemorrhage can be very well inferred from the blood vessels. The source

of hemorrhage is the blood vessels supplying to the pectoralis major muscle.

The thoracoacromial artery pierces the clavipectoral fascia, which lies in the I, II intercostal spaces and divides into 4 branches, pectoral, acromial, clavicular and deltoid. The pectoral branch descends between the two pectoral muscles and is distributed in to them and to the breast, anastomosing with the intercostal branches of the internal thoracic artery and with the lateral thoracic artery. The internal thoracic artery is a branch of subclavian artery, whereas the lateral thoracic artery is a branch of second part of axillary artery.

The source of bleeding of thoracic trauma may be an intercostal artery, internal thoracic artery, aorta and the left side of the heart. The blood may also come from laceration of the lung. The bleeding from the source of axillary artery or internal mammary arteries may be along with extensive destruction of the pectoral region. Since this region is supplied by two sources the internal mammary artery through intercostal arteries and axillary artery, through pectoral branch of thoracoacromial artery. Therefore the chances of large amount of bleeding are more and causing haemothorax which is the emergency.

Under above circumstances *Sushruta's* version as *Stanarohita, Avedhya Siras* appears to be correct. So as far as the number of *Stanarohit Avedhya Siras* are concerned it may be noticed that anastomosis underneath the pectoralis major muscle is formed by 2 sources:

- The pectoral branch of thoracoacromial artery which comes from axillary artery,

- The intercostal artery which comes from the internal thoracic artery. Therefore these two vessels, making anastomosis on both the side, are important from *Avedhya* point of view.

#### 4. Apalap Avedhya Sira:

This *Sira Marma* is situated below both *Ansakuta* and above in the lateral flanks. Injury to this *Marma* causes death due to conversion of blood into pus. It is *Kalantar Pranahara* in *Parinam*.

*Vagbhata* has expressed it more clearly that it is situated in between the back and chest (in lateral flank); below the *Ansakuta*. *Ghanekarji* interprets lateral thoracic and subscapular vessels as *Apalap Marma*. The lateral thoracic artery is a branch of axillary artery and supplies the serratus anterior and the pectoral muscles. It anastomoses with the internal thoracic, subscapular and intercostal arteries, and with the pectoral branch of the thoracoacromial artery. The subscapular artery is the largest branch of the axillary artery.

Axillary artery is the continuation of the subclavian artery begins at the outer border of first rib to the lower border of teres major muscles from where it continues as brachial artery. The brachial artery is nearly straight when arm is abducted at right angle, with the trunk. The first part of axillary artery is deeply situated but its terminal part is superficial and is covered by skin and fascia.

The pectoralis minor crosses the vessel and divides it into the three parts. Violent movement perhaps more frequently lacerates axillary artery than any other artery in the body. It has occasionally been ruptured in attempts to reduce old dislocation of the shoulder joint, especially where the artery

has become fixed to the capsule of the joint. The pectoralis minor is the central landmark of the axillary region here, axillary vessels and brachial plexus bear very definite relationship. The deltopectoral triangle is a gap where the artery can be easily approached. This gap is not covered by extra thoracic muscle of the chest. This may be a spot where any piercing injury or deliberate surgery may cause damage to the axillary vessels, especially vein since slightly overlapping over the artery. This condition may lead to haemothorax with pleural wound causing late acute empyemathoracis with respiratory distress. Otherwise in axillary vascular rupture without involving thoracic cage the bleeding usually is arrested by large amount of clot and this may cause after some times or days spontaneous bleeding endangering life. The vein plays prominent role here because the sympathetic tone of the artery constricts it and stops the bleeding whereas the axillary vein has no such arrangement, therefore it forms a large clot under which the false aneurysm is formed.

Two *Apalap Avedhya Sira* have been described one on either side. The *Apalap Avedhya Siras* can be the axillary vessels. These are found in axilla. Initially the bleeding may not be profuse as the sympathetic tone will cause the vasospasm but there are high chances of secondary hemorrhage and death. Another chance is development of empyema thoracic due to small amount of long standing bleed with secondary infection. Thus it can be said that the *Apalap Avedhya Sira* is axillary artery rather than its branches viz. subscapular artery and lateral thoracic artery.

##### 5. Apstambha Avedhya Sira:

*Apstambha Avedhya Siras* are one on each side according to *Vagabhata (Ashtanga Sangraha)*. None has described the particular site of *Avedhya Siras*. However in *Marma-Vigyana Apstambha Marma* is present bilaterally, in the chest on the medial aspect and prominent structure is *Vatvaha Nadi*. This reflects the bronchial tubes at the level of hili.

The involvement of this *Vatavaha Nadi*<sup>8</sup>, during the course of injury to *Apstambha Marma* causes *Swasa* and *Kasa* (respiratory failure) by filling up thorax by *Vayu*. *Vagbhata* slightly differs from *Sushruta* that injury to this *Marma* fills up thorax with blood which produces *Swasa, Kasa* (Respiratory failure). The cause of blood in the thorax is *Dhamani*. *Ghanekar* is of the view that causative agent of this *Marma* is 2 bronchi.

The trachea about 2 cm wide extends from the cricoid cartilage to the sternal angle to the medial plane. The right bronchus runs 2.5 cm, downward laterally from the lower end of trachea to reach the hilus of the lung opposite the sternal end of the right costal cartilage. The left bronchus runs at a smaller angle from the lower end of the trachea for 5 cm to the left and downwards to reach the hilus of the lung behind the left third costal cartilage, 3.5 cm. from the median plane.

