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An Azygos lobe: A case series

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Abstract:
Background: *Azygos lobe is a rare, anatomical variation found in the upper lobe of the right lung. Typically located in the apico medial region of the right lung, the azygos lobe is separated from the rest of the right upper lobe by a visible fissure called the azygos fissure. It is not considered a true separate lobe, as it lacks its own bronchus and does not correspond to a specific bronchopulmonary segment. Radiologically it is a rare paratracheal opacity. Prevalence is 1% in cadaveric specimen,0.4% in chest radiograph and 1.2% in HRCT. It is developed embryologically when the posterior cardinal vein migrates through the upper lobe of the lung.*
Materials and Method: *CXR film and CT scan film were obtained from the Department of Radiodiagnosis and Respiratory Medicine, RIMS. Consent were taken from the patient. Place of study: Department of Anatomy in association with, Radiodiagnosis and Respiratory Medicine Department, RIMS.*
Case series: *Case 1: A 70 years old, male, presented with complaints of dyspnea and chest pain and patient is known case of Chronic Obstructive Pulmonary (COPD) under supportive treatment. Chest X-Ray shows a linear opacity extending from apex of right lung to mediastinal border. NCCT were taken for further evaluation and it revealed presence of fibro parenchymal band extending from the apex of right lung to the mediastinal surface with inward concavity separating and forming an accessory lobe. Case 2: A case of road traffic accident of a male aged 25 years with complain of chest pain. Chest X-Ray was taken and azygos lobe was detected accidentally. Case 3 and 4 underwent only CT scan and revealed azygos lobe.*
Conclusion: *The azygos lobe often discovered incidentally during radiological examinations and the awareness of its anomaly is crucial especially for anatomist, surgeons, radiologist and respiratory medicine. The fine convex line that crosses the apex may mimic the appearance of pleural line seen in pneumothorax. The consolidation of the azygos lobe may mimic a lungs mass. A comprehensive knowledge of this anatomical variant is vital to avoid complications during thoracoscopic surgery. From an Anatomist's perspective, the azygos lobe represents a fascinating example of anatomical variation and developmental complexity within the thoracic cavity.*
Keywords: *Case series, Azygos Lobe, Computed tomography*

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I. Introduction

The azygos lobe or lobus azygos is a rare anatomical variant present in the upper lobe of the right lung. This malformation was first described by Wrisberg in 1778[1]. It does not correspond to a specific independent bronchopulmonary segment of the lung and according to many authors, the term "azygos lobe" is a misnomer because this part of the lungs does not have its own bronchus or vessels[2]. It is a most well-known lung malformation and most common in the right lung but cases in the left lung has also been reported[3,4]. This anomaly was first recorded by Wrisberg in 1777 on right and left lungs of a three years old boy[5,6]. The azygos lobe was detected incidentally by classical radiography and modern clinical imaging methods[7,8]. Despite a being common malformation, there are presently few anatomic details concerning the azygos lobe. This potential lobe has been called to the attention during thoracic surgery. The incidence reported to be at a range from 0.2% to 1.2 %[9,10,11,12]. The prevalence in the clinical setting is 0.4% in chest radiograph, 1% in anatomical dissection and 1.2% in HRCT [3,13].

An azygos lobe is developed embryologically when the posterior cardinal vein migrates through the upper lobe of the right lung[14]. As a result, two pleural layers are carried through the right upper lobe creating a fissure known as the azygos fissure. Four pleural layers are carried through the right upper lobe creating the azygos fissure. It is a lobe separated from the rest of the lung by a deep groove called an azygos fissure which consist of a folds of parietal pleura wrapped around the azygos vein to form "meso azygos"[15]. It is presumed that the cause of azygos fissure is genetic and depends upon an autosomal dominant gene[16]. The azygos fissure can be classified base on the size and position of the associated azygos lobe which appears in imaging particularly Chest X-Rays, Type A: the fissure is more horizontal, with azygos lobe extending laterally to the apex of the lung, Type B: The

fissure is more vertical, with the azygos lobe occupying a more central position, Type C: The fissure is more medial with the azygos lobe located closer to the mediastinum [17]. While most of the posterior cardinal veins regress during embryological development, the right-sided supracardinal veins form a portion of the inferior vena cava, the intercostal veins, the hemiazygos vein, and the azygos vein. Interestingly, the failure of regression of left-sided supracardinal veins has been reported. This failure leads to such anomalies as the persistence of left superior and inferior vena cava[18,19]. Normally, the posterior cardinal vein migrates over the apex of the right lung to its final position in the mediastinum.

