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ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Left Azygos Lobe and Its Vein: A Rare Anatomical Variant with Clinical Implications

Sol Azigos Lobu ve Veni: Klinik Etkileri Olan Nadir Bir Anatomik Varyant

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ABSTRACT

Introduction: Although anatomical variations of the azygos system are uncommon, they hold clinical significance, particularly when misinterpreted as pathological findings on imaging. Among these variations, the presence of a left azygos lobe and its associated venous anomaly are especially rare and often under-recognized.This study aims to raise awareness of the left azygos lobe and its associated vein as an uncommon venous variation, and to highlight its anatomical, embryological, and clinical relevance through radiological illustrations and literature review.

Case: This descriptive study presents cases illustrating medial entrapment of the left upper lobe by an aberrant left superior posterior intercostal vein, forming a rare left azygos lobe configuration. Multidetector computed tomography with multiplanar reconstructions was used to visualize vascular and parenchymal anatomy. Embryological correlations and potential clinical implications were also examined through a review of relevant radiological and anatomical literature.

Results: Imagings revealed left azygos lobe variant with a medially displaced left upper lobe, entrapped by a dilated vein coursing between the aortic arch and the lung apex. The vein was identified as left superior posterior intercostal vein, forming a pseudo-fissure without bronchovascular separation. This variation mimicked a soft tissue mass on chest radiography and was clarified by cross-sectional computed tomography. Recognition of this anomaly prevented unnecessary diagnostic procedures.

Conclusion: The awareness of rare venous anomalies, such as the left azygos lobe and its associated vein, is essential for radiologists to avoid misdiagnosis. Computed tomography imaging offers reliable identification of such variations and enhances understanding of thoracic venous anatomy, aiding in surgical and interventional planning. Improved awareness of these variations can prevent misdiagnosis and guide future prevalence-based studies.

Keywords: Azygos lobe, left superior intercostal vein, anatomical variation, thoracic CT, venous anomaly, embryology

ÖZ

Giriş: Azygos sistemin anatomik varyasyonları nadirdir ancak özellikle görüntülemede patolojik bulgularla karıştırıldığında klinik açıdan önemlidir. Bu varyasyonlar arasında, sol azygos lobu ve ona eşlik eden venöz anomali oldukça nadir olup genellikle fark edilmez. Bu vaka temelli radyolojik analiz aracılığıyla, sol azygos lobu ve ona eşlik eden venin anatomik, embriyolojik ve klinik önemini tanımlamak amaçlanmıştır.

Olgu: Bu tanımlayıcı çalışma, nadir görülen bir sol azygos lob konfigürasyonu oluşturan aberan sol superior posterior interkostal ven tarafından sol üst lobun mediyal tuzağa düşmesini gösteren bir vakayı sunmaktadır. Vasküler ve parankimal anatomiyi görüntülemek için çok dedektörlü bilgisayarlı tomografi ve multiplanar rekonstrüksiyonlar kullanılmıştır. Radyolojik ve anatomik literatür temelinde embriyolojik ilişkiler ve olası klinik sonuçlar da gözden geçirilmiştir.

Bulgular: Görüntüleme, aort kavsi ile akciğer tepesi arasında seyreden dilate bir ven tarafından mediyal olarak yer değiştirmiş sol üst lob ile birlikte bir sol azygos lob varyantını ortaya koymuştur. Bu ven, bronkovasküler ayrım olmaksızın yalancı bir fissür oluşturan sol superior posterior interkostal ven olarak tanımlanmıştır. Bu varyasyon, akciğer grafisinde yumuşak doku kitlesi olarak taklit edilmiş, kesitsel bilgisayarlı tomografi ile açıklığa kavuşturulmuştur. Bu anomalinin tanınması gereksiz tanısal girişimlerin önüne geçmiştir.

Sonuç: Sol azygos lobu ve ona eşlik eden ven gibi nadir venöz anomalilerin farkında olmak, radyologlar için yanlış tanıların önlenmesi açısından çok önemlidir. BT görüntüleme, bu tür varyasyonların güvenilir şekilde tanımlanmasını sağlar ve torasik venöz anatomiyi anlamayı geliştirerek cerrahi ve girişimsel planlamaya katkıda bulunur.

Anahtar Sözcükler: Azygos lob, sol superior interkostal ven, anatomik varyasyon, torasik BT, venöz anomali, embriyoloji

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Introduction

The azygos system is a paravertebral venous tract in the posterior thorax that includes the azygos, hemiazygos, and accessory hemiazygos veins (1). It connects the superior and inferior venae cavae. Actually, the azygos systems generate essential collateral routes that serve as a critical shunt when the principal pathways are blocked (2).

Abnormalities in embryonic development can lead to a range of venous system anomalies. Variations in the azygos venous system are radiologically well-known to be prevalent with a 0.5–1.2% incidence. Azygos system variations almost never result in symptoms (3). While the exact incidence is unknown, the left azygos lobe and its vein, which are seen significantly less frequently, have been documented in the literature (Table 1). However, it remains under-recognized in both radiological practice and anatomical literature (4).