The pulmonary arteries lie dorsally, on the right in between the right upper and middle lobe bronchi and on the left side, over the left upper lobe bronchus. The veins usually follow the medial or inferior aspect of bronchii. The bronchial arteries cling closely to the wall of bronchus it supplies to the bronchii and the valves of the pulmonary vessels and pulmonary pleura.

The root of the lungs lie at the level of third costal cartilage and their right and left hili are 2.5 and 3.5cm away from the median plane respectively. The fracture of the third rib at the costochondral junction in compressed injury has every chance to rupture the vessels of the root of the lung along with the damage of the bronchii at their root. Any angular piercing injury in second and third costal spaces near the costochondral junction may have the same fate. This may produce haemopneumothorax or emphysema. The penetrating injuries of the middle of the thorax frequently involve pulmonary vessels at the root of lung along with injury to the bronchial tree. The prognosis is bad due to haemopneumothorax and surgical emphysema.

Penetrating injury to the tracheobronchial tree whether due to gunshot, fragment or knife constitutes a serious threat to pulmonary function such a injury is heralded by (1) Subcutaneous emphysema (2) Cough (3) Haemoptysis (4) Pneumothorax (5) Dyspnoea (6) Xiphisternal crunch on the auscultation (7) Massive air leak following tube thoracostomy (8) Progressive or uncontrolled air leak. As with other penetrating injuries to the thorax, gunshot wounds of tracheobronchial tree are associated with the much higher morbidity and mortality because of damage and required debridement are more extensive and technique available for the tracheobronchial defect are often inadequate.

The above discussion suggests that bronchial injury along with haemorrhage is a fatal condition which further means the pulmonary vessels are very much responsible for the fatal condition. Pulmonary arter-

ies form the *Apstambha Sira* which are located at the hilum of the lungs. The injury to these vessels can cause profuse bleeding in the mediastinum and leading to death due to shock and decreased ventilation of lungs. The haemopneumothorax is usually associated with the pulmonary vascular laceration, caused by injuring instrument or fractured bronchus. *Vagbhata* has mentioned one *Avedhya Sira* on each side which becomes matter of discussion because here the vessels are pulmonary artery and pulmonary vein. However the pulmonary artery is more important as compare to pulmonary vein. Since pulmonary artery carries deoxygenated blood directly from the right ventricle of the heart, where as the pulmonary vein carries oxygenated blood from lung to left atrium of the heart. Further pulmonary artery after being injured will try to empty the heart on every beat. Whereas pulmonary vein will not empty the left atrium to the extent that pulmonary artery will do. Thus pulmonary artery is more dangerous to bleed in the hilum at the lung as compare to the pulmonary vein. Therefore pulmonary artery should be held for *Apstambha Avedhya Sira*.

## CONCLUSION

- *Avedhya Siras* of *Vaksha-Pradesha* and *Vaksha-Pradeshgata Marmas* are not same, but they are anatomically closely related.
- *Sira* are one of the important components of *Marma*, according to definition of *Marma*.
- In the present study, the arteries described above as *Avedhya Siras*, if injured may result into the dangerous/serious outcome, and depending on severity may lead to fatal outcome. In some occasions, the in-

jury of Avedhya Siras of mild to moderate severity may lead to some permanent deformities or sometime loss of organ, while in others the injuries to major Avedhya Siras can be fatal also. Thus it is important here to note that injuries to Avedhya Siras described

above are not always fatal. So here the fact is concluded that these Siras are Avedhya in nature.

**Table: After above discussion the following conclusion was drawn**

S.No.	Name of Vaksha-Pradeshgata Marmas & Avedhya Siras	Number of Marmas	Number of Avedhya Siras	Avedhya Siras related to Marmas
1.	Hridaya	1	2 (1 in each side)	Right & left coronary artery
2.	Stanamula	2 (1 in each side)	4 (2 in each side)	Musculophrenic artery Speriorepigastric artery
3.	Stanarohita	2 (1 in each side)	4 (2 in each side)	Thoracoacromial artery Intercostal artery
4.	Apalap	2 (1 in each side)	2 (1 in each side)	Axillary artery
5.	Apstambha	2 (1 in each side)	2 (1 in each side)	Pulmonary artery
<b>Total</b>		9	14	14

## REFERENCES

1. Srikantha Murthy K.R; Susruta Samhita (Illustrated) Vol. I,-English Translation, Published by Chaukhamba Orientalia, Varanasi, 2nd Edition, 2004-chapter 7/3.
2. Ibidem1 chapter7/20-22.
3. Ibidem1 chapter7/24.
4. Murthy K. R. Srikantha; Ashtanga Hridayam (Vol. I) – Text with English Translation, Published by Chaukhamba Krishnadas Academy,Varanasi, 2007-chapter3/34.
5. Ibidem1 chapter7/26.
6. Murthy K. R. Srikantha; Ashtanga Sangraha (Vol.I), Text with English Transla-

tion, Published by Chaukhamba Orientalia, Varanasi, 2003 –chapter3/25.

7. Ibidem 6<sup>th</sup> chapter 6/14.
8. Ibidem1 chapter6/34.

## CORRESPONDING AUTHOR

**Dr. Dubey Deepti**

**Email:**dr.dubeydeepti@gmail.com

*Source of support: Nil*  
*Conflict of interest: None Declared*