Original Article

DOI: 10.7860/JCDR/2024/68678.19022

Prevalence of Azygos Lobe of the Lung in Southern Indian Cadaveric Population: A Retrospective Observational Study

Anatomy Section

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ABSTRACT

Introduction: The azygos lobe is a developmental anomaly found in the upper lobe of the right lung. It has a prevalence of 0.4% in clinical scenarios and 1% during routine anatomical dissections. Clinically, the azygos lobe mimics various conditions. It is a rare incidental finding during chest radiography or Computed Tomography (CT).

Aim: To determine the prevalence of the azygos lobe during anatomical dissection.

Materials and Methods: A retrospective observational study was conducted over a 13-year period from June 2010 to August 2023 in various medical colleges in Mangaluru, Karnataka, India. A total of 102 adult cadavers were studied. The dissected right and left lungs of each cadaver were examined for the presence or absence of an azygos lobe and recorded. The morphology of the azygos lobe was studied, including its size, the presence of the azygos fissure, the depth of the azygos fissure, and the course of the azygos vein. The presence of mesoazygos was also checked, and its attachments were noted. Descriptive statistics were used in terms of frequency and percentage.

Results: Out of the 102 cadavers, only one right lung had an azygos lobe. None of the cadavers had bilateral azygos lobes. The maximum height of the lobe was 5.8 cm, and the width was 4.5 cm. An azygos fissure was found, through which the mesoazygos was present. The mesoazygos was located from the lung to the thoracic wall.

Conclusion: Despite being an incidental finding, the azygos lobe is clinically important. Physicians should be aware of this anomaly, and thoracic surgeons should exercise caution during surgeries involving the thoracic region, such as Video-Assisted Thoracic Sympathectomy (VATS).

Keywords: Azygous fissure, Lung, Mesoazygos, Video-assisted thoracic sympathectomy

INTRODUCTION

The right lung is divided into superior, middle, and inferior lobes by an oblique and a horizontal fissure [1]. Very rarely, a small accessory lobe is found on the upper part of the right lung, which is separated from the rest of the lobe by a deep groove that lodges the azygos vein. This is named as an azygos lobe, lobe of the azygos vein, or accessory pulmonary lobe of the right lung by many different authors [2]. The first finding of the presence of an accessory lobe in the apex of the right lung was made by Wrisberg in 1778 from anatomical studies, and he named it lobus Wrisbergi [3]. The azygos lobe is an abnormal anatomical variant that is mostly seen in the upper lobe of the right lung. Clinically, its prevalence is 0.4%, and it is 1% during anatomical dissections [4]. During embryogenesis, the right posterior cardinal vein (a precursor of the azygos vein) pierces the upper lobe of the right lung instead of traveling over the apex. In some cases, the vein penetrates through the upper lobe of the right lung and drags the parietal and visceral pleura with it, thus creating an accessory fissure, known as the azygos fissure. The azygos vein in such cases is found passing along the bottom of the fissure and is suspended from the thoracic wall through a fold of the parietal pleura, called the mesoazygos [5]. Clinically, the azygos lobe is a variation that can simulate various diseases. It is most often an incidental finding during chest radiography or CT [6]. Not much Indian literature, especially from Southern India, is available on the anatomical findings of this lobe. Hence, the study was conducted to find the prevalence of the azygos lobe during anatomical dissection.

MATERIALS AND METHODS

This retrospective observational study was carried out over a period of 13-year period from June 2010 to August 2023 in various medical colleges of Mangaluru, Karnataka, India and consisted of a sample size of 102 adult cadavers. The dissections were carried out by medical students under the guidance of the anatomy teachers during regular dissection as part of their first MBBS medical curriculum in the Department of Human Anatomy.

Inclusion criteria: Well-embalmed cadaveric lungs were included, where all the lobes and fissures were clearly defined.

Exclusion criteria: Lungs with adhesions, injuries, and surgical resections were excluded from the study.

The chest wall was dissected and removed, and the right and left lungs of each cadaver were examined for the presence or absence of an azygos lobe. These findings were noted and recorded.