This article aims to provide a comprehensive descriptive review of the left azygos lobe and its associated vein, with emphasis on embryological development, anatomical course, and clinical implications. By integrating radiological imaging with embryological and anatomical context, this manuscript seeks to increase awareness of this rare entity and to encourage future studies investigating its prevalence and diagnostic significance.

Anatomical and Embryological Background

To better understand the anatomical positioning, embryological development, and potential diagnostic implications of the left azygos lobe and its associated vein, it is essential to first review the relevant venous anatomy of the thorax. In this context, the structures of the superior and inferior vena cava and their developmental variations provide a foundational basis. These venous components not only contribute to normal systemic circulation but also exhibit several rare variants that can mimic pathological findings on imaging. The following sections outline the anatomy, embryology, and clinical significance of these major thoracic venous pathways, offering a framework to contextualize the rare presentation of the left azygos lobe.

Superior Vena Cava

Anatomy

The right and left brachiocephalic veins, collectively referred to as the innominate veins, converge to form the superior vena cava (SVC), which courses vertically downward behind the sternum. The azygos vein drains into the SVC through the azygos arch (Fig. 1). The azygos arch curves over the right lung hilum, passing from posterior to anterior, before draining into the SVC (3).

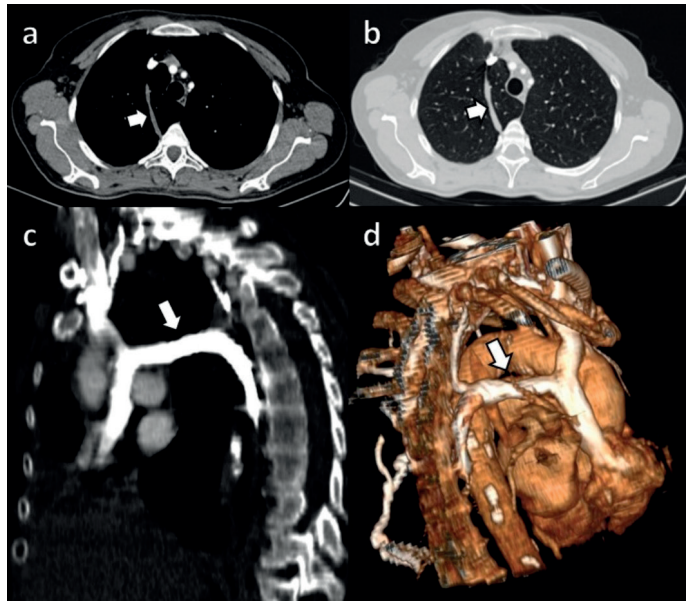

Figure 1. Axial contrast enhanced thorax CT mediastinal and parenchyma window images (a, b) of azygos vein (white arrows), azygos fissure and azygos lobe. MPR sagittal image (c) and 3D reformat image (d) show azygos arch (white arrow).

Table 1. Literature review of the left azygos lobe cases

Year	Author	Title
1954	Weston WJ	Left-sided Lobe of the Azygos Vein
1964	Lesser MB	Left Azygos Lobe. Report of A Case
1967	Hanke R	The Accessory Hemiazygos Vein in the x-ray Picture; Contribution to the Problem of the "Left Azygos Lobe"
1989	Takasugi JE, Godwin JD	Left Azygos Lobe
2003	Ishii A, Fuse S, Kubo N, Hatakeyama K, Takamuro M, Tomita H, Tsutsumi H	Improvement of Protein-losing Enteropathy by Coil Embolization of the Left Azygos Vein
2006	Hazirolan T, Ozkan E, Haliloglu M, Celiker A, Balkanci F	Complex Venous Anomalies: Magnetic Resonance Imaging Findings in a 5-year-old Boy
2009	Uemura M, Takemura A, Ehara D, Yasumitsu H, Ohnishi Y, Suwa F	Left Superior Vena Cava with Left Azygos Vein
2013	Keskin S, Keskin Z, Sekmenli N	The Independent Right and Left Azygos Veins with Hemiazygos Absence: A Rare Case Presentation
2020	Ayyildiz V, Aydin F, Ogul H	Unusual Coexistence In Situs Inversus Totalis; Right Arcus Aorta, Variant Left Azygos Lobe, and Aberrant Left Subclavian Artery
2020	Tang Z, Teng Y, Li J, Du X, Xiao J, Tang G	Left Upper Lung Cancer With Persistent Left Superior Vena Cava and Left Azygos Vein: A Case Report
2020	Notsu E, Ono K, Horie S, Morris JF, Toida K	Double Superior Venae Cavae with Absence of the Coronary Sinus and Anomalies of the Azygos Venous System
2020	Shiri E, Madadi S	An Abnormal Course of the Interazygos Vein: A Case Report

Embryology

Under normal development, the left anterior cardinal vein and the adjacent segment of the common cardinal vein regress. The SVC originates from the proximal portion of the right anterior cardinal vein and the right common cardinal vein. Failure of regression of the left anterior cardinal vein and the corresponding part of the common cardinal vein leads to the formation of a persistent left SVC (Fig. 2) (0.5–2% of population) (5).

