

Anatomical variant of the azygos vein course in a cancer patient and review of the literature

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SUMMARY

The azygos vein is responsible for drainage through a staff of venous blood from the chest wall for the most part. Sometimes its course causes the independence of part of the lung parenchyma, which is known as the accessory lobe of the azygos. The present article presents the casual radiological finding of this anatomical variant in a 70-year-old patient undergoing a computed tomography scan for colon cancer. The azygos accessory lobe is a mostly asymptomatic anatomical variation, but it can be a problem in some thoracic surgeries.

Key words: Azygos vein – Lung – Accessory lobe – Radiology

INTRODUCTION

The azygos vein is an important structure that arises from the junction of the right subcostal and ascending lumbar veins, ascending through the posterior mediastinum to drain into the superior

vena cava (Fig. 1). The azygos vein is responsible for the drainage of the thoracic and abdominal walls, esophagus, bronchi and trachea, and is able to divert blood to the superior or inferior vena cava in the event of a blockage of one of these large vessels (anastomotic system) (Notsu et al., 2020; Petrenko et al., 1990). Despite the fact that its anatomical variations are not very frequent, in some individuals the azygos vein may present variations in its origin, route, termination or tributaries, which have been described in many articles including classical anatomical literature (Adachi, 1940; Falla et al. 1963; Nathan, 1960; Hatfield et al., 1987; Koutsouflianiotis et al., 2018). In the case of unusual routing, this can lead to the formation of isolated regions of the lung parenchyma that may have important clinical implications. These isolated regions are known as “azygos lung lobes” or “vestigial lung lobes”. It is generally believed that they form as a result of an abnormal division of respiratory structures during embryogenesis, resulting in the formation of additional lung structures that are not connected to the rest of the lung parenchyma (Donohue and Daly, 2023).

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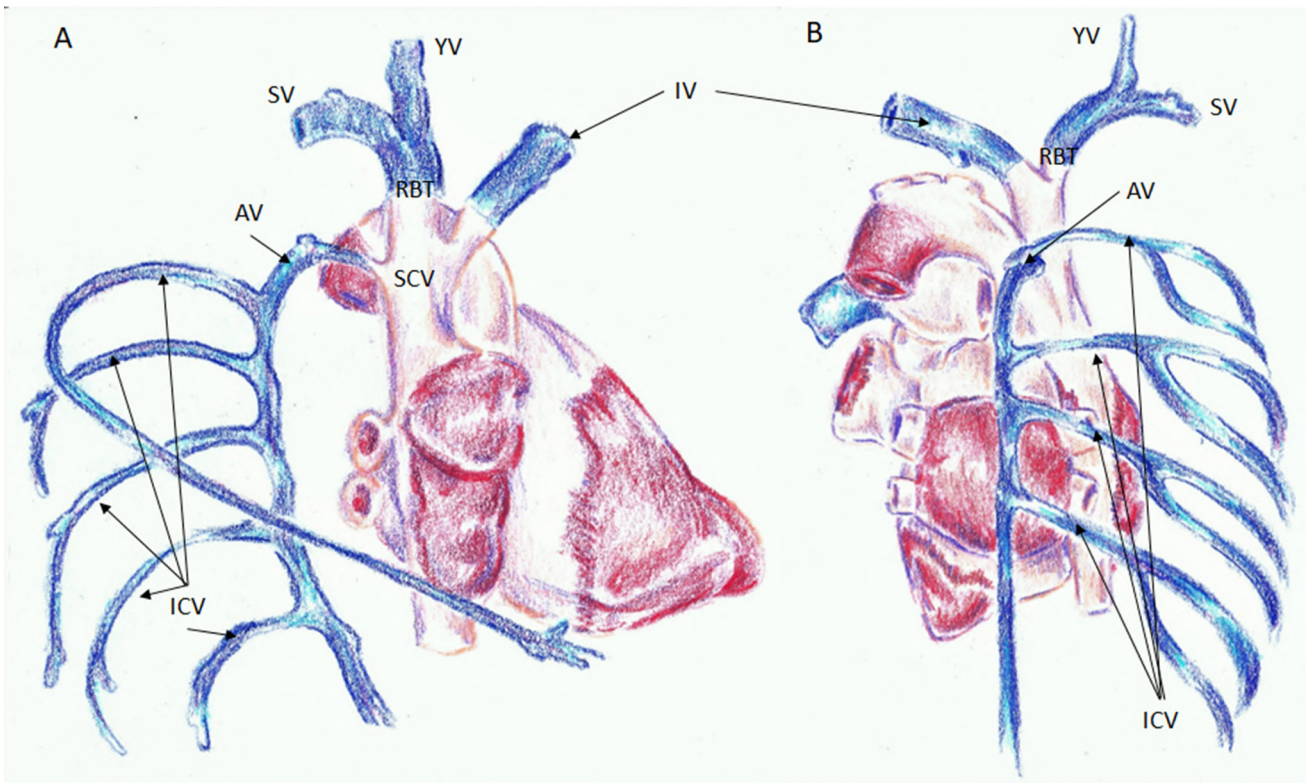