The nerve supply of an azygos lobe is analogous to the nerve supply of any other segments of the lung. The hilum of each lung contains a pulmonary plexus composed of efferent and afferent nerve fibers from the vagus nerve as well as fibers from the sympathetic trunk and cardiac nerve plexus[20].

The characteristic features observed in the radiological findings are tear drop or comma or linear shaped shadow corresponding to an aberrant fissure between the shadow and a triangle shaped parietal shadow known as triagonum parietale and a denser ovoid shadow indicating the confluence of the azygos vein with superior vana cava[21]. Despite the fact that many cases of the azygos lobe are described, the knowledge about it among the clinicians is still insufficient. Lack of this knowledge may lead to the diagnostic failures and surgical difficulties. It is important to be able to recognize the presence of a right azygos lobe to prevent the wrong interpretation during studying and reading various chest radiologic images.

II. Method

Four cases of azygos lobe were found in patients during the radiological examinations of the thorax in the Department of Radiology, RIMS, Imphal. The study was then performed in association with Department of Radiodiagnosis and Department of Respiratory Medicine, RIMS, Imphal. The imaging data and medical history were collected from the Radiodiagnosis and Respiratory department. The written informed consent was taken from the patients. The subject's medical records were reviewed for the clinical manifestations, past known disease and outcomes. Out of four cases, Case 1 underwent chest X-Ray and CT scan, Case 2 underwent only chest X-Ray and Case 3 and 4 underwent only CT scan. The measurement of the azygos lobe was done by using Horos DiCom viewer.

CASE 1

A 70 years old male with a history of heavy smoking and chronic obstructive pulmonary disease (COPD) currently on supportive treatment presented with chest pain and dyspnea. Chest X-Ray revealed a linear opacity in the right upper zone (Fig.1). Extending from apex of the right lung to the mediastinal border.

Non contrast CT scan were taken for further evaluation. A fibro parenchymal band extending from the apex of right lung to the mediastinal surface with inward concavity separating the azygos lobe was observed on CT (Fig.2). Tear drop sign was observed in the coronal view of CT (Fig.3). Right anterior truncus artery is seen arising from the right pulmonary artery just medial to the right main bronchus and bifurcates into two branches, the first branch supplying the azygos lobe (Fig.4). Second branch gives rise to segmental arteries to apical(A1), posterior(A2) and anterior(A3) bronchopulmonary segments of the upper lobe (Fig.5). Azygos lobe measurement was also taken and it measured: 5.8 cm (Anteroposteriorly), 6.6 cm (Height) and 2.6cm (Transverse) in the apico-medial aspect of right lung with azygos vein in the caudal end of the band at the level of 4th thoracic intervertebral disc.

CASE 2

25 years old male came to the casualty after road traffic accident with complain of chest pain. Chest X-Ray was taken and azygos lobe was detected on Chest X-Ray film showing azygos fissure crossing the right upper lung field but no azygos vein (Fig.6).

CASE 3

30 years old male attended in the Chest Medicine OPD with complaints of recurrent cough with sputum. After investigation was done Acid Fast Bacilli was found to be negative, CT scan was also done and revealed normal lungs parenchyma but azygos fissure and azygos vein was seen in the mediastinal side of the upper lobe of right lung (Fig.7).

CASE 4

60 years old male with known case of COPD presented in Respiratory Medicine Department with the complaints of chest pain and dyspnea. Azygos vein n fissure was revealed on HRCT (Fig 8).

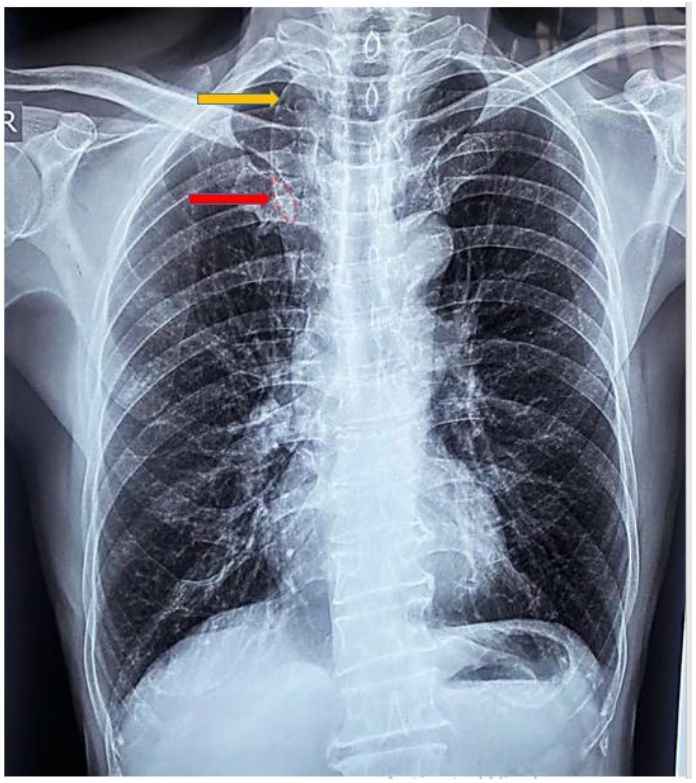

Fig 1: Chest radiograph of the case showing azygos fissure and vein (red arrow).

