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Case Report

A CONTINOUS LEFT AZYGOS VENOUS LINE WITH SINGLE RETRO-AORTIC TRANSVERTEBRAL ANASTOMOTIC CHANNEL: A CASE REPORT AND REVIEW

***Rimpi Gupta[1], Batra A.P.S.[1,] Shveta Swami[1], Shalini Chaudhary[1], Sunaina Grover[1], and Bikramjeet Singh[2]**
[1]Department of Anatomy, BPS GMC for Women, Khanpur Kalan, Sonipat
[2]MD Forensic Medicine, Demonstrator, BPS GMC for Women, Khanpur Kalan, Sonipat
**Author for Correspondence*

ABSTRACT
The azygos system of veins varies greatly in their mode of origin, course, tributaries, anastomoses and termination. These deviations result predominantly due to its complex embryological development. Azygos venous system develops as right and left aygos venous lines dorsolateral to the aorta. Right azygos venous line develops into vertical part of azygos vein and left one gives rise to a set of longitudinally arranged veins which develops into superior or accessory hemiazygos veins and inferior hemiazygos vein. These are connected by subcentral/ transvertebral veins which vary extremely. The number of such transvertebral veins has been reported from zero to five in the previous literature. In the present case, a continous left azygos venous line was reported which drained into right azygos vein through a single transvertebral connection, thus there is only one transvertebral vein and the left azygos line is not divided into superior and inferior hemiazygos veins. Anatomical knowledge of such variations is important for a clinician while doing mediastinal surgery or to interpret CT/ MRI images.

Keywords: *Azygos Vein, Accessory Hemiazygos Vein, Hemiazygos Vein, Retro-aortic Transvertebral Connection*

INTRODUCTION
The azygos vein typically starts from the posterior aspect of the inferior vena cava (IVC), at or below the level of the renal veins, although the origin is not constant. If present, the lumbar azygos ascends anterior to the upper lumbar vertebrae. It may pass behind the right crus of the diaphragm or pierce it, or it may traverse the aortic hiatus of diaphragm. Anterior to the twelfth thoracic vertebral body, the azygos is joined by a large vessel formed by the right ascending lumbar and subcostal veins that passes forward and to the right of the twelfth thoracic vertebra. In the absence of a lumbar azygos this common trunk may form the azygos vein itself. Whatever its origin, the azygos vein ascends in the posterior mediastinum to the level of the fourth thoracic vertebra, where it arches forward above the right pulmonary hilum. It ends in the superior vena cava, before the latter pierces the pericardium. The hemiazygos vein is formed by a common trunk formed by the left ascending lumbar and subcostal veins and drains the lower three left posterior intercostal veins and esophageal and mediastinal tributaries. It ascends anterior of the vertebral column to the eighth thoracic level, crosses the vertebral column posterior to the aorta and ends in the azygos vein (Standring, 2008). The accessory hemiazygos vein descends to the left of the vertebral column, and receives the left fourth or fifth to eighth posterior intercostals veins; it crosses the seventh thoracic vertebra to join the azygos vein. Variations related to azygos venous system are not rare (Mezzogiorno and Passiatore, 1988). Several variations are reported in the literature viz agenesis of accessory hemiazygos vein with a predominant left superior intercostal vein draining the upper intercostals spaces, agenesis of hemiazygos vein (ozbeck *et al.*,1999), incomplete accessory hemiazygos vein with posterior intercostals veins draining bilaterally into the azygos vein (Kocabiyik *et al.,* 2006), pre-aortic interazygos vein (Pyrzowski *et al.,* 2007), the accessory hemiazygos vein may join the hemiazygos vein, in which case their common trunk opens into the azygos vein (Standring, 2008) and variant accessory hemiazygos vein with persistant cranial segment of posterior cardinal vein (Mahato, 2009) etc.

CASES

During the routine undergraduate dissection of the posterior mediastinum of thorax, we encountered a variation in the azygous system of veins. In the present case the hemiazygous and accessory hemiazygous veins formed a continous channel to the left of vertebral column and drained into the azygous vein at T9 by a single transvertebral channel that passes behind the aorta.

