

The vanishing azygos vein

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Section: Chest imaging

Area of Interest: Thorax

Procedure: Diagnostic procedure

Imaging Technique: Conventional radiography

Imaging Technique: CT

Special Focus: Congenital Case Type: Clinical Cases

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Patient: 62 years, female

Clinical History:

The here presented patient is a 66-year-old woman with a history of severe chronic obstructive pulmonary disease, candidate for lung transplantation. Pre-interventional assessment included chest radiography and CT that showed multiple nodules, warranting CT-guided biopsy. Following biopsy the patient developed a pneumothorax, necessitating thoracostomy tube placement.

Imaging Findings:

The initial chest radiograph (Fig. 1a) and CT (Fig. 1b) showed a typical variant azygos fissure with a teardrop-shaped opacity at its lower end (Fig. 1a), corresponding to the laterally and intrapulmonary displaced arch of the azygos vein.

Following needle biopsy of a right upper lobe lung nodule (Fig. 1c), a pneumothorax occurred (Fig. 2), with partial collapse of the right lung and caudal displacement of the azygos lobe.

The follow-up images after placement of a right-sided chest tube documented rapid resorption of the pneumothorax and reexpansion of the right upper lobe, including the azygos lobe. However, the azygos lobe reexpanded laterally to the arch of the azygos vein, resulting in an empty azygos fissure on the radiograph, without the typical teardrop-shaped opacity at its caudal end (Fig. 3a). CT confirmed the displacement of the arch of the azygos vein, now adjacent to the right mediastinal wall (Fig. 3b).

Discussion:

The azygos lobe is an anatomic variant with an incidence of 0.4-1.2% [1-4]. During fetal development, the right posterior cardinal vein, precursor of the upper segment of the azygos vein, does not migrate over the right lung's apex to its normal paratracheal position, but rather penetrates into the right upper lobe's apical segment [5, 6]. Two layers of parietal and visceral pleura form the azygos fissure (mesoazygos) extending cranially to the displaced vein. Contrarily, fissures between ordinary lung lobes are covered by two sheaths of visceral pleura only. The azygos fissure delineates laterally the so-called azygos lobe, without independent bronchovascular tree segments, not a lung lobe in the strict sense [7].

The azygos lobe is a benign and asymptomatic anatomic variant.

Due to its sagittal orientation, the azygos fissure is perceptible on frontal radiographs as a thin line, similar to the small fissure. The azygos vein is seen end on at its lower end as a teardrop-shaped opacity. At the upper end of the fissure, a triangular opacity (trigone) represents a pleural reflection towards the chest wall [2]. The Boyden classification differentiates between three types of azygos lobes, A, B and C, depending on the length of the mesoazygos [8]. In type A, the trigone is situated on the lateral aspect of the pulmonary apex, in type B at its midpoint, and in type C even more medially. In cases of pneumothoraces the azygos lobe may disappear from its

usual location medial to the azygos fissure, and displace it medially after reexpansion, leaving an empty azygos fissure now composed of visceral pleural only. Other causes for lateral luxation of the azygos lobe are increased intrathoracic pressure (cough, vomiting), vertebral collapse [9], fibrosis [6], and pleural effusion [10]. A short mesoazygos predisposes to azygos lobe luxation [4]. Following azygos lobe luxation, the fissure may disappear [6]. Some conditions may mimic an azygos fissure, such as lung scars, or the wall of a dilated oesophagus [10]. The azygos vein's arch should be searched for if an azygos fissure is suspected. Discovery of an empty azygos lobe may indicate a former pneumothorax having occurred unnoticed, but the finding has no functional repercussion. Azygos lobe anatomy is important in biopsy or surgical planning (upper lobe resection, bullectomy) to avoid any unnecessary complications [4, 9, 11].

In conclusion, the azygos lobe is a benign variant adjacent to an azygos fissure. The fissure may remain empty after a pneumothorax.