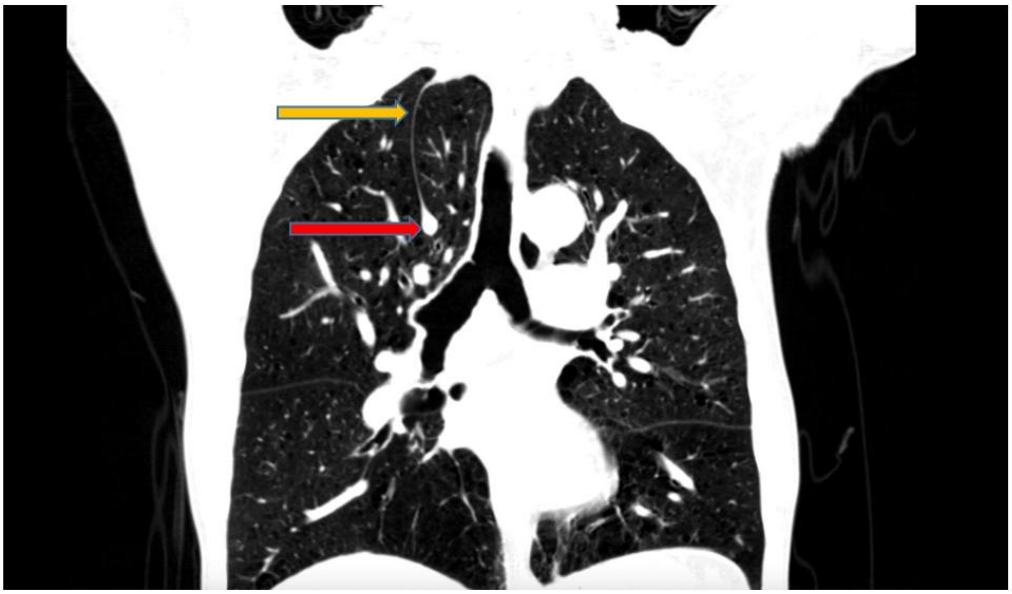

Fig 2: Coronal view of Azygos fissure in Non contrast CT. A fibro parenchymal band extending from the apex of right lung to the mediastinal surface with inward concavity separating the azygos lobe.

