Original Research Article

Morphological Study on Fissures of Lungs in North Karnataka Population

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Abstract

Introduction: The lung fissures define the borders of the lobes of the lungs; understanding their position is essential for understanding lobar anatomy and, as a result, finding the broncho-pulmonary segments, which is important both physically and therapeutically. **Objective:** This study was carried out to examine lungs morphologically and classify lung fissures based on Craig and Walker. **Materials and methods:** In this study, 30 cadaveric lungs were taken and examined for morphology and differentiation of fissures. Out of these 30 cadaveric lungs, 20 were males, and 10 were of females. The thoracic wall of properly embalmed and formalin-fixed cadavers was dissected, and the lungs were exposed to study the morphological features, including number, lobes, and fissures. **Result:** This study state 19 (63.3%) incomplete horizontal fissure in the right lungs. Interestingly this study also represents no horizontal fissure in 1 (3.3%) right lung. Whereas 9 lungs were having incomplete oblique fissure and in 2 (6.6%) there was no oblique fissure. Similarly, this study also state 12 (40%) incomplete oblique fissure in the left lung. In one lung interestingly there was no fissure. While, other right and left lungs were anatomically normal. **Conclusion:** According to the current study, the right lung had more partial horizontal fissures and a few right lungs had no fissures. Radiologists and surgeons must be aware of variations in lung fissures and lobes in order to minimize and reduce the mortality and morbidity associated with invasive lung procedures. Understanding the anatomy of lung fissures assists in evaluating the various radiographic manifestations of interlobar fluid. I hope that this research will be useful to all of the practitioners mentioned above.

Key Words: Lungs, Fissures, lobes.

Introduction

Lungs are crucial respiratory organs located in the thoracic cavity on each side of the heart[1]. In humans and many other animals, the lungs are the major organs of the breathing system. Their role in the respiratory system is to absorb oxygen from the environment and transport it to the bloodstream, as well as to expel carbon dioxide from the circulation into the atmosphere, in a process known as gas exchange[2]. Each lung is divided by fissures into lobes[3]. Clinicians must be aware of pulmonary anatomical changes such as number, fissures, and lobes. Hayashi et al. noted that understanding the architecture and typical variations of the main fissures is critical for detecting their various imaging appearances and related problems[4]. Similarly Aziz et al. suggested that interlobar fissures are important landmarks for proper identification of normal pulmonary anatomy and evaluation of disease[5].

The fissures allow the lobes to move more freely in respect to one another, allowing for more distention and movement of the lower lobes during respiration[6]. As a result, they assist in a more uniform expansion of the entire lung. Because the fissures define the borders between the lobes of the lungs, understanding their location is essential for understanding lobar anatomy and, as a result, for locating the broncho-pulmonary segments, which is important both physically and therapeutically. The right lung has 3 lobes separated by the oblique and horizontal fissures[7].

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The oblique fissure of the right lung separates the superior and middle lobe from the inferior lobe, and the horizontal fissure separates the superior lobe from the middle lobe. The left lung has 2 lobes, superior and inferior, separated by a single oblique fissure[7]. The oblique fissure begins at the posterosuperior aspect of the hilum at the level of the 5th thoracic spine, crosses the posterior border about 6cm from the apex of the lung at the level 4th thoracic spine. On the sternocostal surface, the fissure follows the 6th rib and crosses the inferior border near its anterior end. It then passes backward onto the mediastinal surface to end at the inferior aspect of the hilum. The horizontal fissure seen only on the right lung starts at the oblique fissure at the midaxillary line; it runs across the costal surface, is level with the 4th costal cartilage, and passes onto the hilar surface to end in front of the hilum[8]. Therefore, based on the above mention statements, this study was carried out to examine lungs morphologically.

Materials and methods

In this study, 30 cadaveric lungs were taken and examined for morphology and differentiation of fissures. Out of these 30 cadaveric lungs, 20 were of males, and 10 were of females. The thoracic wall of embalmed and formalin-fixed cadavers was dissected, and the lungs were exposed to analyze the morphological aspects such as number, lobes, and fissures. Craig and Walker's (1997) anatomical categorization was used to identify the existence and extent of pulmonary fissures[9].