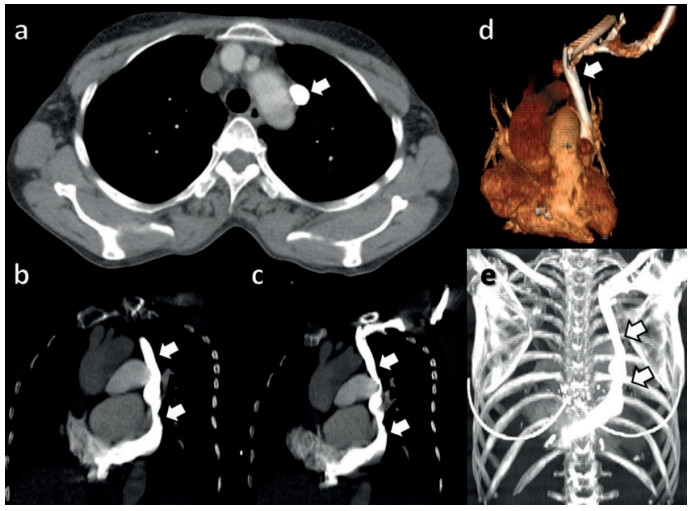

Figure 2. After left arm IV contrast administration, axial contrast enhanced thorax CT image (a), coronal MPR images (b, c), 3D reformat image (d) and MIP image (e) shows the persistent left vena cava superior vein (white arrows).

Clinical Significance

Superior vena cava syndrome may arise as a consequence of complete or partial obstruction of the SVC. This syndrome is most commonly seen secondary to malignancy (Fig. 3). The severity of symptoms depends on the development of rich collateral via azygos venous system network (6).

Many patients develop multiple collateral pathways. Most veins draining in SVC are connected to a rich network of venous plexus. These venous plexus networks are not normally used. If there is venous occlusion, they become visible and provide a clue for location of occlusion. The shunting by the help of the intercostal veins to azygos venous system and creating caval-caval anastomosis (Fig. 4) by the help of the superficial veins are the most important systems enabling anastomosis (7).

Inferior Vena Cava

Anatomy

The inferior vena cava (IVC) is formed by the union of the right and left common iliac veins, typically at the level of the L5 vertebra. The IVC is positioned along the right anterolateral side of the vertebral column. (8).

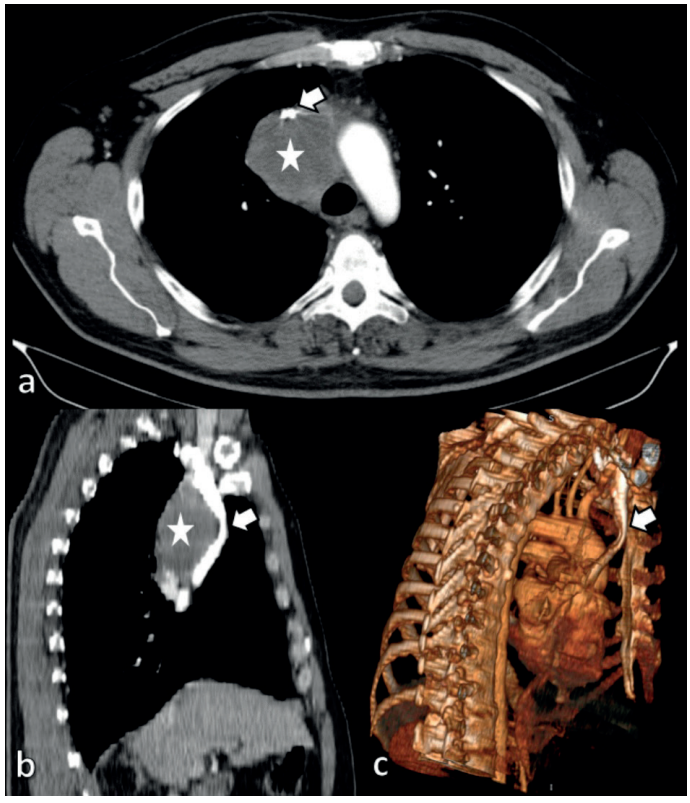

Figure 3. Axial and sagittal contrast enhanced thorax CT mediastinal window images (a, b) and 3D reformat image (c) shows mass lesion (white stars) and partial obstruction of superior vena cava (white arrows).