Differential Diagnosis List: Luxation of the azygos lobe following pneumothorax, Lung scar, Bandlike atelectasis, Right oesophageal wall in oesophageal dilation

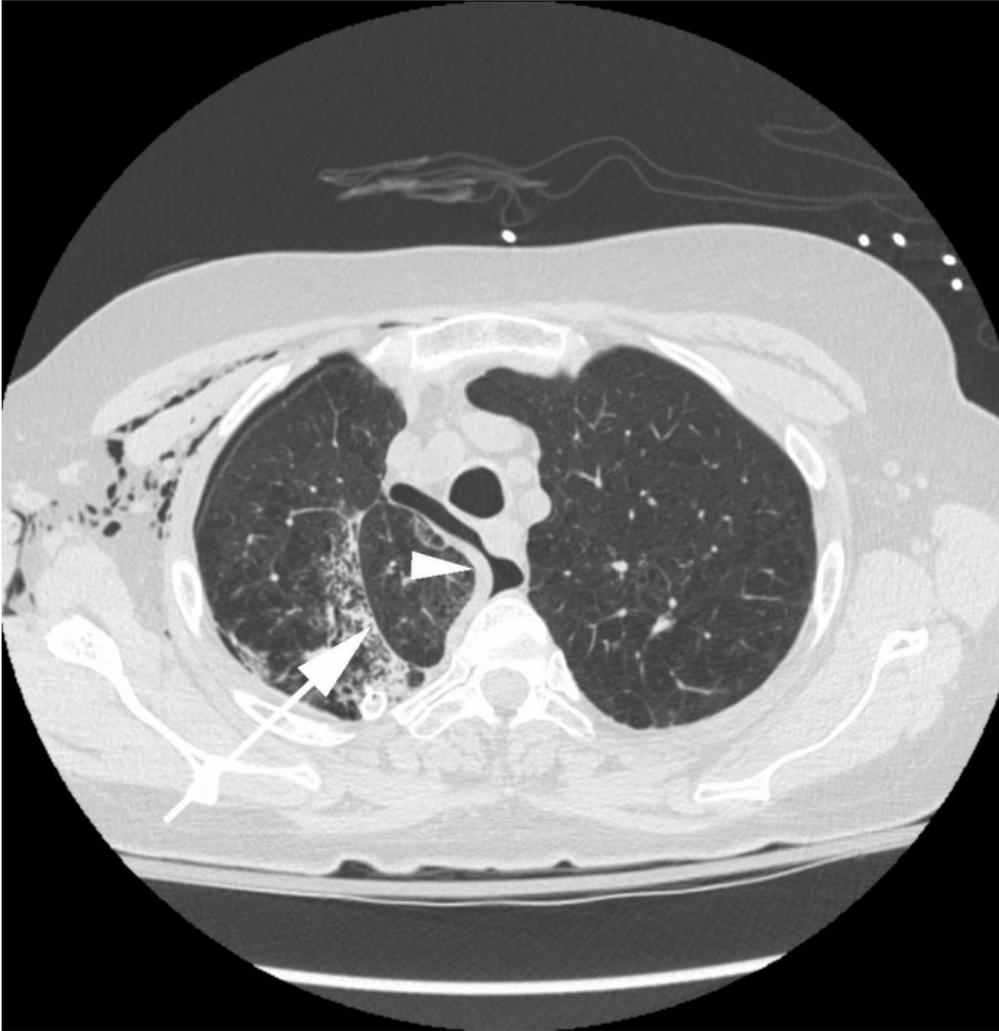
Final Diagnosis: Luxation of the azygos lobe following pneumothorax