Fig. 1.- Representation of the anatomy of the azygos vein in its normal course, seen from a lateral (A) and a posterior view (B). AV (azygos vein); ICV (intercostal veins); YV (yugular vein); SV (subclavian vein); RBT (right brachiocephalic trunk); SCV (superior cava vein).

CASE PRESENTATION

A 70-year-old female patient with a personal history of hypercholesterolemia and cataract surgery. In 2016, the patient began with rectal bleeding, for which a lower digestive endoscopy (LDE) was performed, which revealed a rectal mass that was diagnosed as a rectal adenocarcinoma by pa-

thology. In the CT corresponding to the extension study, an anatomical variant (Fig. 2) is observed by chance, consisting of the existence of a region of the medial right lung parenchyma that is isolated from the rest due to the existence of a longer than usual course of the vein azygos as it opens into the superior vena cava. The staging of the

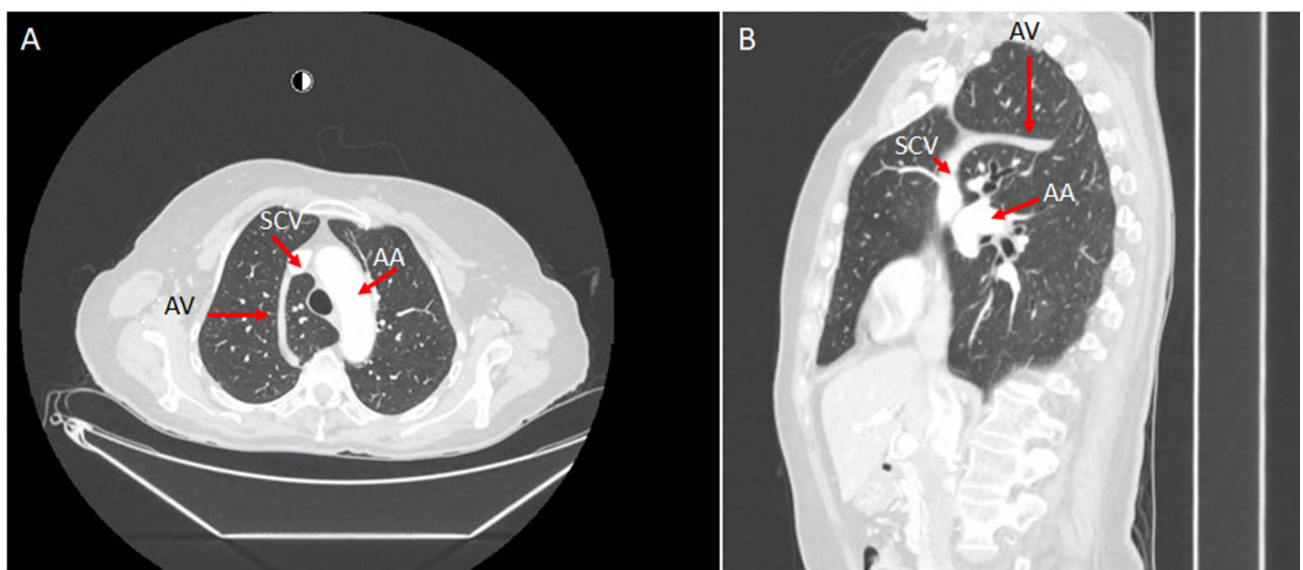


Fig. 2.- Computed tomography scan image showing an accessory azygos lung lobule in A) axial view and B) sagittal view. AV (azygos vein); AA (aortic arch); SCV (superior cava vein).

rectal tumor was T3N20 after the patient underwent surgery for low anterior rectal resection. The patient was treated with adjuvant chemotherapy with FOLFOX for 12 cycles (6 months). The patient is currently in good general condition and is free of disease.

DISCUSSION

The presence of azygos lung lobes is a relatively rare anatomical variation, and its incidence has been estimated at around 0.05% in the general population detected in 0.4% of medical examinations. Although they are generally considered a benign anatomical variation, their presence may have clinical implications in certain cases. For example, the presence of an azygos lung lobe can make interpretation of radiological images difficult, and can be confused with a lung lesion. In addition, the presence of an azygos lung lobe may increase the risk of complications during certain surgical procedures or radiological interventions (Atari et al., 2017). In the medical literature, several cases of azygos lung lobes have been described in asymptomatic patients, as well as in patients with respiratory or cardiovascular symptoms (Adachi, 1940; Falla et al. 1963; Nathan, 1960). In general, the diagnosis is made by imaging techniques, such as computed tomography or chest X-ray, and treatment depends on the presence of associated symptoms or complications. The presence of this anomaly is usually discovered incidentally in patients with pneumothorax, although some studies report that this anomaly is frequently found in patients who are going to undergo a sympathectomy for hyperhidrosis (Nakata et al., 