The forensic and surgical importance of anatomical variation. 
The lobe of the azygos vein. 
A case report

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Abstract: We present the case of a 57 year old male in which clinical and radiographical investigations raised the suspicion of a thoracic space-substituting process. Subsequent axial slice computed-tomography scan, revealed an unusual course of the azygos vein, through the parenchyma of the superior lobe of the right lung, associated with a supernumerary right pulmonary lobe. This extremely rare anatomical variation, known in literature as the lobe of the azygos vein, might be considered a malformation, leading easily to a false diagnostic, sometimes alarming, such as a malignant space-substituting process.

Key Words: the lobe of the azygos vein, anatomical variation, malformation, computed-tomography.

The azygos vein system is a venous system of the trunk walls which drains most of the blood from the trunk walls and in a small part the blood of some thoracic viscera (veins from the esophagus, bronchi, pericardium and mediastinum) [1]. In the Anatomical Nomenclature there are three veins of this system: the azygos vein (v. azygos), the hemiazygos vein (v. hemiazygos) and the accessory hemiazygos vein (v. hemiazygos accesoria) [2]. The azygos vein is formed on the posterior trunk wall, inferior to the diaphragm, by the unification of a venous trunk formed by 2-3 lumbar veins and the subcostal vein on the right side. From its origin the azygos vein has an ascending course on the anterior and lateral facet of the vertebral column on the right side. It goes up to the level of the fourth thoracic vertebra where it forms an anterior curve around the pedicle of the right lung, this last part representing the arch of the azygos vein. In its course the azygos veins receives its tributaries such as the right posterior intercostal veins (except for the superior intercostals vein of the first intercostals space).

At the level of the eight thoracic vertebra, the azygos vein receives the hemiazygos vein, another of its tributaries. Usually the azygos vein has a lateral relation with the medial facet of the right lung on its vertebral part, leaving an impression, including the one of the azygos arch.

Numerous anatomical variations have been encountered and presented in anatomical literature concerning the azygos vein, its course and anatomical relations and its origin (some authors consider that there are individual aspects of this vein) [3].

From an embryological point of view, although there has been controversy, the idea that the azygos vein is formed from the proximal extremity of the right post-cardinal vein and the proximal part of the right super-cardinal vein is accepted; due to the simultaneous development of the azygos vein and the lungs, there is a possibility for supernumerary pulmonary lobes to develop such as the lobe of the azygos vein [4].

The lobe of the azygos vein can be considered equally as an anatomical variation or a malformation, without clinical significance, usually being a random discovery of imagistic studies or during studies on dissected cadavers (rarely on autopsies). The possibility of these anatomical variants has to not be overlooked; a thorough imagistic and radiologic examination is mandatory prior to thoracic surgery.

Because of its aberrant course through the superior lobe of the right lung to its drainage point in the superior vena cava, the azygos vein determines a fissure, sometimes even a septum (azygosseptum) [5], medial to which a supernumerary lobe is formed, the lobe of the azygos vein.

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Case report

A 57-year old male patient was clinically investigated by the general practitioner and the pneumologist; he received a recommendation for several investigations including imagistic studies. The patient underwent a chest x-ray and then a cardio-thoracic computed-tomography scan at a Clinic in Bucharest. The chest x-ray revealed a linear opacity in the projection site of the superior lobe of the right lung, medial to which there was a more transparent area. The suspicion of a space-substituting process made the computed-tomography examination mandatory, in view of a possible surgical procedure. The computed-tomography scan, with the axial slices (figure 1,2) and the bi-dimensional reconstructions, revealed an unusual course of the azygos vein, apparently through the parenchyma of the superior lobe of the right lung, ending in the superior vena cava.

Discussions

The way that the lobe of the azygos vein develops is related to the possibility that the azygos vein have different origins and pathways; even so, not all the anatomical variations of the azygos system are related to the apparition of this lobe. For the lobe of the azygos vein to exist a more lateral path of the azygos veins is needed, associated with an abnormal evolution of the right pulmonary bud in relation to the adjacent somatopleura and splachnopleura [6].

The azygos vein is formed on the posterior trunk wall and has an ascending path under the right parietal pleura (it derives from the somatopleura). Its superior extremity and its arch, in case that a lobe of the azygos vein exists, deviate laterally to the right. This modified trajectory affects also the parietal pleura (somatopleura) and the visceral pleura (splachnopleura), adjacent to the posterior facet of the superior lobe of the right lung. The four pleural sheets with the azygos vein in their free-margins, take the shape of a true septum (azygosseptum) [5]. They enter in the superior lobe of the right lung and they detach a medial portion shaped like a “drop of water” [5]. This will be recognized as the lobe of the azygos vein [7].

The importance of this anatomical variation is considerable :

- Any patient with insufficient or wrong imagistic studies can become a victim of a false diagnostic, sometimes alarming, such as a malignant space-substituting process.
- A computed-tomography scan or a magnetic resonance scan of the thorax has a critical importance prior to any surgery in that region.
- The presence of the azygos vein in pulmonary parenchyma can complicate the evolution of some erosive or infiltrative processes from the superior lobe of the right lung.
- Any surgical procedure in this region has to consider the possibility of this anatomical variation, in this case avoiding possible injury to the azygos vein or its tributaries.
- The discovery during the necropsy of a hemorrhage made by accidental injury to the azygos vein, in its aberrant trajectory, suggests a pre-operative misdiagnosis.

References

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