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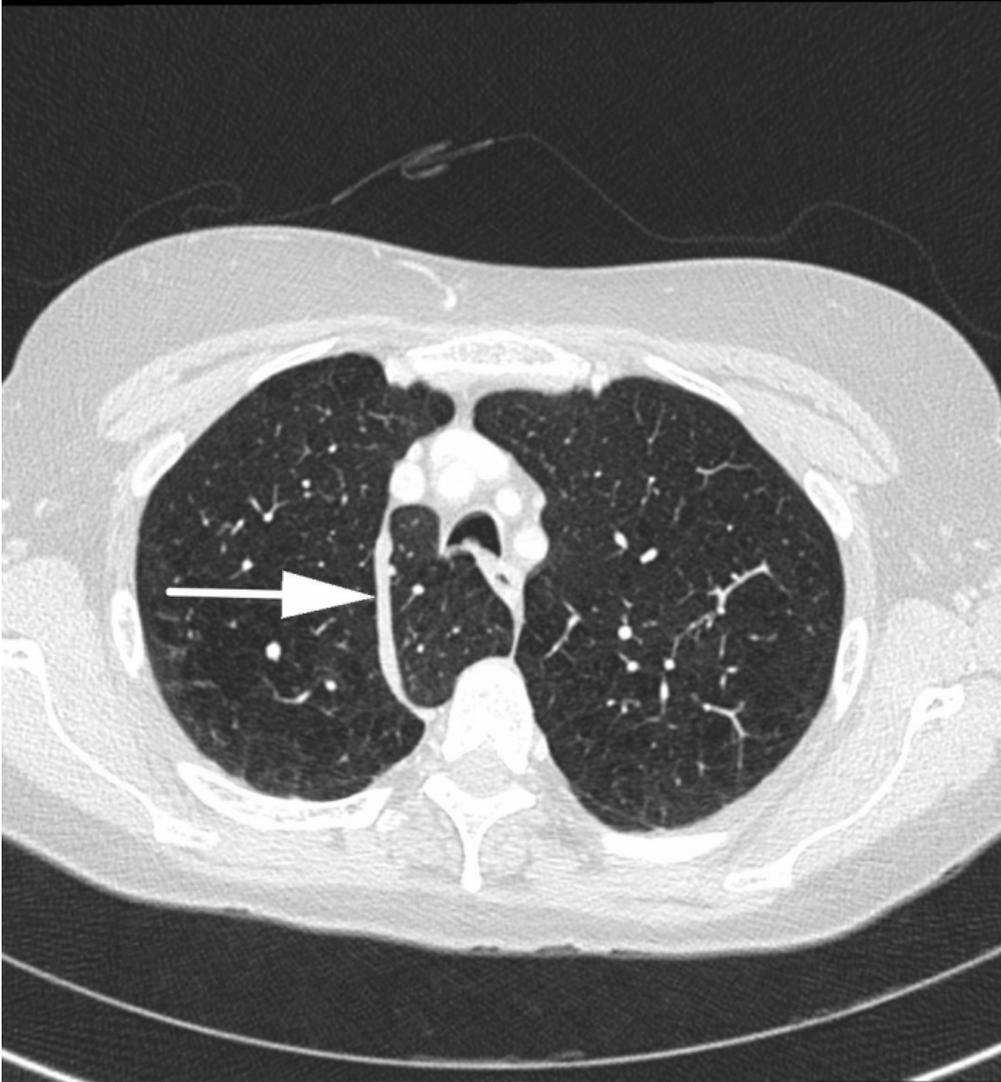
Figure 1