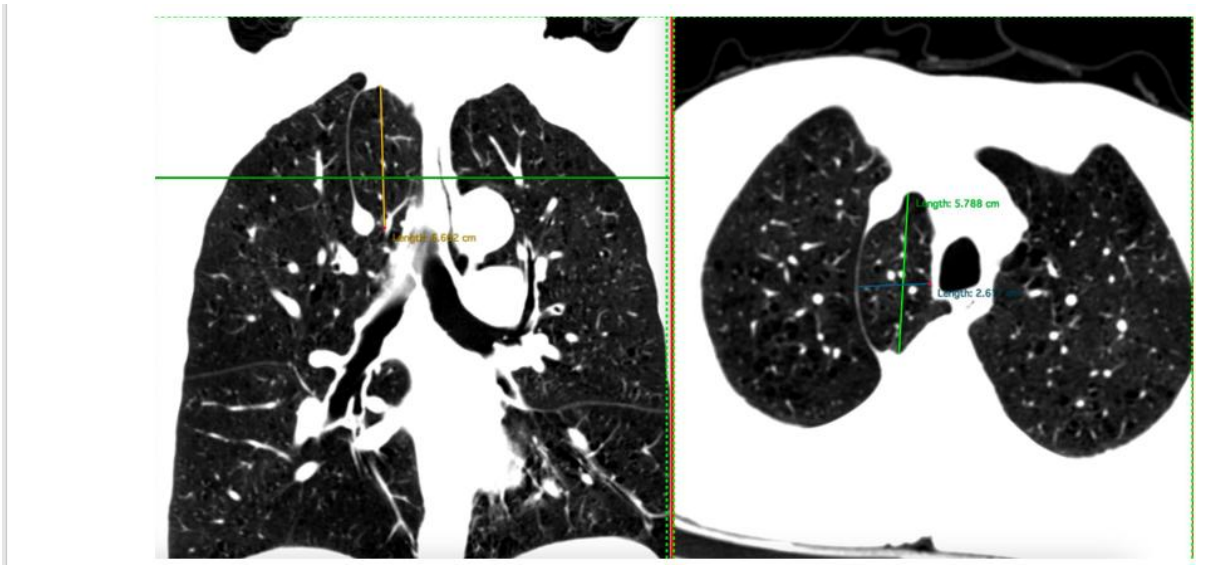

Fig 3: Coronal & Axial view of the Azygos lobe showing azygos fissure with "Tear Drop" sign

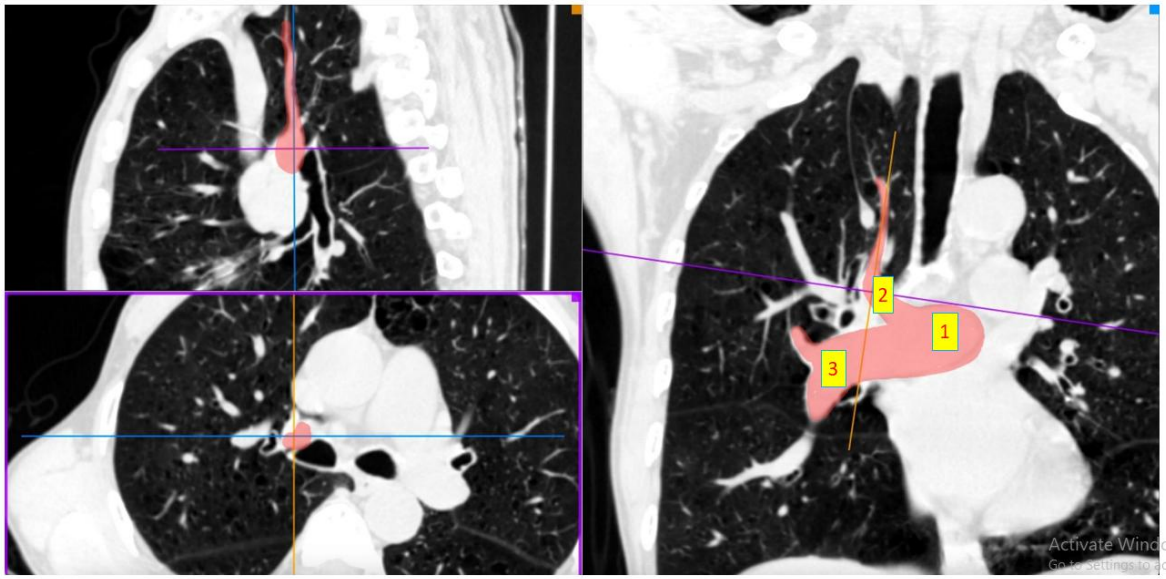

Fig.4: CT scan showing Right main pulmonary artery (1), Anterior truncus branch (2) and Descending Interlobar branch (3). Azygos lobe measurement: 5.8 cm (Anteroposteriorly), 6.6 cm (Height) and 2.6cm (Transverse) in the apico-medial aspect of right lung with azygos vein in the caudal end of the band at the level of 4th thoracic intervertebral disc.

