



Morphological Variations of Fissures of Lung : An Anatomical Study

KEYWORDS

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ABSTRACT *Background:* Lungs are divided into lobes by fissures. Fissures are the integral part of lungs helps in uniform expansion of lungs. *Materials and methods:* The present study is conducted on 64 (34 left, 30 right) lungs obtained from the formalin fixed cadavers of department of anatomy, MVJ Medical College and Research Hospital, Bangalore. The specimens were thoroughly studied and variations in the fissures were noted. The length of oblique and horizontal fissures were measured. *Results:* Out of 34 left lungs, 10 lungs showed incomplete and 1 lung with absent oblique fissure. On the right side, out of 30 lungs, 5 lungs had incomplete oblique fissure and 9 lungs had incomplete and 2 lungs with absent horizontal fissure. Accessory fissure was seen in 6 right and 5 left lungs. *Conclusion:* The clinical awareness of variations in fissures of lung is important for clinicians in their day to day practice to reduce the mortality and morbidity associated with surgical procedures.

INTRODUCTION:

The lungs are the pair of essential organ of respiration located within the thoracic cavity, on either side of heart and other mediastinal contents. Each lung is half-conical in shape, divided into lobes by fissures. Anatomically, left lung is divided into upper and lower lobes by oblique fissure whereas right lung is divided into upper, middle and lower lobes by oblique and horizontal fissures. In each lung the oblique fissure begins from the mediastinal surface above and behind the hilum and cuts the posterior border of the lung about 2.5 cm lateral to the junction of the T3 and T4 spine. Then it runs along the costal surface, cuts the inferior border of the lung and will reappear on the mediastinal surface and ends at the lower end of hilum. The horizontal fissure begins at the oblique fissure, courses along the costal surface, cuts the anterior border and appears on the mediastinal surface to end at the hilum.¹

The fissures of lung helps in the movement of lobes in relation to one another, which will accommodate the greater distension and movement of the lobes during respiration and hereby helps in uniform expansion of lung². These fissures may be complete, incomplete or absent. Other than usual fissures, the lungs may also have accessory fissure which may be single or multiple dividing the lungs into many lobes³. The knowledge of variations in the fissures is important for radiologists to properly interpret the x-rays because most of the time the incomplete fissures gives an atypical appearance of pleural effusion⁴. It is of great significance to cardio thoracic surgeon for planning segmental resections or pulmonary lobectomy⁵. Considering the clinical importance of variations in the fissures of lung, the present study is an attempt to learn the different morphological features of lung as it is not only of clinical importance as well as of academic interest.

MATERIALS AND METHOD

64 lung specimens free from pathological lesions, removed from the 10% formalin fixed cadavers from the department of anatomy, MVJ Medical college and Research Hospital, Bangalore were included in the study. The morphological features of variations of fissures of lung such as complete, incomplete or absence, presence of any acces-

sory fissures were noted. The length of oblique and horizontal fissures were measured and statistically analysed.

RESULTS

Out of 64 lungs, 34 lungs belongs to left side and 30 lungs from right side. In the left lung, complete oblique fissures was noted in 23 (67.6%) lungs, incomplete in 10 (29.4%) and absence of oblique fissure in 1 (3%) lung. Accessory fissures were noted in 5 (14.7%) lungs. Among the right lungs, oblique fissure was complete in 25 (83.3%) lungs, incomplete in 5 (16.7%) lungs. Horizontal fissure was complete in 18 (60%) lungs, incomplete in 9 (30%), absent in 3 (10%) lungs. Accessory fissures were noted in 6 (20%) lungs. The mean length of oblique fissure was 29.89 cm and horizontal fissure was 10.06 cm.

DISCUSSION

Morphological variations in the lobes and fissures of lung is mainly due to the defective pulmonary development⁶. During the development, as the lung grows, the spaces or fissures that separate individual bronchopulmonary buds/segments become obliterated except along two planes, evident in the fully developed lungs as oblique or horizontal fissures⁷. Obliteration of these fissures either completely or partially may lead to absence or incomplete fissures. Accessory fissure could be due to non-obliteration of spaces which normally are obliterated⁸.

Based on the degree of completeness of fissures and location of pulmonary artery at the base of oblique fissure Craig and Walker proposed a classification, which includes 4 grades. Grade I: complete fissure with entirely separate lobes; Grade II: complete visceral cleft but parenchymal fusion at the base of fissure; Grade III: visceral cleft evident for a part of fissure. Grade IV: complete fusion of lobes with no evident fissural line⁹. According to this classification, in the present study, oblique fissure in 23 lungs on the left and 25 lungs on the right side shows grade I, 10 lungs on the left side and 5 lungs on the right side shows grade III and 1 lung on the left side shows grade IV. Similarly variations involving horizontal fissure in 18 lungs belongs to grade I, 9 lungs grade III, and 3 lungs belongs to grade IV.

Several studies have been reported regarding the varying percentage of presence of incomplete natural fissures.

TABLE 1: COMPARISON OF PERCENTAGE OF INCOMPLETE AND ABSENCE OF NATURAL FISSURES BY DIFFERENT AUTHORS WITH PRESENT STUDY

	Medlar et al ¹⁰ ,1947	Meenakshi et al ⁸ 2004	Prakash et al ¹¹ 2010	Lydia .S.et al ¹² 2014	Present study
Right lung					
Obliquefissure					
Incomplete	21%	36.6%	39.3%	5.5%	16.7%
Absent	4.8%	—	7.1%	0	0
Horizontalfissure					
Incomplete	17.1%	63.3%	50%	25%	30%
Absent	45.2%	16.6%	7.1%	111.11%	10%
Left lung					
Obliquefissure					
Incomplete	10.6%	46.6%	35.7%	2.5%	29.4%
Absent	7.3%	—	10.7%	0	3%

Even though variations in the fissures are mainly due to defective development, they are of great clinical importance. An incomplete fissures frequently leads to postoperative air leakage. They alter the spread of infection within the lung from one lobe to other. It may cause odd appearances of fluid tacking within the lung¹³. The lymphatics of lung drain from pleura towards the hilum. Altered course of oblique fissure would lead to altered course of visceral pleura, thereby changing the arrangement of lymphatic drainage³.

Accessory fissures were seen in 11 lungs (6 on right, 5 on left). These fissures act as a channel for the spread of infections leading to sharply margined pneumonia. Accessory fissures can also be confused with areas of pleural sacs or bullae or linear atelectasis¹⁴. Most of the time in infants these accessory fissures may be seen in different locations of the lung, delimiting the abnormal lobes which corresponds to the normal bronchopulmonary segments¹⁵.

CONCLUSION:

Considering the fact that malignant lung neoplasm are on the rise all over the world, the knowledge of variations in the morphology of fissures will be helpful for cardiothoracic surgeons while performing the segmental resection. It is also helpful for the radiologists and clinicians to exactly diagnose, plan and modify the surgical procedures to improve the final outcome.



Fig1: Showing multiple accessory fissures on the mediastinal surface of left (a,b) and right lung (c)



Fig2: Left lung showing complete absence of oblique fissure



Fig3: Left lung with incomplete oblique fissure on the

costal surface.



Fig4:Right lungs showing the absence of horizontal fissure.



Fig5:Right lung showing incomplete horizontal fissure (HF)and accessory fissure(AF) on the costal surface.

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