Figure 1: Showing the continous left azygos venous line opening into azygos vein by a single transverse channel

DISCUSSION

The azygos system of veins develop from a pair of longitudinal venous lines, called the right and left azygos venous lines (medial sympathetic line), on either side of the aorta. The right azygos venous line develops into the vertical part of the azygos vein. The arch of the azygos is contributed partially by the persistent cephalic part of the right posterior cardinal vein. The fate of the left azygos venous line is different. The primary azygos venous line on the left gives rise to a set of longitudinally arranged veins. The upper set, named the superior or accessory hemiazygos veins, drain the fourth to the sixth intercostal spaces posteriorly. The lower part of the azygos venous line gives rise to the inferior hemiazygos vein that

arises as the left ascending lumbar vein, similar to the azygos vein on the right, draining the seventh and lower intercostals spaces. The accessory hemiazygos and the hemiazygos veins usually are independent systems and connect to the azygos vein with retro-aortic transvertebral veins which vary extremely.

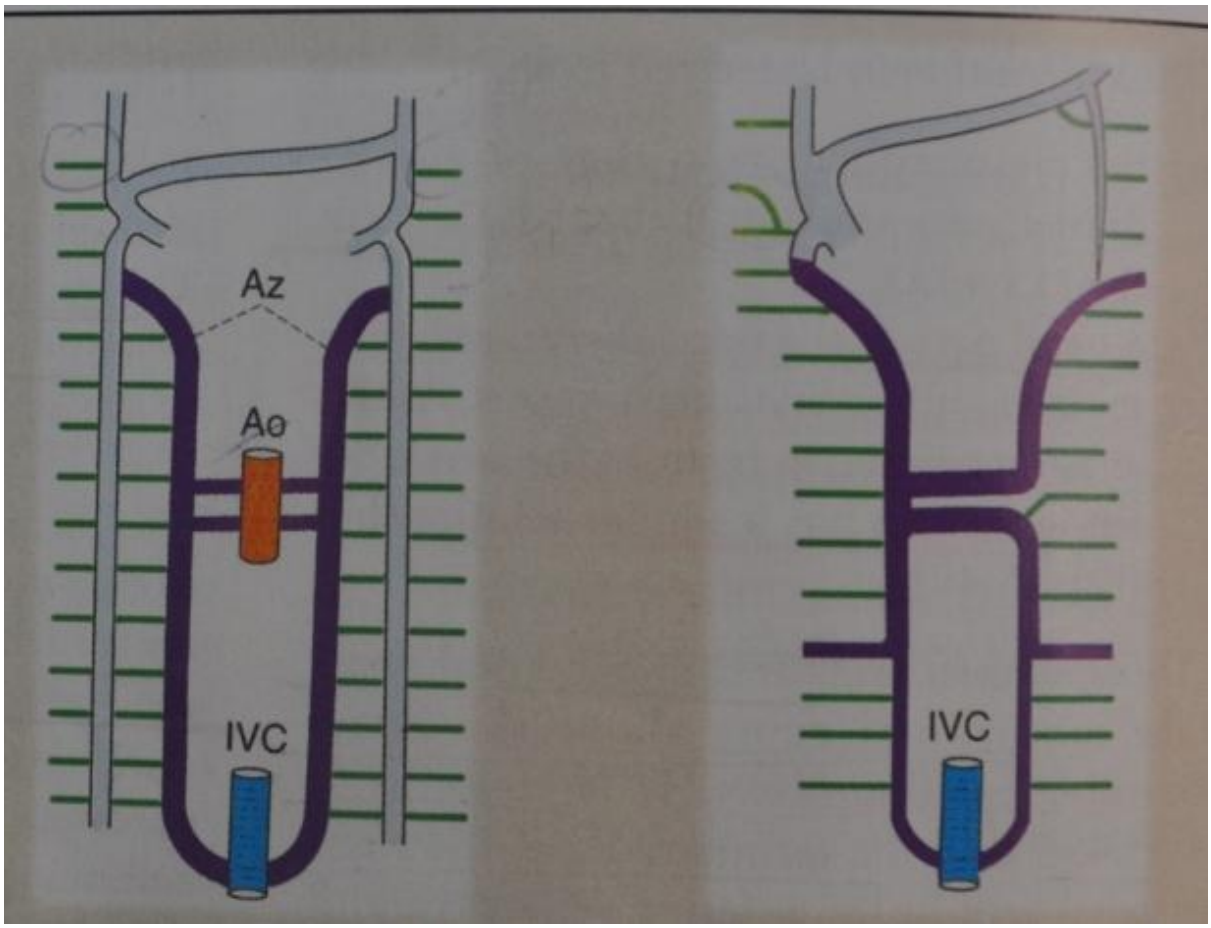

Figure 2: Showing normal development of azygous venous system
Az: Right and Left azygos venous lines
Ao: Aorta
IVC: Inferior Vena Cava

These may be upto five connections. These transvertebral routes are often very short because azygos vein is more commonly anterior to the vertebral column and often passes to the left of the midline for part of its course. These transverse channels embrylogically are derived from such connections between the right and the left posterior cardinal veins (Standring, 2008).

Kutoglu *et al.*, (2012) in their study on 48 cadavers found 14 cases where single retro-aortic transvertebral anastomosis exists between the right and left azygous venous lines. He classified such cases as type II with respect to the classification of Anson (1984). According to this 98% of all cases in Kutoglu *et al.*, (2012) (2012) are type II and known as the transition type. It further consists of group 2-10. There are multiple retro-aortic anastomoses between the azygos and hemiazygos systems. From group 2-5, quantity of transverse anastomoses increases. There is continuity in the left side. Between groups 6-10, it is seen as vertical bending and number of transverse anastomoses decreases gradually. Seib (1934) in his study on 100American whites and 100American Negroes found an average of 3 transvertebral anastomoses.