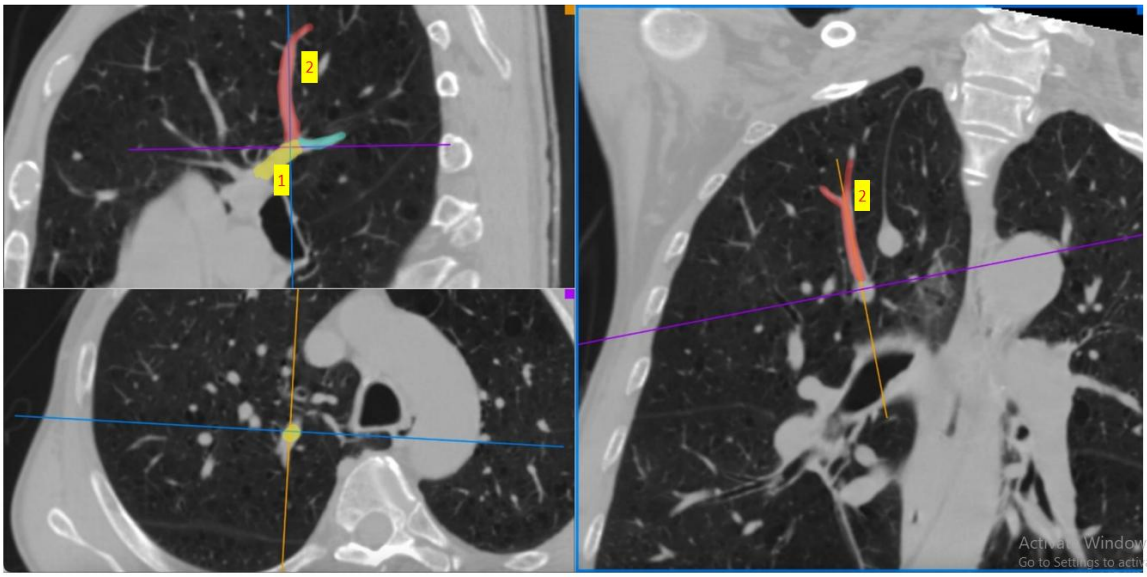

Fig. 5: CT scan showing Anterior truncus artery (1) and apical segmental artery (2).

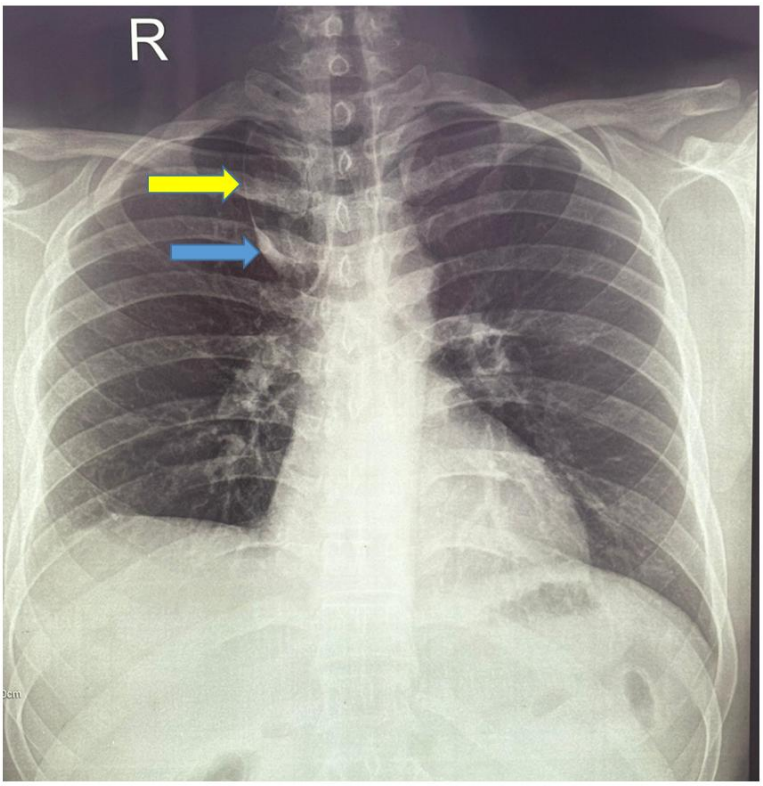

Fig.6: Chest X-Ray: showing azygos fissure (yellow arrow), vein (blue arrow) and lobe.

