

CASE REPORT

Accessory Pulmonary Ligament? A Case Report of Lingula-Diaphragmatic Anatomy Variation

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ABSTRACT

This case report presents a groundbreaking discovery of a hitherto undocumented ligament connecting the lingula lobe of the left lung to the diaphragm. The study involved a routine dissection of an adult Asian cadaver during a respiratory module practical session. The cord-like structure, approximately 7 cm in length and 2 cm in diameter, showed ligamentous features and was firmly attached to the upper surface of the left diaphragm without any vascular connections. This finding holds potential clinical significance, particularly during anatomical resections of the lung, as the ligament may need to be freed in surgeries such as lingulectomy, left upper lobectomy, or left lower lobectomy. However, the ligament's relevance differs from the well-known inferior pulmonary ligament, which aids in accessing crucial lymph nodes during left lower lobectomy. The absence of vascular structures suggests a lack of mediastinal lymph nodes associated with this newly identified ligament. Further research is warranted to fully understand its clinical implications.

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INTRODUCTION

Traditionally, only a small number of ligaments are associated with the diaphragm known as diaphragmatic ligaments. One such ligament is the inferior pulmonary ligament, which is a thickening of the pleura that connects the diaphragm to the base of the lungs (1). The pulmonary ligament, on the other hand, is a delicate double-layered pleural fold that runs vertically from the area around the lung hilum and root. It extends downwards between the mediastinal surface of the lung, where it merges with the visceral pleura, and the lateral aspect of the mediastinum near the oesophagus, where it joins the parietal pleura of the mediastinal region.

Within the pleural cavity, both lungs possess a remarkable degree of mobility, except for specific points such as the hilum and pulmonary ligament, where they are connected to the mediastinum. The lungs are also linked to the pericardium by the phrenopericardial

ligaments. Another important connection between the diaphragm and the oesophagus is the prenoesophageal ligament, which consists of loose connective tissue. Additionally, there is a subdiaphragmatic peritoneal thickening composed of the falciform and triangular ligaments (1). We present a groundbreaking case report as there is a notable absence of literature documenting any ligament connecting the lingula to the diaphragm. Our findings mark the first documented instance of such a ligament attachment.

CASE REPORT

A routine practical session was conducted during the respiratory module. The session was scheduled for first-year medical students at Universiti Putra Malaysia. In the lungs part of the trolley section, an adult Asian cadaver with an unknown identity was dissected. The thoracic cage was previously removed; however, the lungs, heart, diaphragm and part of the parietal pleura were still intact in situ without any major damage. No obvious pathological conditions were observed. It was a medium-built male cadaver with no obvious other systemic anomalies seen.

It was observed that at the upper lobe of a left lung, specifically in the lingula, an obvious cord-like structure was attached to the corresponding diaphragm site (Fig. 1). The structure has similar features as a ligament in terms of its colour and strength. Furthermore, it has similar features to other nearby ligaments. Additionally, the presence of an inferior pulmonary ligament of the left lung at its mediastinal surface was not communicated with this structure, which was at the costal surface. Distally, this structure was attached at the upper surface of the left diaphragm and no obvious cut or tear was seen.

This cord-like structure has a glistening appearance, measuring approximately 7 cm in length and 2 cm in diameter. It has a firm consistency and is absent of vasculatures. The suspensory ligament of the pleural dome and the inter-pleural ligaments were not observed in this cadaver since it need further extensive dissection. No similar appearance was also seen on the right side of the lungs and no attachment was observed to the surfaces of the heart, oesophagus and liver.

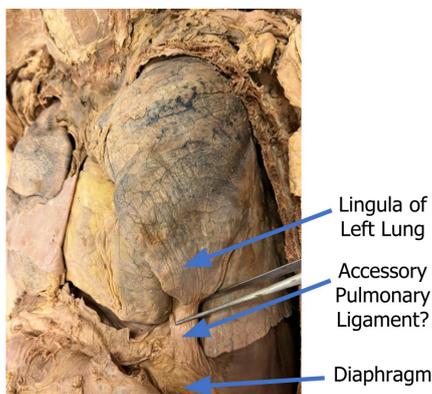


Figure 1: Left lateral view of cadaveric lungs specimen. A cord-like structure is attached from the lingula to the left part of the diaphragm of a healthy thoracic cadaver.

DISCUSSION

Notably, the previous cadaveric study in India demonstrated the variation present in the hilum rather than the pulmonary ligament itself (2). About more than 100 lungs of cadavers were examined, specifically focused on the hilum of the lungs. It was found that no obvious anomalies or variations of the pulmonary ligament itself. However, one of the lungs demonstrated the structure of the right pulmonary vein was located inferior to the pulmonary ligament, which was not superior to it. Furthermore, the accessory lung fissure closely related to the pulmonary ligament has to be careful not to be missed, such as the inferior accessory fissure.

Anatomical resections of the lung are performed mainly for primary or secondary lung cancers and in some rare instances for infection cases such as Aspergillosis, multiple drug-resistant tuberculosis and lung abscess.

Hence, it is vital to know the anatomical division of the lungs since the chest cavity is assessed via an open thoracotomy (anterior, lateral or posterolateral) or Video Assisted Thoracoscopy (VATS) (multiple ports, two-ports or uniportal (3).

Importantly, ligaments and mediastinal pleura are the necessary structures that need to be freed in order to access the hilar structures for an anatomical resection of the lung (4). As this case applied, the presence of an additional ligament in the lingula segment makes it an important ligament that requires freeing for performing a lingulectomy or a left upper lobectomy. Furthermore, this lingula ligament must also be released if a left lower lobectomy is performed to allow the left upper lobe to expand.

Additionally, the inferior pulmonary ligament is an essential structure during left lower lobectomy, as its freeing allows access to the lymph nodes in that area known as station 9 lymph nodes, which are crucial for lung cancer staging (N2 nodes). Once the ligament is freed, the inferior pulmonary vein becomes more accessible (5). Therefore, the presence of a ligament connecting the lingula lobe to the diaphragm might not hold the same clinical relevance as the inferior pulmonary ligament. This is because there are no vascular structures associated with it, and consequently, there are no mediastinal lymph nodes around this ligament.

CONCLUSION

In conclusion, this case report presents a remarkable discovery of a previously undocumented ligament connecting the lingula lobe of the left lung to the diaphragm (Fig. 2). The cord-like structure exhibits ligamentous characteristics and appears to be distinct from the well-known inferior pulmonary ligament. This finding holds potential clinical significance, especially during anatomical resections of the lung, where freeing the ligaments and mediastinal pleura is necessary to

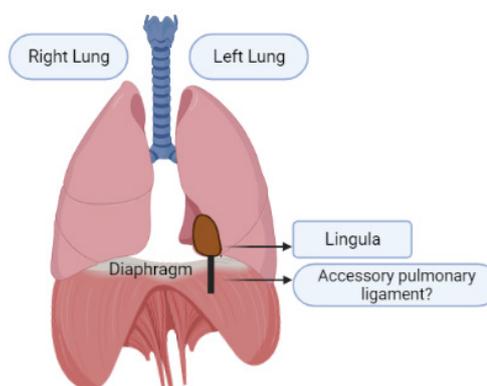


Figure 2: Left lateral view of cadaveric lungs specimen. A cord-like structure is attached from the lingula to the left part of the diaphragm of a healthy thoracic cadaver.

access hilar structures. This discovery highlights the importance of thorough anatomical understanding and may contribute to improved surgical approaches and patient outcomes. Further research is required to elucidate the ligament's clinical implications fully.

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