In the present case, the left azygos venous line persist as a continous channel draining the fourth to eleventh left posterior intercostal veins and there is only one retro-aortic transvertebral anastomotic

channel between the right and left azygos venous line at T9 level. Thus our case also belongs to type II of Anson BJ's classification where there is single retro-aortic transvertebral anastomotic channel between the azygos and hemiazygos veins.

Conclusion

It is important to report and document the different variations of the azygos venous system because especially in CT and MRI scans some variations of the azygos venous system can easily be confused with pathological conditions such as aneurysms, tumors and enlarged lymph nodes. Finally, it is of utmost importance for the surgeons during the mediastinal operations of the possibility of a variation of the azygos venous system.

REFERENCES

Anson BJ and McVay CB (1984). *Surgical Anatomy*, 60th edition (W.B. Saunders Co.) Igaku-Shoin Saunders, Tokyo 464–465.

Kocabiyik N, Kutoglu T, Albay S, Yalcin B and Ozan H (2006). Azygos vein system abnormality: case report. *Gulhane Medical Journal* **48** 180–182.

Kutoglu T, Turut M, Kocabiyik N, Ozan H and Yildrim M (2012). Anatomical an alysis of azygos vein system in human cadavers. *Romanian Journal of Morphology and Embryology* **53**(4) 1051-6.

Mahato NK (2009). Anomalous accessory hemi-azygos system with persistent cranial segment of posterior cardinal vein - A case report. *Brazilian Journal of Morphological Science* **26** 177–179.

Mezzogiorno A and Passiatore C (1988). An atypic pattern of azygos venous system in man. *Anatomischer Anzeiger* **165** 277–281.

Ozbek A, Dalcik C, Colak T and Dalcik H (1999). Multiple variations of the azygos venous system. *Surgical and Radiologic Anatomy* **21** 83–85.

Pyrzowski J, Spodnik JH, Lewicka A, Poplawska A and Wojcik S (2007). A case of multiple abnormalities of the azygos venous system: a pre-aortic interazygos vein. *Folia morphologica (Warsz)* **66**(4) 353-5.

Seib GA (1934). The azygos system of veins in American whites and American negroes, including observation of the inferior caval venous system. *American Journal of Physical Anthropology* **19** 39-163.

Standring S (2008). *Gray's Anatomy*: the Anatomical Basis of Clinical Practice, 40 edition (Churchill Livingstone), Edinburgh Philadelphia 939-40.