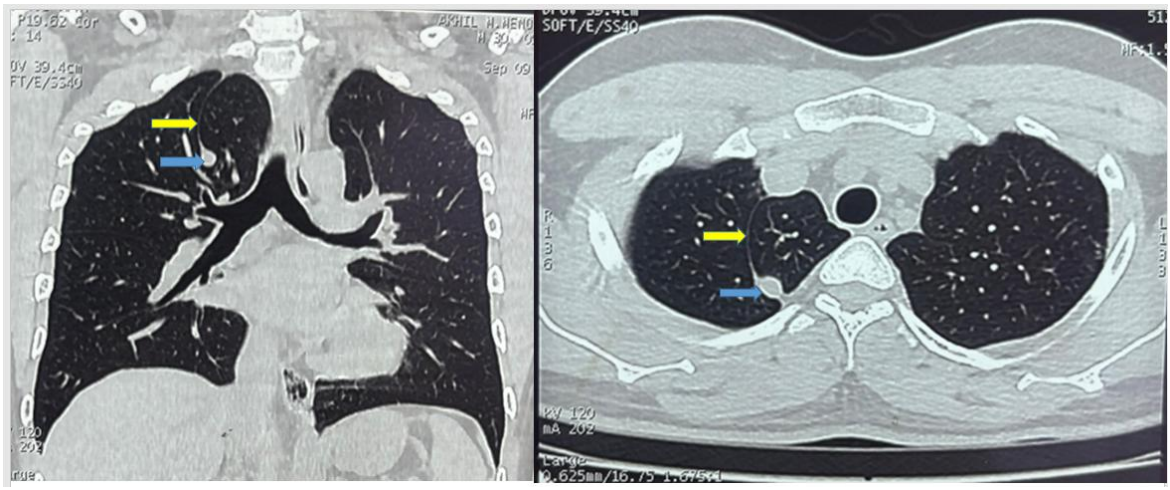

Fig.7: Coronal and Axial section showing azygos fissure azygos (yellow arrow), vein (blue arrow) and lobe.

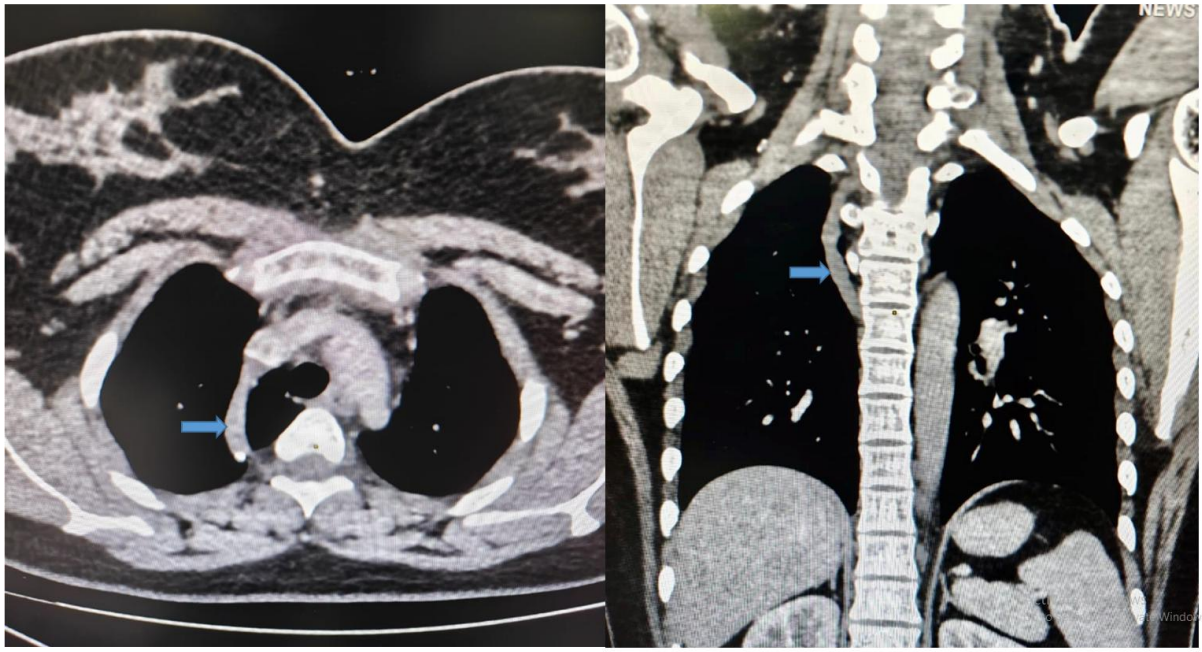

Fig.8: Axial and coronal section of CT showing azygos vein (blue arrow).

III. Discussion

The first anatomical description of the azygos lobe was published by Heinrich Wrisberg in 1770. This anatomical variation has clinical and clinical consequences. Despite the fact that many cases of the azygos lobe are described, the knowledge about it among the clinicians is still insufficient. Lack of this knowledge may lead to the diagnostic failures and surgical difficulties. It is important to be able to recognize the presence of a right azygos lobe to prevent the wrong interpretation during studying and reading various chest radiologic images, since it can mimic a mass, a lung abscess, pulmonary nodule or a bulla [22,23,24]. It might change the normal location of the superior vena cava or cause right paratracheal opacity[23]. It could also be misidentified in AIDS patients with tuberculosis, when a fistula between a large lymph node and the esophagus is seen[25]. Consolidation of the azygos lobe can mimic a lung mass as stated by A. Chabot-Naud[22],J.Wall and S.P[26]. They also mentioned that azygos lobe is embryologically a part of the right upper lobe and its bronchial and arterial supply arises from the apical or posterior segments of the right upper lobe. J Wall and S.P[26], J.E. Takasugi[27] stated that left azygos lobe has been reported as well, but it is extremely rare. Smith et al.[28] reported that in thoracoscopic procedures, recognition of the azygos lobe is particularly important as partial obstruction of surgical site during thoracoscopic sympathectomy. Surgeons should be ready for different surgical procedures if they encounter the right azygos lobe since its presence makes surgery using a thoracoscope more difficult, increasing the probability of bleeding throughout the thoracic surgery[29,30] and particularly during sympathectomies[31]. Bancroft et al[32] reported two cases

