

## Incidental Finding of Pulmonary Azygos Lobe

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### Abstract

A middle aged male presented with dyspnea post-surgery for a benign brain tumour and was referred to the radiology department for Computerized Tomography Pulmonary angiography on account of suspected pulmonary embolism.

The Computerized Tomography Pulmonary angiogram (CTPA) showed filling defects in the RT and LT main pulmonary arteries, their segmental and subsegmental arteries confirming the pulmonary embolism. Incidentally visualized is an azygos vein which was displaced laterally with resultant creation of a deep pleural fissure in the apical segment of the right upper lobe creating an Azygos lobe? An Azygos lobe is a normal anatomic variant of the right upper lobe due to invagination of the azygos vein and pleura during embryological development in the fetus. It is not a true accessory lobe as it does not have its own bronchus and it can be mistaken for a bulla, abscess, pulmonary nodule or a lung mass. Radiologists need to have knowledge of this anatomical variant, document it in their reports and not describe it as pathology. This knowledge is also useful for thoracic surgeons and respiratory care physicians when they are performing thoracoscopic procedures for sympathectomy or doing a thoracic surgery.

**Keywords:** Azygos lobe; Azygos fissure; Lung; Computerized Tomography Pulmonary Angiogram

### Introduction

An azygos lobe is an unusual but important anatomical variant of the right lung anatomy [1,2]. Heinrich Wrisberg first recognized it during a postmortem exam in 1877 and it was first described on the chest radiograph in 1923 [1,3]. Azygos lobe is formed when a displaced right posterior cardinal vein penetrates into the apex of the lung instead of normal migration over it

during embryogenesis [4]. Its worldwide incidence ranges between 0.2%-1.2% with approximately 0.4% found on chest radiographs and 1% on anatomical dissection [5,6] It is more common in males than females and there is a predilection for family inheritance [7-9].

The azygos lobe can mimic various conditions such as bulla, abscess, pulmonary nodule, lung mass and even a case of primary adenocarcinoma arising from an azygos lobe has been reported. They are usually found incidentally during a pulmonary CT scan or chest radiography [10,11]. On a chest radiograph an azygos lobe is visualized as a parenchymal portion separated from the upper lobe by an azygos fissure which runs convex to the mediastinum and traverses the apex of the right lung which is triangular in shape at its upper portion (trigonum parietale)[1,4]. Here, we report a case of azygos lobe, diagnosed incidentally on a CTPA in a middle aged male with suspected pulmonary embolism.

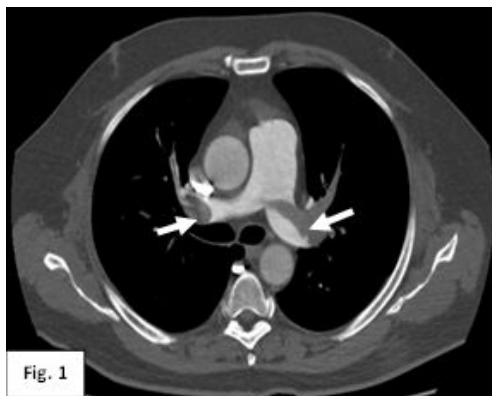
### Case Report

A middle aged male presented to the neurosurgical clinic with sudden collapse at home. Exactly 40 days prior to this he had undergone brain surgery for a benign brain tumour and had been on pharmacological therapy (enoxaparin) in addition to mechanical measures for Deep vein thrombosis prophylaxis since post-op day 3. On admission to hospital about an hour later, he had regained consciousness and his vital signs were as follows: BP 105/76 mmHg, Pulse 120/min and SpO2 92%, RR 36/minute.

Clinical examination was significant for tachypnea, tachycardia and oxygen saturation in the low 90's even on supplemental oxygen.

