

Reentrance of Azygos Vein into Azygos Fissure After Pneumothorax

Prnömotoraks Sonrası Azigos Fissürüne Tekrar Yerleşen Azigos Veni

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ABSTRACT

Empty azygos fissure implies dislocation of the azygos vein to the mediastinal side of the right upper lobe from azygos fissure, which is usually secondary to pneumothorax, pleural effusion, parenchymal fibrosis, vertebral collapse or persistent vomiting. We are presenting here a case where a separated azygos vein in CT and radiography images was noted. Moreover, in the follow-up images, it appeared that the complete reexpansion of the right lung resulted in reentrance of the azygos vein into azygos fissure in its native position.

Keywords: Azygos vein, pneumothorax, multislice computed tomography, anatomic variation

öz

Boş azigos fissürü, azigos veninin pnömotoraks, plevral efüzyon, parankimal fibrozis, vertebral çökme ve persistan kusma gibi nedenlerle azigos fissüründen sağ üst lobun mediastinal tarafına doğru yer değiştirmesini ifade eder. Bu olgu sunumunda BT ve radyografilerde ayrılmış azigos veni bulunan ancak takip görüntülemelerde sağ akciğerdeki reekspansiyona bağlı azigos veninin azigos fissürü içine tekrar girdiği saptanan bir olgu sunulmuştur.

Anahtar Kelimeler: Azigos veni, pnömotoraks, çok kesitli bilgisayarlı tomografi, anatomik varyasyon

Introduction

An azygos fissure is observed in 0.4% of chest radiographs and 1.2% of thorax computed tomography (CT) scans as a normal anatomical variant [1, 2]. It is developed as a result of the penetration of the azygos vein through the right upper lobe. An empty azygos fissure is usually caused by the collapse of the right upper lung lobe, which causes displacement of the azygos vein from the azygos fissure [3]. In our case, the azygos vein showed re-entrance to the azygos fissure after a pneumothorax.

Case Report

A 15-year-old girl was admitted our hospital for the evaluation of scoliosis. Whole spine radiography (Siemens FD-X, Siemens, Erlangen, Germany) showed less than 10° of spinal curve in the lower thoracic region. Thoracic spine radiography showed an azygos fissure as an incidental finding. Three years later, when she was 18 years old, she was re-admitted with acute chest pain. Chest x-ray and CT (Sensation I6, Siemens, Erlangen, Germany) scans demonstrated a moderate amount of pneumothorax, which was accepted as the spontaneous type. CT scan also showed that the azygos vein separated completely from the azygos fissure (Figure 1, 2). A chest tube was placed, and proper treatment was provided. Re-expansion of the right lung was followed by chest radiography, and on the fourth day, the chest x-ray showed the complete re-expansion of the right lung and revealed re-entrance of the azygos vein into the azygos fissure. Two years after the admission, she was again admitted to our hospital with chest pain. Contrast-enhanced thorax CT was performed to elucidate the cause of the chest pain. CT showed not only the absence of a pneumothorax but also the native position of the azygos vein in the azygos fissure, which had been displaced from the right upper lobe because of the pneumothorax (Figure 3).

Written informed consent was obtained from the patient.



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Figure 1. Contrast-enhanced axial CT image using a mediastinal window setting (2 mm slice thickness) obtained at the level of upper lobes after chest tube insertion for a pneumothorax shows a pneumothorax with complete separation of the azygos vein (curved arrow) from the visceral pleural part of the azygos fissure (straight arrows).



Figure 3. Contrast-enhanced axial CT image (5 mm slice thickness) obtained at the level of the aortic arcus, which was performed 2 years after the treatment of the pneumothorax, shows no pneumothorax and shows the azygos vein (white arrows), which is in its native position.



Figure 2. Coronal reformatted contrast-enhanced CT image (3 mm slice thickness) shows a pneumothorax with complete separation of the azygos vein (curved arrow) from the visceral pleural part of the azygos fissure (straight arrows). This image also shows the azygos vein (curved arrow) and parietal part of the azygos fissure (empty arrow), which maintain their native position.

Discussion

Pulmonary tissue medial to the azygos fissure and vein is not accepted as a true lung lobe because it does not have its own bronchus [4]. In fetal growth, the right posterior cardinal and right supracardinal veins form the azygos vein [1]. The posterior cardinal vein takes a position medial to the right upper lobe. After that, the arch of the azygos vein goes down to the right paratracheal region until it reaches its normal anatomical location. Repression of the first medial movement of the right posterior cardinal vein prevents medial movement of the azygos vein. The azygos vein arbitrarily penetrates through the right upper lobe. The two-fold parietal and visceral pleura form a configuration that surrounds the azygos arch and forms the azygos fissure [5].

The azygos fissure is identified on chest radiography as a right paramediastinal extra line at the apex of the right lung. The azygos vein is visible

as a teardrop-shaped dense area at the bottom of the azygos fissure [6]. An empty azygos fissure implies the dislocation of the azygos vein from the azygos fissure to the mediastinal side of the upper lobe, which is usually found in association with a pneumothorax, pleural effusion, parenchymal fibrosis, vertebral collapse, and persistent vomiting [2, 5-7].

According to Maldjian and Phatak [5], there are two different mechanisms that may change the appearance of the azygos fissure. The first mechanism, which is more common, is that the parietal pleural layers disintegrate from the fissure while visceral pleural layers do not disintegrate during the re-expansion of the lung after a pneumothorax; hence, the fissure does not vanish but the azygos vein replaces the mediastinal surface. The second mechanism is that both the visceral and parietal pleural layers disintegrate during the expansion of the lung after a pneumothorax, which will envelop the lung apex and subsequently cause complete disappearance of the azygos fissure. In both the conditions, the parietal pleural layers do not separate from the azygos vein. They claim that the pneumothorax volume and depth of the azygos fissure determine the mechanism that will be involved.

In our patient, the azygos fissure maintained its shape after the re-expansion of the right lung, as seen in the first mechanism, but it contained the azygos vein, which was different the first mechanism. The initial radiography, which was performed for the evaluation of scoliosis, revealed that our patient had an azygos fissure with the azygos vein. We detected a separated azygos vein on CT scan and radiography, which were performed after chest tube placement for the pneumothorax. However, the difference appeared in follow-up images, which showed the re-entrance of the azygos vein into the azygos fissure after the complete re-expansion of the right lung; in other words, its previous position was retrieved.

One patient with an azygos fissure was reported by Villanueva et al. [6]; in this patient, the azygos vein was within the azygos fissure in CT images obtained a month after two episodes of a pneumothorax. In the sixth-month follow-up CT, they observed the azygos vein, which had separated from the azygos fissure because of apical fibrosis of the right lung. However, there was no image in their case showing two episodes of a pneumothorax and the separation of the azygos vein from the azygos fissure. In our case, on the other hand, the initial radiography showed the azygos fissure and vein before the pneumothorax. Besides, CT images showed the pneumothorax and separation of the azygos vein from the azygos fissure.

An azygos fissure usually has no clinical significance but may lead to hazards or technical difficulties during surgery [6]. Reporting an empty azygos fissure is important to prevent damage to the azygos vein that may occur during surgery [2]. Re-entrance of the azygos vein into the azygos fissure after a pneumothorax or pleural effusion may be important, particularly in terms of forensic medicine and critical care units. To the best of our knowledge, there have no reports in the literature regarding the potential re-entrance of the azygos vein into the azygos fissure. The awareness of clinicians and radiologists that the empty azygos fissure is not irreversible will prevent confusion that can occur during follow-up.

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