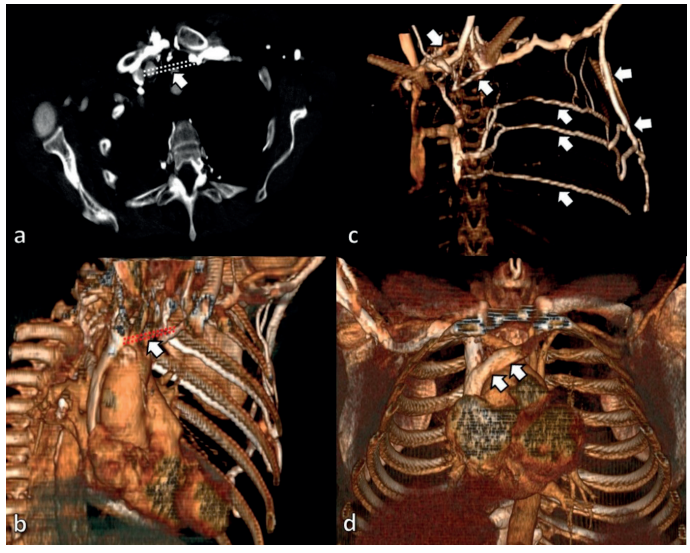

Figure 4. On axial contrast enhanced thorax CT and 3D reformat images (a, b) there is an interrupted course of left innominate vein (white and red dots). 3D reformat image (c) shows rich network of venous plexus (white arrows). The left subclavian vein continues as shunting by the help of the intercostal veins to azygos venous system and creating caval-caval anastomosis by the help of the superficial veins in same patient (c). 3D reformat image (d) shows normal left innominate vein (white arrows).

Embryology

The formation of the right-sided IVC involves the sequential development and remodeling of three paired embryonic venous systems: the posterior cardinal, subcardinal, and supracardinal veins. This formation occurs as certain segments of these venous

systems undergo anastomosis, while others regress. (9). Due to the complexity in its embryogenesis, there are numerous variations of IVC.

The most common anatomical variation of the IVC is a duplicated IVC (Fig. 5), occurring in 0.2–3% of cases. Duplication of the IVC occurs when both the right and left supracardinal veins persist. Anomalies involving the suprarenal segment of the IVC are comparatively less common (Fig. 6a), with an incidence of about 0.6%. A rare variant is an intrahepatic interruption of the IVC with azygos continuation (Fig. 6b), which occurs when the right subcardinal vein does not merge with the vitelline vein to form the intrahepatic segment of the IVC (10).

Another variation is circumaortic left renal vein (Fig. 7). The incidence of this anomaly is 1.5–16%. Anastomotic communications between subcardinal and supracardinal veins form a collar of veins encircling the aorta. A circumaortic vein forms when the dorsal venous collar fails to regress during embryonic development. If the dorsal collar persists and ventral collar regresses, it is called retroaortic left renal vein (Fig. 8). The incidence of this anomaly is 0.8–3.7% (9).

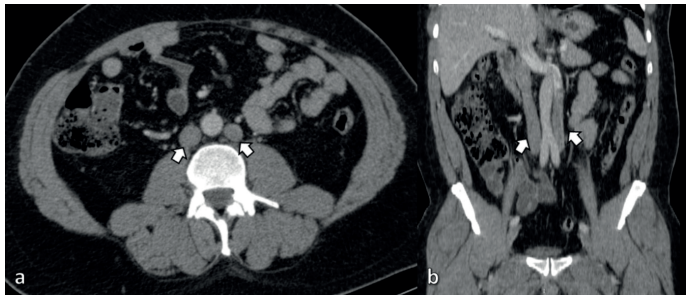

Figure 5. On axial and coronal contrast enhanced abdomen CT images (a, b) you can see duplicated inferior vena cava (white arrows).

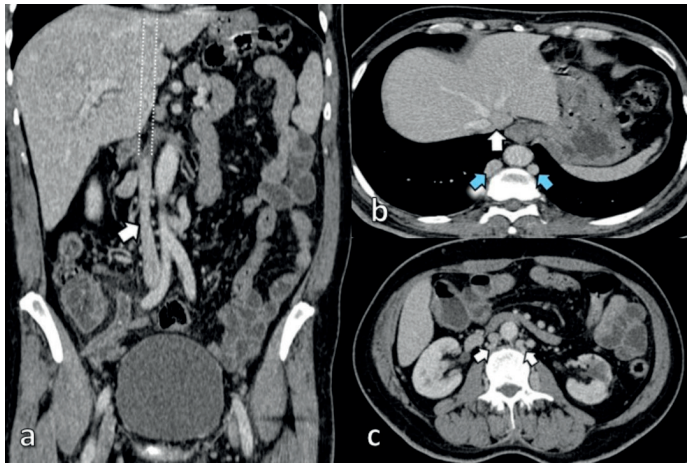

Figure 6a. On coronal CT image (a), infrarenal IVC is intact (white arrow), whereas the suprarenal portion of the IVC is absent (white dots). (b) The intrahepatic IVC is intact and the hepatic veins drain into the hepatic segment of the IVC (white arrow) on axial CT image. (c) The interrupted IVC continues by the help of lumber venous plexus (white arrows) on axial CT image and drains into the azygos and hemiazygos veinous system on axial CT image. You can see enlarged azygos and hemiazygos veins (blue arrows) on image b.