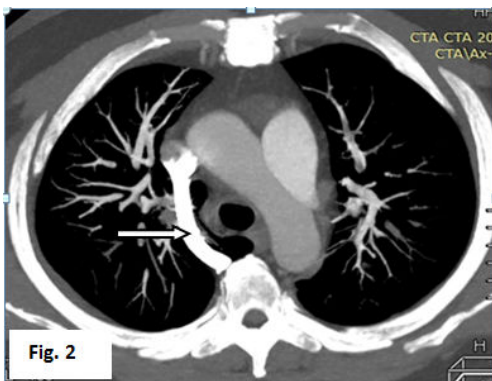
Pulmonary Embolism was suspected and after he was stabilised he was brought to the radiology department for CT pulmonary angiography.

The images of the CT pulmonary angiogram showed multiple filling defects in the RT and LT main Pulmonary arteries, their segmental and subsegmental arteries which was consistent with pulmonary embolism (**Figure 1**).

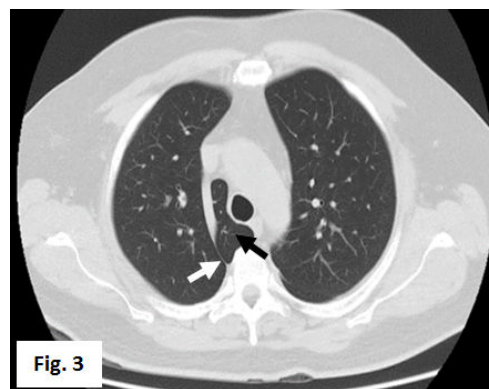


**Figure 1:** CT Pulmonary Angiogram (mediastinal window) at the level of the main pulmonary arteries showing filling defects (white arrows) in the RT and LT main pulmonary arteries and the segmental arteries consistent with Pulmonary embolism.

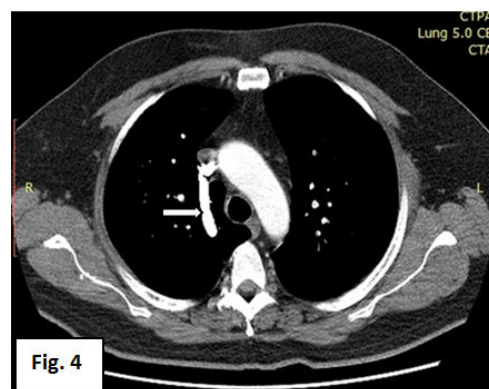
We also found incidentally an azygos vein which was displaced laterally with resultant creation of a deep pleural fissure (azygos fissure) in the apical segment of the right upper lobe creating an Azygos lobe and draining into the superior vena cava (SVC) (Figures 2-4).



**Figure 2:** CT Pulmonary Angiogram (MIP) at the level of the aortic arch showing the laterally displaced Azygos vein (white arrow) on the RT emptying into the SVC and creating an Azygos lobe.



**Figure 3:** CT Pulmonary Angiogram, lung window showing the azygos vein creating a deep pleural fissure / Azygos fissure (white arrow) into the apical segment of the right upper lobe creating an Azygos lobe (black arrow).



**Figure 4:** CT Pulmonary Angiogram, mediastinal window showing the laterally displaced Azygos vein (white arrow) on the RT creating an Azygos lobe and draining into the SVC.

He was treated and later discharged by the neurosurgical unit and he is doing well.

## Discussion

This case report describes a rare but an important anatomic variant of the right lung, found incidentally on a CTPA in a middle aged male who presented with pulmonary embolism.

An azygos lobe is an unusual but important anatomical variant of the right lung anatomy [1,2]. Heinrich Wrisberg first recognized it during a postmortem exam in 1877 and it was first described on the chest radiograph in 1923 [1,3]. Azygos lobe is formed when a displaced right posterior cardinal vein penetrates into the apex of the lung instead of normal migration over it during embryogenesis [4]. The incidence worldwide ranges between 0.2%-1.2% with approximately 0.4% found on chest radiographs and 1% on anatomical dissection [5,6]. It is more common in males than females and there is a predilection for family inheritance [7-9]. Our patient is a male however there is no known family history of an azygos lobe.