a



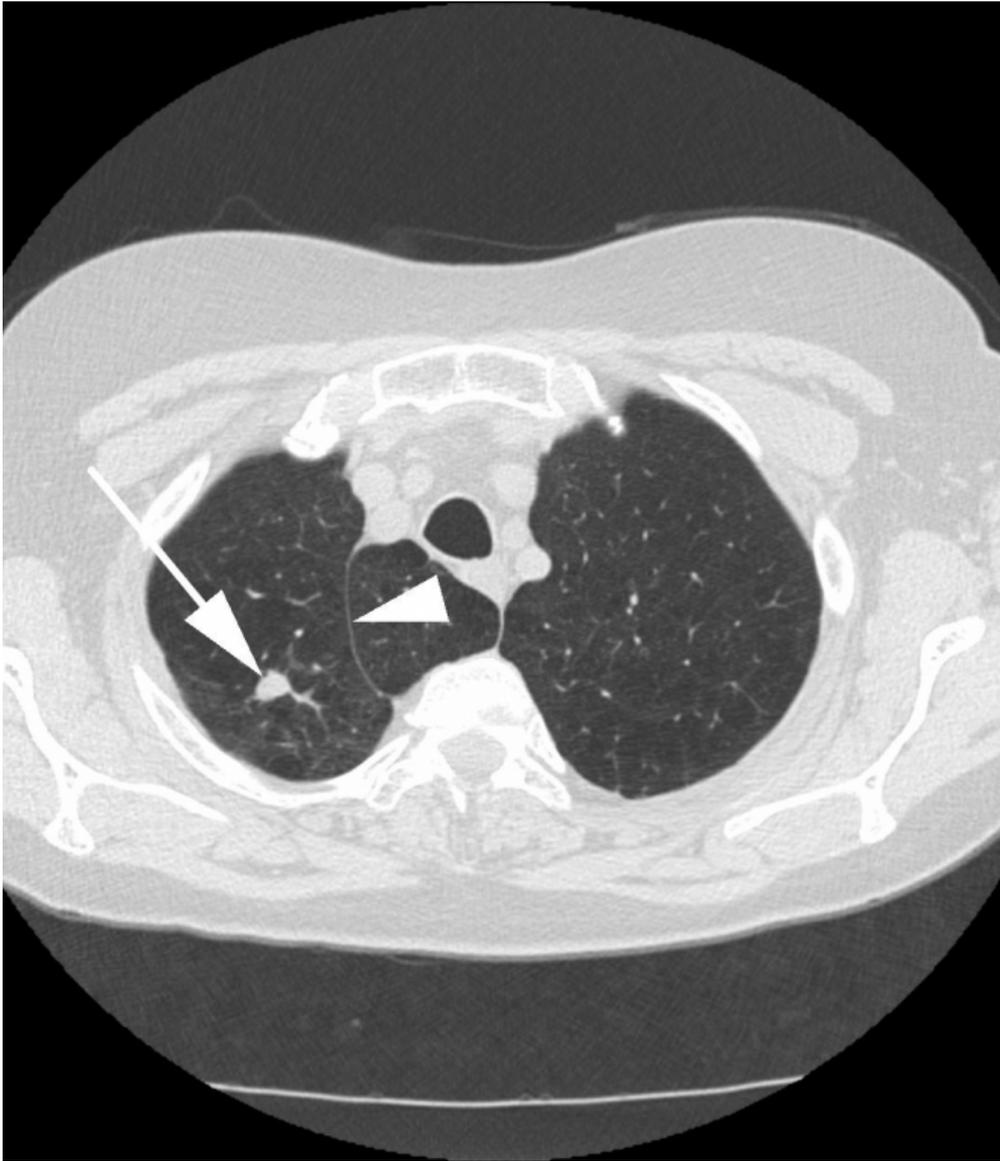
Description: Origin:

b



Description: Axial image of contrast-enhanced CT scan shows azygos vein coursing postero-anteriorly through the lowermost portion of the fissure (arrow). **Origin:** Geneva University Hospitals

c



Description: Nodule of the right upper lobe to be biopsied (arrow). The azygos fissure can be seen (arrowhead), separating the azygos lobe from the rest of the right upper lobe. **Origin:** Geneva University Hospitals

