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### Case Report

## Bilobed Right Lung: A Case of Absent Horizontal Fissure

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#### ABSTRACT

The human lungs are organs of respiration present in the greater part of thoracic cavity on each side of heart in the mediastinum resting on diaphragm. The right lung is classically divided into three lobes namely superior, middle and inferior by the oblique and horizontal fissures. The left lung is divided into superior and inferior lobes by a single deep oblique fissure. The fissures help in expansion of lungs during respiration. During the routine dissection of thoracic region of human cadaver, bilobed right lung with absent horizontal fissure was observed. The right lung was divided into superior and inferior lobe by a single oblique fissure. The left lung had normal anatomy in this case. The variations in the fissures and lobar pattern of lungs are common and are due to altered developmental process during intrauterine life. The anatomical knowledge of these disparities in fissures is important for clinicians prior to performing any pulmonary surgical procedures and to prevent postoperative complications.

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#### Introduction

Human lungs are a pair of soft and spongy organs of respiration present in the greater part of thoracic cavity on either side of mediastinum. The medial surface of each lung is attached to the mediastinum by a narrow root from where the bronchi, blood vessels, lymphatics and nerves enter or leave the lung.[1]

Each principal bronchus divides into three lobar bronchi on the right side and two on the left that enter the lungs through the hilum located in the mediastinal surface. The pattern of bronchopulmonary segments is different in superior lobes of two lungs because of presence of a middle lobe in the right lung and earlier division of principal bronchus as compared to left lung.[2]

The right lung is typically divided into three lobes namely superior, middle and inferior by the oblique and horizontal fissures. The oblique fissure takes curved course antero-inferiorly beginning at the level of fifth thoracic vertebra posteriorly about 6.5 cm below the apex and then meets the inferior margin at sixth costochondral junction. The oblique fissure divides the right lung into superior and inferior lobes. A small triangular middle lobe is wedged between the superior and inferior lobes by the horizontal fissure beginning at the level of fourth costal cartilage from anterior border of lung and extending horizontally backwards to join the oblique fissure in the mid- axillary line. The left lung is divided into superior and inferior lobes by a single deep oblique fissure which is usually more vertical as compared to right lung.[2,3]

The fissures act as a plane of cleavage covered by extensions of pulmonary pleura that helps in movement of lobes of lungs

separately and also over each other during inspiration.[4]

The horizontal fissure is seen in anterior view of chest radiograph, whereas the oblique fissure is better appreciated on lateral view of chest radiograph.

The anatomical knowledge about the absence of fissures or presence of accessory or incomplete fissures is important prior to performing any pulmonary surgical procedures and also in radiology as these can be misinterpreted on chest radiographs and computed tomography scans.

#### CASE:

The dissection of thoracic region of adult male cadaver was performed according to the guidelines mentioned in Cunningham's Practical Manual and by abiding to the ethical standards at the department of anatomy at Dr. R.P.G.M.C., Kangra at Tanda.

The bilobed right lung with absent horizontal fissure was observed.

The right lung was divided into two distinct lobes, superior and inferior by a single oblique fissure shown in figure 1. The oblique fissure was present at the level of third thoracic vertebra beginning from the posterior border about 6cm below the apex and coursing spirally in the antero-inferior direction. It was a grade-I oblique fissure according to Craig and Walker[5] classification as the fissure was complete and forming two separate lobes. The middle lobe was not seen due to absent horizontal fissure. The lateral and medial bronchopulmonary segments of the middle lobe were a part of superior lobe.

The mediastinal surface and hilar region of right lung had normal morphological features as seen in figure 2.

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The left lung was having one oblique fissure and two lobes with no variation in its anatomy.

**Figure 1: Costal surface of right lung showing only two lobes due to absent horizontal fissure.**



**Figure 2: Mediastinal surface of the bilobed right lung.**



## DISCUSSION

Developmentally the lung bud arises as a ventral outgrowth from the wall of foregut around 4th week of gestation. The epithelial lining of lungs is completely endodermal in origin and the connective components are derived from splanchnic mesoderm. The lung bud first splits into right and left primary bronchial buds that correspond to the development of right and left lung respectively. These primary buds yield three secondary bronchial buds on the right side and two on the left that will eventually give rise to three lobes in the right lung and two lobes in the left lung. Further extensive branching of bronchial buds will form numerous bronchopulmonary segments which fuse later

except at the site of formation of horizontal and oblique fissures.[6,7] This case may be attributed to complete fusion of bronchopulmonary segments at the site of horizontal fissure.

The structural variations in the lungs are due defective obliteration of these fissures either completely or incompletely during development.[8]

Earlier in a case study, we have discussed about distinct lobar pattern of right lung having accessory fissures and lobes.[9]

George et al studied morphology of the human lungs in Indian cadavers and observed absence of horizontal fissure in two right lung specimens out of 65 total specimens.[10]

A study conducted by Ughade et al on 50 right lung specimens showed absent horizontal fissure in two cases and incomplete horizontal fissure in 18 lung specimens. All the specimens of right lung had oblique fissure.[11]

## CONCLUSION

The variations in the fissures such as absent horizontal fissure or presence of accessory fissures are normal and accredited to altered pulmonary development in fetal life. In our case, the right lung had single oblique fissure forming two separate lobes. This is a common variant seen in right lung. Better understanding of these anatomical variations of lungs along with their fissures and lobes is important for surgeons to minimise postoperative complications like air leakage following lobectomies.

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