where the phrenic nerve was coursing within the azygos fissure. Multiple cases of spontaneous pneumothorax associated with an azygos lobe have been reported by J. Wall[26] and G. Pradhan[33]. Recurrent hemoptysis, as a complication of an azygos lobe has also been reported by Denega et al[34]. Changes in the intrathoracic pressure may result in the "empty azygos fissure" phenomenon, in which the medial displacement of the azygos vein occurs after the re-expansion of the collapsed lung, secondary to pneumothorax or pleural effusion as well as a shortened meso-azygos[35,36].

P. Icard[37] described that in rare cases, the azygos vein aneurysm can also occur which may present as a round or oval paratracheal shadow. In idiopathic or congenital cases, these aneurysms are commonly located in the arch of the vein and remain asymptomatic or may be accompanied by pressure like or tightness sensation in the chest. An untreated azygos vein aneurysm can predispose to the risk of rupture, thrombosis or pulmonary embolism.

IV. Conclusion

The azygos lobe is often discovered incidentally during radiological examinations. Awareness of this anomaly is crucial for Anatomist, Radiologist, Pulmonologist and Surgeons. The fine convex line that crosses the apex may mimic the appearance of pleural line seen in pneumothorax. The consolidation of the azygos lobe may mimic a lungs mass. A comprehensive knowledge of this anatomical variant is vital to avoid complications during thoracoscopic surgery. The azygos lobe represents a fascinating example of anatomical variation within the thoracic cavity providing unique insights into lung development and its associated variations, which can be of particular interest for academicians, clinicians and researcher. As azygos lobe is a rare anatomical malformation, since many anatomy textbooks and radiology atlases do not mention the right azygos lobe, this study with enrich the existing literature with new data.