Figure 2

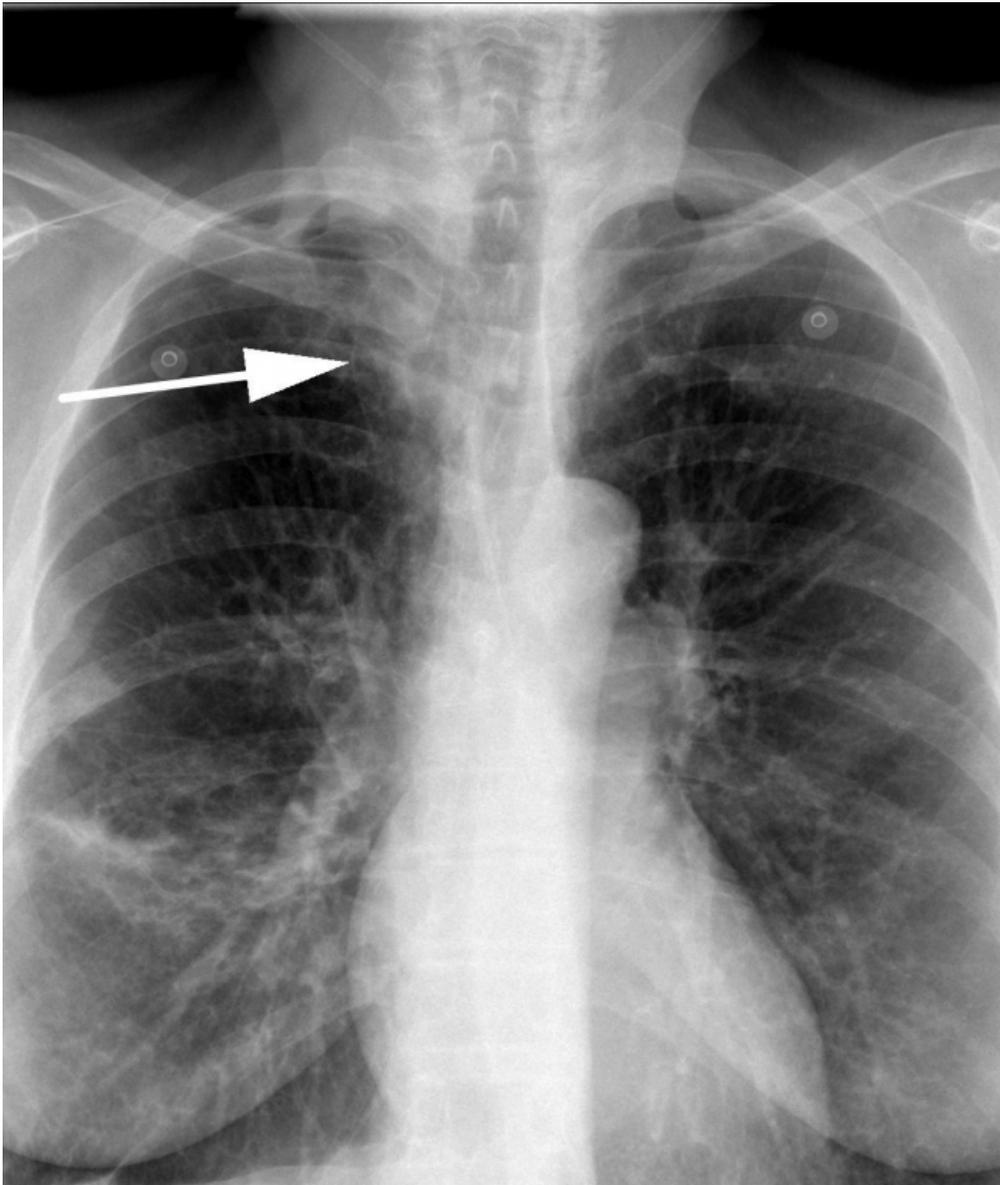
a



Description: Axial non-enhanced CT image shows right pneumothorax following fine needle biopsy. The azygos vein is now freely exposed, covered only by parietal pleura (arrowhead), whereas the azygos scissure is empty (arrow). **Origin:** Geneva University Hospitals