2016; de Oliveira et al., 2022). There are occasions where, in the operation itself, although it does not cause pathology, the course of the azygos vein is reorganized and it is repositioned in its normal position (Choi et al., 2023). In addition to the formation of azygos lung lobes, other anomalies have been described, such as duplication of the azygos vein, the absence of the azygos vein, or its connection with abnormal structures. Another setting where azygos vein variations are diagnosed is in teaching cadaveric dissections such as rare anatomical variant discovered during dissection classes for medical students. In this case,

the azygos vein was located on the left side of the descending thoracic aorta, coursed up the left side of the descending thoracic aorta and crossed the left subclavian artery and left vagus to terminate in the left brachiocephalic vein (Nayak et al., 2020). During dissection, various anatomical variations of the azygos vein have been reported (Badagabettu et al., 2016; Liu et al., 2020) such as a common origin (inferior vena cava) to the azygos venous branch and hemiazygos vein and a shortening of the azygos vein with exclusive drainage of the right intercostal veins (Atari et al., 2017), among others. In terms of embryological development, azygos lobule is made up when a branch from cardinal posterior vein migrates along lung upper lobe instead of the apex, so, this vein drags pleural layers and provokes the independence of this lung region called azygos lobe due to the apparition of the azygos fissure. Cardinal veins involute in left side but not in right side, setting up the inferior cava vein and azygos system (Tran et al., 2023). In clinical terms, the presence of azygos vein variations may have implications in surgical and radiological procedures. For example, the presence of an azygos lung lobe can make interpretation of radiological images difficult and can be confused with a lung lesion. In addition, the presence of an abnormal connection between the azygos vein and the superior vena cava may increase the risk of complications during certain surgical procedures or radiological interventions. In this case, this finding is not relevant but it could be a risk factor in this patient if she would have to undergo chest surgery for a metastasectomy.

CONCLUSION

In conclusion, anatomical variation of the azygos vein is a relatively common phenomenon, and it may be associated with pulmonary anomalies and complications in surgical and radiological procedures. Understanding these variations and their relationship to lung anatomy may be important for proper diagnosis and treatment of certain clinical conditions.

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