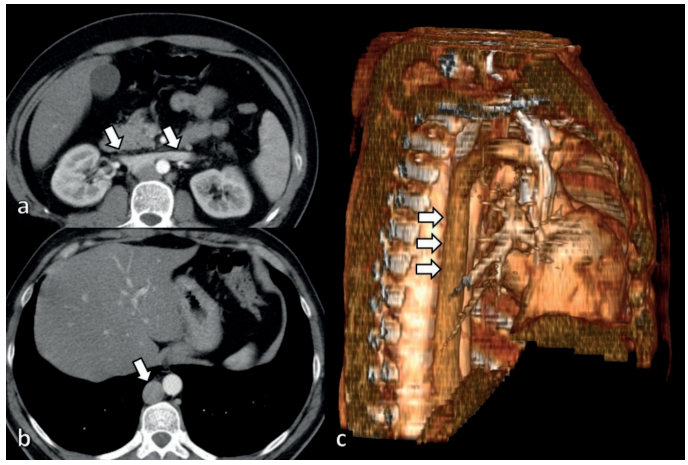

Figure 6b. In another case additionally absence of the intrahepatic IVC is present too. (a) On axial CT image, blood in renal veins return in the azygos system directly (white arrows). On axial CT image (b) and 3D reformat image (c) you can see enlarged azygos vein (white arrows).

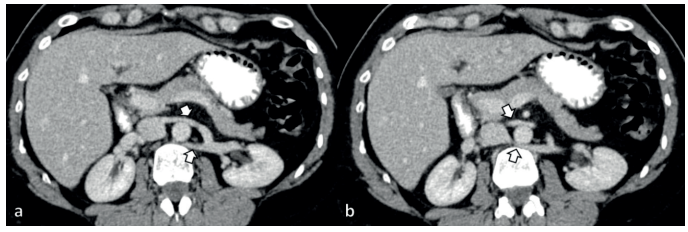

Figure 7. You can see circumaortic left renal vein (white arrows) of axial enhanced abdomen CT images (a, b).

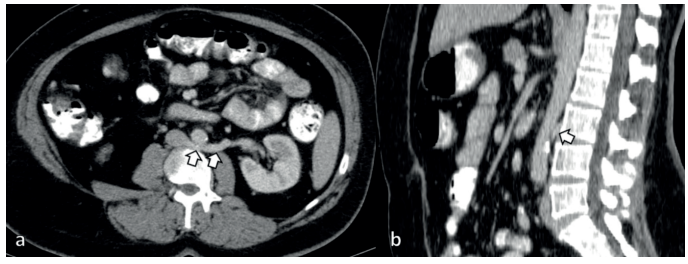

Figure 8. On axial MPR and sagittal contrast enhanced abdomen CT images (a, b) you can see retroaortic left renal vein (white arrows).

Clinical Significance

Retroaortic renal vein variation is usually asymptomatic, but may cause hematuria and abdominal/flank pain due to compression of left renal vein like nutcracker syndrome (11).

Complete or partial obstruction of the IVC can occur resulting in a condition like non-specific abdominal or back pain; may also include lower extremity cramping, swelling or pain. These occlusion conditions may be seen secondary to malignancies, which may alter staging and surgical management (Fig. 9) (12).

Recurrent deep venous thromboses and pulmonary emboli refractory to treatment with anticoagulation may require placement of an inferior vena cava filter. Congenital anomalies may cause difficulty in vascular access and IVC filter placement. Understanding variant IVC anatomy helps avoid problems in several situations during IVC filter placement (13).

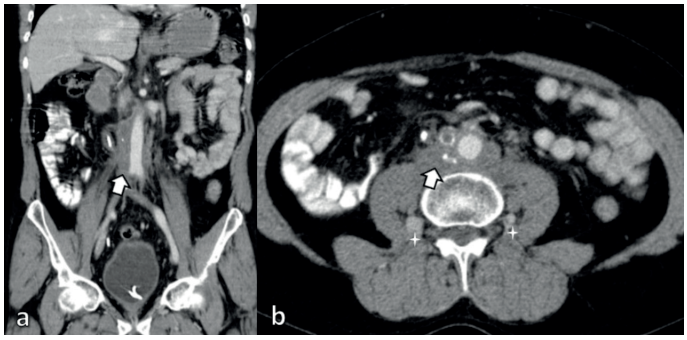

Figure 9. On coronal and axial contrast enhanced abdomen CT images (a, b) you can see complete obstruction of IVC because of malignancy (white arrows). (b) Be aware of enlarged lumber venous collateral pathways (white stars).