Photographs were taken, and the morphology of the azygos lobe was studied. The size of the lobe, the presence of the azygos fissure, the depth of the azygos fissure, and the course of the azygos vein were noted. The height of the lobe was measured from the midpoint of the superior margin to the midpoint of the inferior margin. The width of the lobe was measured from the midpoint of the posterior margin to the medial margin [7]. The depth of the azygos fissure was noted after retracting it. The mesoazygos is a fold of pleura created by the azygos vein, and its attachments to the thoracic wall were noted from the lung to the thoracic wall.

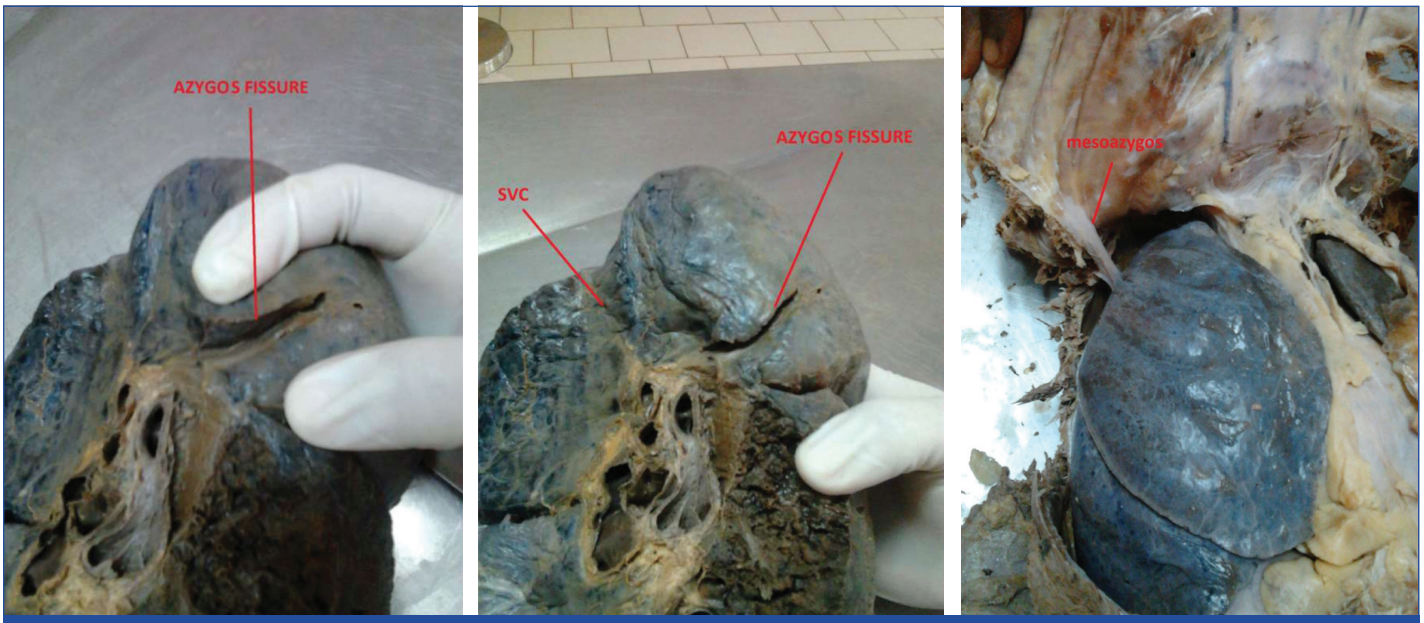
STATISTICAL ANALYSIS

The data was tabulated in Microsoft Excel, and descriptive statistics were used in terms of frequency and percentage.

RESULTS

Out of the 102 cadavers, only one right lung had the presence of an azygos lobe (0.98%). Bilateral azygos lobes were not seen in any of the cadavers. Azygos lobes were not seen in the left lungs. An azygos fissure was found in the upper lobe of the right lung

[Table/Fig-1]. The depth of this fissure was 2 cm. The azygos vein was passing through the mesoazygos and opens into the Superior Vena Cava (SVC) [Table/Fig-2]. The attachments of the mesoazygos extending from the azygos fissure to the thoracic wall were observed [Table/Fig-3]. The maximum height of the lobe was 5.8 cm, while the width was 4.5 cm [Table/Fig-4].