Craig and walker classifications

Grade	Classification
Grade I	Complete fissure with entirely separate lobes, the lobes being held together only at the hilum by the bronchi and pulmonary Vessels
Grade II	Complete visceral cleft but parenchymal fusion at the base of the fissure.
Grade III	Visceral cleft is evident for a part of the fissure, i.e., the fissure does not extend up to the hilum.
Grade IV	Complete fusion of lobes with no evident.

Results

In this study, 30 cadaveric lungs were studied, out of which 20 were males, and 10 were from females.

Table 1: Representing different fissure in right lungs

Right Lung			
Horizontal fissure		Oblique fissure	
Incomplete	Absent	Incomplete	Absent
19	1	9	2
63.3%	3.3%	30%	6.6%

Result of this study state 19 (63.3%) incomplete horizontal fissure in right lungs. Interestingly this study also represents no horizontal fissure in 1 (3.3%) right lung. Whereas, 9 lungs were having incomplete oblique fissures, and in 2 (6.6%), there was no oblique fissure. On the other hand, other lungs were having normal fissures and lobs.

Table 2: Representing anatomy of fissure in left lungs

Left lung		No fissure	
Oblique fissure		Right lung	Left lung
Incomplete	Absent		
12	1	Nil	1
40%	3.3 %	-	3.3%

Similarly, the results of this study state 12 (40%) incomplete oblique fissures in the left lung. In one lung, interestingly there was no fissure. While other left lungs were anatomically normal.

Discussion

Lungs are important respiratory organs positioned on each side of the heart in the thoracic cavity. The lungs are the principal organs of the breathing system in humans and many other animals. They take oxygen from the environment and transport it to the bloodstream, as well as release carbon dioxide from the circulation into the atmosphere, a process known as gas exchange. The gaps or fissures that divide individual broncho-pulmonary buds/segments disappear as the lung matures, save in two planes, which are apparent as oblique or horizontal fissures in completely developed lungs[10]. Obliteration of these fissures, either entirely or partially, could explain the absence or incompleteness of oblique or horizontal fissures. Accessory fissures could be the result of gaps that are ordinarily erased not being obliterated. Incomplete pulmonary fissures, which indicate partial lobe fusion, are prevalent, accounting for more than half of all pulmonary fissures. Several authors[11-14] have reported varying percentages of incidence of the incompleteness of the fissures. In his study of 1200 pairs of lungs, Medlar discovered incomplete oblique fissure in 10.6% and 25.6 percent of the left and right lungs, respectively, and incomplete horizontal fissure in 17.1% of the right-sided lungs[11]. Oblique fissures were absent in 7.3 percent of the left and 4.8 percent of the right lungs, respectively, while horizontal fissures were absent in 45.2 percent of the right lungs. Fusion was observed across the upper right major (oblique) fissure in 70% of fixed and inflated lung specimens (50 of each side), across the lower right major fissure in 47%, across the upper left major fissure in 40%, across the lower-left major fissure in 46%, and across the minor (horizontal) fissure in 94%. In another Indian study, partial and nonexistent horizontal fissures were found in 21% and 10.5 percent of the participants, respectively[15]. In 5.3 percent of the right-sided lungs, there was an incomplete oblique fissure with no horizontal fissure. Incomplete oblique fissures were found in 21% of the lungs on the left side. This investigation found 19 (63.3%) incomplete horizontal fissures in the right lungs. Surprisingly, no horizontal fissure was seen in one (3.3 percent) right lung in this investigation. In 9 lungs, the oblique fissure was partial, and 2 (6.6 percent) lungs had no oblique fissure. A total of 12 (40%) incomplete oblique fissures were found in the left lung in this study. Surprisingly, there was no fissure in one of the lungs. The left and right lungs, on the other hand, were anatomically normal. I hope that this research will aid in the provision of information that will be beneficial to both patients and clinicians.

Conclusion

According to the current study, the right lung had more partial horizontal fissures and a few right lungs had no fissures. Radiologists and surgeons must be aware of variations in lung fissures and lobes in order to minimize and reduce the mortality and morbidity associated with invasive lung procedures. Understanding the anatomy of lung fissures assists in evaluating the various radiographic manifestations of interlobar fluid. I hope that this research will be useful to all of the practitioners mentioned above.

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