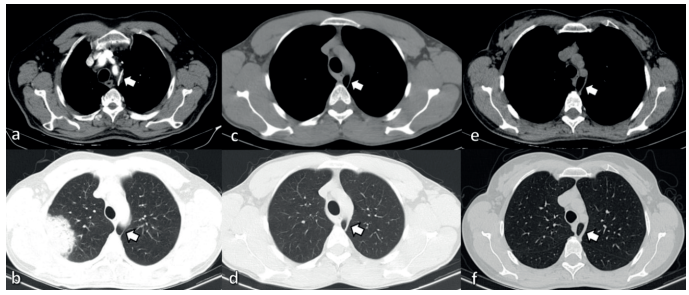

Figure 10. (a) You can see normal posterior superior intercostal vein course (white arrow) on axial enhanced thorax CT image. The other images (b-f) there are case examples of left upper lobe entrapped medially by an aberrant course of posterior superior intercostal vein, «left azygos lobe» can be seen (white arrows).

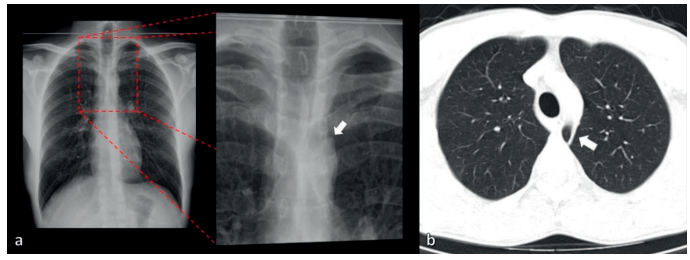

Figure 11. Posteroanterior (PA) chest radiograph (a) shows the "aortic nipple" sign due to a dilated left superior posterior intercostal vein (white arrow). Axial thoracic CT (b) demonstrates a left azygos lobe formed by medial entrapment of the left upper lobe.

Left Azygos Lobe and Its Vein

Anatomy

Although the azygos lobe and the left azygos lobe are termed accessory lobes, they do not represent true accessory lobes, as they lack a separate bronchus and arterial supply (14).

The azygos lob is a right lung variation that is seen 0.5–1.2% in population. The azygos lobe is located medially in upper lobe of right lung and usually diagnosed incidentally on imaging. It is separated from other segments of upper lobe by azygos fissure, which contains the azygos vein and four pleural layers (15). While the exact incidence is unknown, the left azygos lobe and its vein variation is located upper lobe in same way (4).

Embryology

Normally, the posterior cardinal vein passes through the apex of the right lung before settling into its typical anatomical location. An azygos lobe forms when, instead of following this usual migration path during embryonic development, the right posterior cardinal vein penetrates the lung apex. This lobe results from a failure of the azygos vein to shift medially toward the right tracheobronchial junction, staying above the lung apex instead (14).

Results

The aberrant vein described in this article corresponds to left superior posterior intercostal vein. The left superior posterior intercostal vein is an anatomical structure that we are familiar with in interventional radiology due to the frequently improper placing of central venous catheters when the SVC is obstructed (16). Under normal conditions, it courses adjacent to the aortic arch and drains into the left brachiocephalic vein.

The left azygos lobe may result from a medial movement-migration defect of the left superior posterior intercostal vein above the lung apex (Fig. 10) (4).

The clinical significance of the presence of the left superior posterior intercostal vein, which creates the appearance of "aortic nipple" on the chest X-ray, can be seen more clearly on the chest X-ray when it is dilated (Fig 11) (17). This dilatation is sometimes mistaken for a mediastinal tumor, lymphadenopathy, or aneurysm (18). Evaluation for inferior vena cava agenesis, Budd-Chiari Syndrome, superior or inferior vena cava obstruction is recommended in the presence of dilated left superior posterior intercostal vein in the cross-sectional examination (19).

Conclusion

In a 12-week-old fetus, the proximal portion of the left posterior cardinal vein persists, giving rise to the root of the left azygos vein. The right supracardinal vein differentiates into the right hemiazygos and accessory hemiazygos veins. Through an anastomotic connection, the right hemiazygos vein extends into the left azygos vein, which further continues into the left SVC. The left SVC drains into the right atrium via the coronary sinus (Fig. 12 and 13) (20).