[Table/Fig-1]: Showing the azygos fissure in the upper lobe of right lung.
[Table/Fig-2]: Showing the azygos fissure and the impression for superior vena cava into which the azygos vein open after coursing through the fissure.
[Table/Fig-3]: Mesoazygos containing the azygos vein suspended from the thoracic wall through a fold of parietal pleura. (Images from left to right)

[Table/Fig-4]: Mediastinal surface of right lung showing the length and width measurements of the azygos lobe.

DISCUSSION

The present study showed a prevalence of 0.98% for the azygos lobe, which indicates that it is very uncommon. Anson BJ et al., in 1950, studied the American cadaveric population and reported a prevalence of 0.43% [8]. Boyden EA, in 1952, studied about 500 cadavers and found only one case of an azygos lobe at the University of Minnesota in the United States [9]. He reported a prevalence of 0.2%. Rauf A et al., in 2012, while studying the South African population, found four cases of azygos lobe out of the 704 cadavers studied [7]. He reported a prevalence of 0.57%. Biswas KK et al., in 2018, studied 92 cadavers and found azygos lobe in two cadavers with a prevalence of 2.17% [Table/Fig-5] [7-10].

Author	Year	Population	Prevalence
Anson BJ et al., [8]	1950	American	0.43%
Boyden EA [9]	1952	American	0.20%
Rauf A et al., [7]	2012	South African	0.57%
Biswas KK et al., [10]	2018	North Indian	2.17%
Present study	2024	South Indian	0.98%

[Table/Fig-5]: Comparison of the prevalence of azygos lobe in different populations [7-10].

The review of the literature shows that the results of the prevalence of the azygos lobe in the present study are comparable with those reported by other authors for different populations. In the study conducted by Rauf A et al., the mean height was 6.7 cm whereas the mean width was 4.5 cm, which was comparable to the present study where the height was 5.8 cm and the width was 4.5 cm [7]. Not many anatomical studies are conducted on the morphometry of the azygos lobe. Hence, the measurements could not be compared. The azygos lobe was not observed in the left lung in the present study.

Clinically, the azygos lobe is an incidental finding on chest X-ray and CT scans. On chest X-rays, the azygos lobe appears as a dense comma-shaped shadow starting from the apex of the right lung till the mediastinum. This can be very easily confused with a bulla, abscess, or pneumothorax. Sometimes, consolidation of the azygos lobe, which has a similar appearance, may be mistaken for a lung mass [11-13]. In certain surgeries like VATS, it can pose many problems while operating. Its presence also makes it difficult to identify the sympathetic chain and may also damage the azygos vein during these procedures [14,15]. There were no anatomical studies for a proper understanding of this condition. Moreover, this is just an incidental finding on a chest X-ray with its limitations. Hence, this study will help physicians, especially thoracic surgeons, to be aware of this anomaly. This will also help to prevent any complications during surgeries involving the thoracic region like VATS and for formulating management strategies. Also, it will help the radiologists while making diagnosis involving the chest X-rays. They must be aware of this anomaly and keep in mind that it is a possible differential diagnosis since it can be confused with a bulla, abscess, pneumothorax, and lung mass.

Limitation(s)

Limitations of this study design are that the results may be fragile if the database is inadequate. Also, data may be inconsistently measured between subjects.

CONCLUSION(S)

The azygos lobe is very often an incidental finding. Even though it is a very rare finding, it is important clinically. Hence, the surgeons must be aware of this condition to prevent any complications which may occur during surgeries.

Acknowledgement

Author would like to thank all his respected teachers and dissection attenders for their guidance and support in completing this study. Author is thankful to all the previous authors and publishers from whom the data was gathered for this study. The authors sincerely thank those who donated their bodies to science so that anatomical research could be performed. The results from such research can potentially increase mankind's overall knowledge, which can then improve patient care. Therefore, these donors and their families deserve our highest gratitude.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Nov 23, 2023
- Manual Googling: Dec 30, 2023
- iThenticate Software: Jan 04, 2023 (20%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? No
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: **Nov 22, 2023**
Date of Peer Review: **Dec 26 2023**
Date of Acceptance: **Jan 06, 2024**
Date of Publishing: **Feb 01, 2024**