The azygos lobe can mimic various conditions such as bulla, abscess, pulmonary nodule, lung mass and even a case of primary adenocarcinoma arising from an azygos lobe has been reported. They are usually found incidentally during a pulmonary CT scan or chest radiography [10,11] as in this case. On a chest radiograph an azygos lobe is visualized as a parenchymal portion separated from the upper lobe by an azygos fissure which runs convex to the mediastinum and traverses the apex of the right lung which is triangular in shape at its upper portion (trigonum parietale)[1,4].

Azygos lobe is not a true accessory lobe because it is not an independent segment of the right lung [2,12]. It is considered a portion of the right upper lobe of the right lung as its arterial and bronchial supplies arise from the apical segment of the right upper lobe [6,13]. The left azygos lobe has been documented but this is extremely rare [14].

The azygos vein is normally formed by the union of the right subcostal vein and the right ascending lumbar vein at the level of the L1/L2 vertebrae. It passes through the diaphragmatic aortic hiatus into the thoracic cavity and ascends along the anterolateral surface of the thoracic vertebrae where it takes a curve at T4 and then joins the superior vena cava. On a Chest radiograph the azygos vein arch appears as a tear drop and is usually seen at the caudal point of the right paratracheal stripe, at the right tracheobronchial angle [15]. The azygos lobe is formed when the right posterior cardinal vein, which is one of the precursors of the azygos vein, penetrates the right lung apex, rather than migrating over it. The cardinal vein carries both pleural layers with it, resulting in entrapment of a portion of the right upper lobe. The double folds of visceral and parietal pleura form a mesentery like structure, termed the mesoazygos or azygos fissure, containing the azygos vein arch in its lower most portions [15].

The Azygos lobe is seen on the chest radiograph limited by the azygos fissure and this fissure appears as a fine convex line that crosses the apex of the right lung and on the CTPA shows the deep penetration of the lung behind the SVC and the trachea. The azygos fissure extends from the lateral aspect of the vertebral body posteriorly, to the right brachiocephalic vein and SVC anteriorly and consists of two layers of parietal pleura and two layers of visceral pleura. The azygos vein is seen as a thicker structure following the same path as the fissure and this was depicted in the CT Pulmonary angiogram images of our patient. The azygos vein usually drains into the SVC, but occasionally in the right brachiocephalic vein [16]. The azygos vein was seen draining into the SVC in our patient. We could not obtain his Chest Radiograph and the scannogram obtained before the CT Pulmonary angiogram did not reveal much.

An important feature of an azygos fissure or pleural folds is that it helps in preventing dissemination of infection to the azygos lobe from adjacent parts of the lung; however multiple cases of spontaneous pneumothorax associated with an azygos lobe have been reported. Recurrent hemoptysis, as a complication of an azygos lobe, has also been reported. An azygos vein aneurysm can also occur, which may present as a round or oval paratracheal shadow [15].

Two cases have been reported where the phrenic nerve was seen coursing within the azygos fissure [17], the azygos fissure is however free in this patient and did not demonstrate any abnormality.

The first case of pulmonary azygos lobe reported in Ghana was encountered during a thoracotomy for modified Blalock-Taussig shunt in a 3-year old boy [18]. This is the second case being reported.

A detailed understanding or knowledge of this anatomical variant is crucial as an azygos lobe might increase the risk of neurovascular injuries with resultant excessive blood loss or phrenic nerve injury and other complications during thoracoscopic procedures for sympathectomy or thoracic surgery [19,20] and radiologists also need to know this anatomic variant in order not to mistaken it for a pulmonary pathology.