Venous variations are often linked with various cardiovascular anomalies, including endocardial cushion defects, tetralogy of Fallot, and aortic coarctation. In patients with a left SVC, catheterization can lead to severe complications such as shock, cardiac arrest, or angina, likely due to catheter manipulation within the coronary sinus. Recognizing these venous variations is crucial in interventional radiology and cardiothoracic surgery to ensure that appropriate cannulation techniques are used, effectively diverting the substantial volume of systemic venous blood entering the heart through the coronary sinus (Fig. 14)

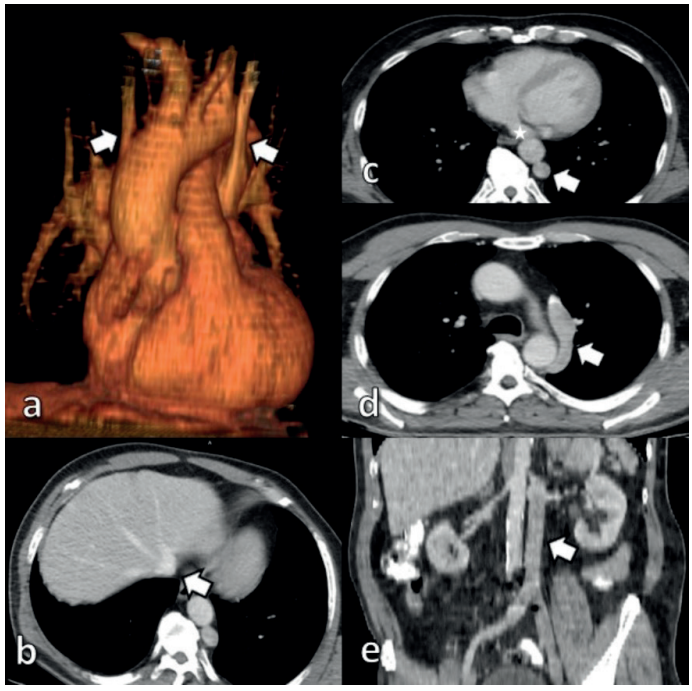

Figure 12. (a) 3D reformat image reveals double superior vena cava (white arrows). (b) The intrahepatic IVC is intact and the hepatic veins drain into the hepatic segment of the IVC (white arrow) on axial CT image. On coronal reformat CT image (e), infrarenal left IVC is intact (white arrow), whereas the suprarenal portion of the IVC is absent. (c, d) Left IVC continues by the help of left azygos vein (white arrows). There is anastomotic vein (white star) between the left superior vena cava and the right atrium through the coronary sinus.

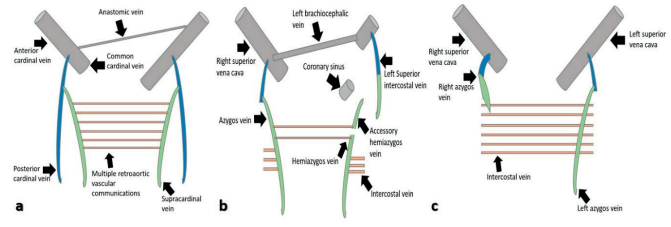

Figure 13. Schematic diagrams of SVC and the azygos venous system. (a) A schematic diagram of veins related to the SVC and azygos veins in the fetal period. (b) Usual morphology of the superior vena cava and the azygos system of veins. (c) The left azygos vein morphology.

Figure 14. Digital subtraction angiography (DSA) image in a patient demonstrates careful placement of a central venous port catheter. Recognition of thoracic venous variations –particularly the presence of a persistent left superior vena cava and prominent coronary sinus– enabled successful and complication-free catheterization (Courtesy of Assoc. Prof. Dr. Mehmet Fatih İnecikli, used with permission).

(21). It is also known that being informed of the patient's variations and existing anatomy prior to any surgical operation boosts the likelihood of success. Radiologist should be aware of *left azygos lobe and its vein* to identify variations correctly.

In conclusion, CT plays a key role in diagnosing vascular anomalies, offering high spatial resolution with multiplanar reconstructions and volume-rendered imaging. Recent advances in CT technology, coupled with dose-reduction techniques, enable the acquisition of essential diagnostic information at lower radiation levels. Recognizing rare anatomical variants such as the left azygos lobe and its associated vein not only prevents potential diagnostic pitfalls but also deepens our understanding of thoracic vascular anatomy. By presenting and characterizing this unusual variation, this manuscript aims to raise awareness among radiologists and to encourage further research into its incidence and clinical implications.

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Consent of Patients: The participants were informed in detail, and informed consent was obtained.

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Author Contributions: Concept - Ş.B.A.; Design - Ş.B.A.; Supervision - Ş.B.A.; Data Collection and/ or Processing - Ş.B.A.; Analysis and/or Interpretation - Ş.B.A.; Literature Search - Ş.B.A.; Writing - Ş.B.A.; Critical Reviews - Ş.B.A.