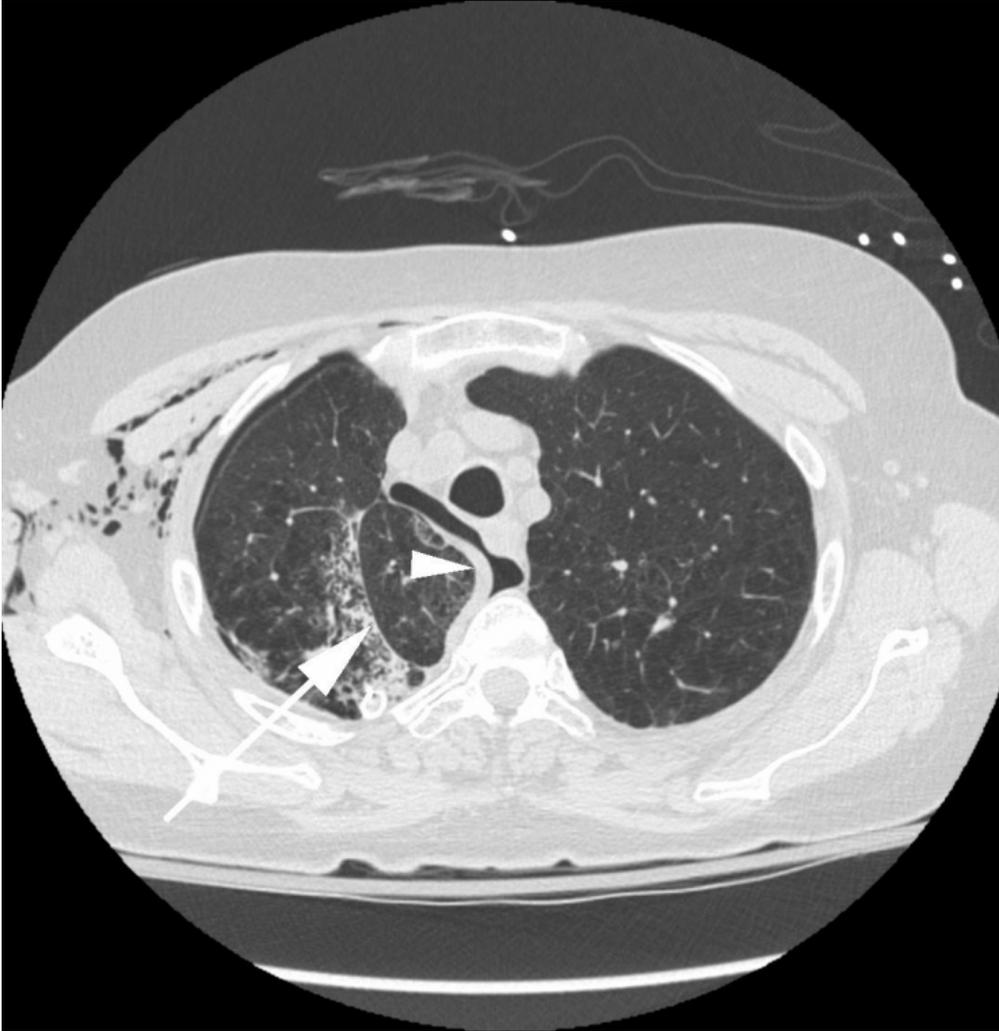
Figure 3

a



Description: Radiograph after chest tube placement shows reexpansion of the right lung, including the azygos lobe. The arch of the azygos vein is medially displaced in a paramediastinal position (not seen), the azygos fissure empty (arrow). **Origin:** Geneva University Hospitals

b



Description: CT image after chest tube placement and reexpansion of right lung. The azygos lobe displaces the azygos vein now medially (arrowhead), the azygos fissure (arrow) remains empty. Note small residual pneumothorax. **Origin:** Geneva University Hospitals