References

[1]. Wrisberg HA(1777) Observationes anatomicae de vena azyga duplici,aliisque hujus venae varietatibus. Novis Commentariis Societas Reg. Scient., Goettingen,TOME III,14
[2]. V.T. Salve, J.S. Atram Y.V. Mhaske, Azygos lobe presenting as right para-tracheal shadow,Lung India 32(1)(2015Jan-Feb)85-86
[3]. Akhtar J, Lal A, Martin KB, Popkin J. Azygos lobe: A rare cause of right paratracheal opacity. Respir Med Case Rep. 2018 Feb 3;23:136-137.
[4]. Mpolokeng KS, Madolo MY, Louw GJ, Gunston G. Anatomical variations in lung fissures leading to supernumerary lobes in the lungs. Translational research in anatomy. 2022 Sep 1;28:100209.
[5]. Stibbe P. The accessory pulmonary lobe of the vena azygos. J Anat.1919 53:305-314.
[6]. Cimen M, Erdil H, Karatepe T. A cadaver with azygos lobe and its clinical significance. Anat Sci Int. 2005 Dec;80(4):235-7.
[7]. Cohen AG, Dooneief AS. Azygos lobe revealed by planar roentgenography. Am J Roentgenol Radium Ther. 1951 Feb;65(2):183-4.
[8]. Arslan G, Cubuk M, Ozkaynak C, Sindel T, Lüleci E. Intrapulmonary right brachiocephalic vein associated with azygos lobe. Clin Imaging. 2000 Mar-Apr;24(2):84-5.
[9]. BOYDEN EA. The distribution of bronchi in gross anomalies of the right upper lobe particularly lobes subdivided by the azygos vein and those containing pre-eparterial bronchi. Radiology. 1952 Jun;58(6):797-807.
[10]. Chiba S, Suzuki T, Takahashi D, Kasai T. An autopsy case of azygos lobe and the extra-pulmonary course of the bronchial veins in man. Okajimas Folia Anat Jpn. 1990 Mar;66(6):313-37.
[11]. Ariyürek OM, Gülsün M, Demirkazik FB. Accessory fissures of the lung: evaluation by high-resolution computed tomography. Eur Radiol. 2001;11(12):2449-53.
[12]. Aziz A, Ashizawa K, Nagaoki K, Hayashi K. High resolution CT anatomy of the pulmonary fissures. J Thorac Imaging. 2004 Jul;19(3):186-91.
[13]. B.Felson, The azygos lobe: its variation in health and disease, Semin. Roentgenol. 24(1989) 56-66.
[14]. Moawad CM, Griepp Moawad KA et al. The azygos lobe of the lung. Pulmonology.2022; 28(3):241-42.
[15]. Rivand Y, Maldijian PD. The azygos vein from A to Z. J Thoracic imaging. 2009;34(5):W100-W108.
[16]. Mpokeng KS, Madolo KS, Madolo MY, Louw GJ et al. Autosomal variations in lung fissure leading to supernumerary lobes in lungs. Trans Res Anat. 2022; 28:100209.
[17]. Ndiaye A, Ndiaye NB, Ndiaye A, Diop M, Ndoye JM, Dia A. The azygos lobe: an unusual anatomical observation with pathological and surgical implications. Anat Sci Int. 2012 Sep;87(3):174-8.
[18]. Nemec J, Heifetz S. Persistence of left supracardinal vein in an adult patient with heart-hand syndrome and cardiac pacemaker. Congenit Heart Dis. 2008 May-Jun;3(3):219-22. [PubMed]
[19]. Kotov G, Dimitrova IN, Iliev A, Groudeva V. A Rare Case of an Azygos Lobe in the Right Lung of a 40-year-old Male. Cureus. 2018 Jun 11;10(6):e2780.
[20]. Wang J, Li J, Liu G, Deslauriers J. Nerves of the mediastinum. Thorac Surg Clin. 2011 May;21(2):239-49.
[21]. Bendick, A.J. and and Wessler, H.: The azygos lobe of the lung. Amer. J. Roentgenol. & Rad. Therapy.1928;20: 1-6.
[22]. Chabot-Naud A, Rakovich G, Chagnon K, Ouellette D, Beauchamp G. A curious lobe. Can Respir J. 2011 Mar-Apr;18(2):79-80.
[23]. Akhtar J., Lal A., Martin K.B., Popkin J. Azygos lobe: A rare cause of right paratracheal opacity. Respir. Med. Case Rep. 2018;23:136–137.
[24]. Munn S. Pseudoazygos lobe caused by lymph node pneumatocele. J. Thorac. Imaging. 2002;17:310–313.
[25]. Mata J, Cáceres J, Alegret X, Coscojuela P, De Marcos JA. Imaging of the azygos lobe: normal anatomy and variations. AJR Am J Roentgenol. 1991 May;156(5):931-7.
[26]. Wall J, Stawicki SP. Interesting clinical image: The azygos lobe. OPUS 12 Scientist 2009;3(2):28-29.
[27]. Takasugi JE, Godwin JD. Left azygos lobe. Radiology. 1989 Apr;171(1):133-4.

[28]. Smith J, Karthik S, Thorpe JA. Pulmonary azygous lobe: a potential obstacle during thoracoscopic sympathectomy. Eur J Cardiothorac Surg. 2004 Jan;25(1):137.
[29]. Sadikot R.T., Cowen M.E., Arnold A.G. Spontaneous pneumothorax in a patient with an azygos lobe. Thorax. 1997;52:579–580; discussion 5–6.
[30]. Rauf A., Rauf W.U., Navsa N., Ashraf K.T.A. Azygos lobe in a South African cadaveric population. Clin. Anat. 2012;25:386–390.
[31]. Reisfeld R. Azygos lobe in endoscopic thoracic sympathectomy for hyperhidrosis. Surg. Endosc. 2005;19:964–966.
[32]. Bancroft A, Stephens RE. Course variability of the phrenic nerve in the presence of an azygos lobe: two case reports. Clin Anat. 2007 Nov;20(8):982-3.
[33]. Pradhan G, Sahoo S, Mohankudo S, Dhanurdhar Y, Jagaty SK. Azygos Lobe - A Rare Anatomical Variant. J Clin Diagn Res. 2017 Mar;11(3):TJ02.
[34]. Denega T, Alkul S, Islam E, Alalawi R. (2015). Recurrent hemoptysis - a complication associated with an azygos lobe. The Southwest Respiratory and Critical Care Chronicles, 2015;11(/3):44-47.
[35]. Lenoir V, Kohler R, Montet X. The empty azygos fissure. J Radiol Case Reports 2013; 7 (4):10–15.
[36]. 5. Betschart T, Goerres GW. Azygos lobe without azygos vein as a sign of previous iatrogenic pneumothorax: two case reports. Surg Radiol Anat 2009 Aug; 31(7):559-562.
[37]. P.Icard,E Fares,J.F Regnard,P.Levasseur,Thrombosis of an idiopathic saccular azygos aneurysm,Eur.