References

1. Dudiak CM, Olson MC, Posniak HV. CT evaluation of congenital and acquired abnormalities of the azygos system. Radiographics. 1991;11(2):233–246. https://doi.org/10.1148/radiographics.11.2.2028062
2. Lawler LP, Corl FM, Fishman EK. Multi-detector row and volume-rendered CT of the normal and accessory flow pathways of the thoracic systemic and pulmonary veins. Radiographics. 2002;22(Suppl 1):S45–60. https://doi.org/10.1148/radiographics.22.suppl_1.g02oc05s45
3. Piciucchi S, Barone D, Sanna S, Dubini A, Goodman LR, Oboldi D, et al. The azygos vein pathway: an overview from anatomical variations to pathological changes. Insights Imaging. 2014;5(5):619–628. https://doi.org/10.1007/s13244-014-0351-3
4. Demos TC, Posniak HV, Pierce KL, Olson MC, Muscato M. Venous anomalies of the thorax. AJR Am J Roentgenol. 2004;182(5):1139–1150. https://doi.org/10.2214/ajr.182.5.1821139
5. Verma M, Pandey NN, Ojha V, Kumar S, Ramakrishnan S. Developmental anomalies of the superior vena cava and its tributaries: What the radiologist needs to know? Br J Radiol. 2021;94(1118):20200856. https://doi.org/10.1259/bjr.20200856
6. Sheth S, Ebert MD, Fishman EK. Superior vena cava obstruction evaluation with MDCT. AJR Am J Roentgenol. 2010;194(4):336–346. https://doi.org/10.2214/AJR.09.2894
7. Lacout A, Marcy PY, Thariat J, Lacombe P, El Hajjam M. Radio-anatomy of the superior vena cava syndrome and therapeutic orientations. Diagn Interv Imaging. 2012;93(7-8):569–577. https://doi.org/10.1016/j.diii.2012.03.025
8. Shin DS, Sandstrom CK, Ingraham CR, Monroe EJ, Johnson GE. The inferior vena cava: a pictorial review of embryology, anatomy, pathology, and interventions. Abdom Radiol (NY). 2019;44(7):2511–2527. https://doi.org/10.1007/s00261-019-01988-3
9. Ghandour A, Partovi S, Karuppasamy K, Rajiah P. Congenital anomalies of the IVC-embryological perspective and clinical relevance. Cardiovasc Diagn Ther. 2016;6(6):482–492. https://doi.org/10.21037/cdt.2016.11.18

10. Petik B. Inferior vena cava anomalies and variations: imaging and rare clinical findings. Insights Imaging. 2015;6(6):631–639. https://doi.org/10.1007/s13244-015-0431-z
11. Ufuk F. CT angiography of posterior nutcracker syndrome. Radiology. 2021;298(2):295. https://doi.org/10.1148/radiol.2020203826
12. Smillie RP, Shetty M, Boyer AC, Madrazo B, Jafri SZ. Imaging evaluation of the inferior vena cava. Radiographics. 2015;35(2):578–592. https://doi.org/10.1148/rg.352140136
13. Doe C, Ryu RK. Anatomic and technical considerations: inferior vena cava filter placement. Semin Intervent Radiol. 2016;33(2):88–92. https://doi.org/10.1055/s-0036-1581089
14. Akhtar J, Lal A, Martin KB, Popkin J. Azygos lobe: a rare cause of right paratracheal opacity. Respir Med Case Rep. 2018;23:136–137. https://doi.org/10.1016/j.rmcr.2018.02.001
15. Mata J, Caceres J, Alegret X, Coscojuela P, De Marcos JA. Imaging of the azygos lobe: normal anatomy and variations. AJR Am J Roentgenol. 1991;156(5):931–937. https://doi.org/10.2214/ajr.156.5.2017954
16. Vahid B, Kotiah S, Marik P. Malposition of central venous catheter in left superior intercostal vein in a patient with superior vena cava syndrome. Radiography. 2007;13(4):307–309. https://doi.org/10.1016/j.radi.2006.03.006
17. Friedman AC, Chambers E, Sprayregen S. The normal and abnormal left superior intercostal vein. AJR Am J Roentgenol. 1978;131(4):599–602. https://doi.org/10.2214/ajr.131.4.599
18. Deşer SB, Demirağ MK. A dilated left superior intercostal vein misdiagnosed as aortic dissection. Turk Gogus Kalp Dama. 2017;25(3):475–476. https://doi.org/10.5606/tgkdc.dergisi.2017.14259
19. Cortez JV, Vanlandingham W, Conner KS. Enlargement of the left superior intercostal vein – "Aortic Nipple". J Am Osteopath Coll Radiol. 2018;7(2):13–15.
20. Uemura M, Takemura A, Ehara D, Yasumitsu H, Ohnishi Y, Suwa F. Left superior vena cava with left azygos vein. Okajimas Folia Anat Jpn. 2009;86(2):55–60. https://doi.org/10.2535/ofaj.86.55
21. Hazirolan T, Ozkan E, Haliloglu M, Celiker A, Balkanci F. Complex venous anomalies: magnetic resonance imaging findings in a 5-year-old boy. Surg Radiol Anat. 2006;28(5):534–538. https://doi.org/10.1007/s00276-006-0125-9