## Conclusion

Radiologists should be aware of this rare anatomic variant, look for it and note it in their reports as knowledge of this anatomical variant is important in order to prevent misdiagnosis and/or unnecessary interventions. In addition knowledge of the various lesions that might occur in the azygos lobe and the azygos fissure will cause early visualization and diagnosis on imaging. This knowledge is also useful for thoracic surgeons and respiratory care physicians when they are performing thoracoscopic procedures for sympathectomy or thoracic surgery.

## Conflicts of Interest

The authors wish to state that there is no conflict of interest.

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## References

1. Felson B (1989) The azygos lobe: its variation in health and disease. *Seminars in Roentgenol* 24: 56–66.
2. Salve VT, Atram J S, Mhaske Y V (2015) Azygos lobe presenting as right para-tracheal shadow. *Lung India* 32: 85–86.
3. Gill AJ, Cavanagh, SP, Gough, MJ (2004) The azygos lobe: An anatomical variant encountered during thoracoscopic sympathectomy. *Eur J Vasc Endovasc Surg*, 28: 223-224.
4. Mata J, Caceres J, Alegret X, Coscojuela P, De Marcos J, et al. (1991) Imaging of the azygos lobe: Normal anatomy and variations. *AJR Am J Roentgenol* 156: 931-937.
5. Arakawa T, Terashima T, Miki A (2008) A human case of an azygos lobe: Determining an anatomical basis for its therapeutic postural drainage. *Clin Anat*, 21: 524-530.

6. Gourahari P, Satyajeet S, Siladitya M, Yera D, Suman KJ, et al. (2017) Azygos lobe-a rare anatomical variant. *J Clin Diagn Res* 11: 243-248.
7. Shinichi Fukuhara, Marissa Montgomery, Angelo Reyes (2013) Robot-assisted azygos lobectomy for adenocarcinoma arising in an azygos lobe. *Interact Cardiovasc Thorac Surg* 16: 715-717.
8. Fisher MS (1985) Re: Adam's lobe. *Radiology* 154: 547-547.
9. Postmus PE, Kerstjens J M, Breed A, Jagt EVD (1986) A Family with Lobus Venae Azygos. *Chest*, 90: 298-299.
10. Darlong LM, Ram D, Sharma A, Sharma AK, Iqbal SA, et al. (2017) The Azygos Lobe of the Lung. In: *The Case of Lung Cancer*. *Indian J Surg Oncol*, 8: 195-197.
11. Kotov G, Dimitrova I N, Iliev A (2018) A Rare Case of an Azygos Lobe in the Right Lung of a 40-year-old Male. 10: 2780.
12. Chabot-Naud A, Rakovich G, Chagnon K, Ouellette D, Beauchamp G, et al. (2011) A curious lobe. *Can Respir J* 18: 79-80.
13. Wall J, Stawicki SP (2017) The azygos lobe. *Int J Acad Med* 3: 189-90.
14. Lesser MB (1964) Left Azygos Lobe: Report of a case. *Chest* 46: 95-96.
15. Jamal A Amos L, Kevin B Martin, Joel P (2018) Azygos lobe: A rare cause of right paratracheal opacity. *Respir Med Case Rep* 23: 136-137.
16. Fortin F, Amini B, et al. Azygos lobe. *Radiopaedia*.
17. Bancroft A, Stephens RE (2007) Course variability of the phrenic nerve in the presence of an azygos lobe: *Clin Anatomy* 20: 982-983.
18. Edwin F, Gyan B, Tettey M, Kotei D, Frimpong-Boateng K, et al. (2009) A pulmonary azygos lobe encountered during thoracotomy for modified Blalock-Taussig shunt.
19. Delalieux S, Hendriks J, Valcke Y, Somville J, Lauwers P, et al. (2006) Superior sulcus tumor arising in an azygos lobe. *Lung Cancer* 54: 255-257.
20. Ndiaye A, Ndiaye NB, Ndiaye A, Diop M, Ndoeye JM, et al. (2012) The azygos lobe: an unusual anatomical observation with pathological and surgical implications. *Anat Sci Int* 87: 174-178.