

Variation in the Lobar Pattern of the Right & Left Lungs A Case Report Seen In 3 Cadaveric Lungs

Dr. Gokul Krishna Reddy Nune, Dr. Minati Patra, Dr. K. Rama Rao
Dept. of Anatomy, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha.

Abstract: The right lung usually has three lobes and two fissures while the left lung has two lobes and one fissure^{1,2,3}. During this study on cadavers we observed in three cadaveric lungs in which one is showing a variant in-complete transverse fissure in the left lung separating the superior lingual and anterior Broncho-pulmonary segments. In the second one the left lung, there is absence of oblique fissure at the usual site & an incomplete fissure separating upper lobe from lower lobe and in the third one both lungs (right lung showing incomplete fissures in the diaphragmatic surface dividing the lower lobe into three lobes & the left lung showing a variant in-complete transverse fissure in the left lung separating the superior lingual and anterior Broncho-pulmonary segments). Such variant fissures and lobes are clinically important in cases of lobectomy & thoracotomy procedures.

Keywords: Bronchopulmonary segments, Lobectomies, Lung Fissure, Lung

I. Introduction

The right lung and left lung are divided into lobes by an oblique fissure present in both lungs and a transverse fissure which is present only in the right lung^{1,2,3}. The lung surface is divided into lobules by dark lines. Each lobule corresponds to the Broncho-pulmonary segment which is the functional unit of the lung^{1,2,3}.

The oblique fissures commence 6cm below the apex of each lung, 2cm from the medial plane and at the level of the T3 & T4 spines^{1,2,3}. The transverse fissure overlies the fourth rib to meet the oblique fissure at the level of the mid axillary line^{1,2,3}. The presence of the transverse fissure results in three lobes on the right lung while the left lung will have only two lobes. The three lobes on the right lung are named: superior, middle and inferior lobe & in the left lung named as superior and inferior lobe.

The awareness of anatomical variations of lobes of the lung is essential because radiologists may misinterpret them on an X-ray or a CT scan. Such variations when known can help in planning lobectomies involving individual segment^{4,5}. Hence this case study aims to present the unique variations in the morphology of lung fissures and lobes observed during a routine dissection. This might serve to generate some data regarding lung lobes and fissures which can be made available to cardio thoracic surgeons to help in the appropriate planning of surgery.

II. Materials And Methods

This case study carried in the Anatomy Department during dissection of the thoracic region of an adult male cadavers of middle age, which are unclaimed cadavers & the past medical history of them was not known. The lung fissures and lobes were studied and the variant fissures and lobes were noted. The lungs specimens were photographed.

Observations

In the first cadaver the left lung showing the classical oblique fissure which is commencing from a distance of 7cm from the apex of the lung on the vertebral part of the medial surface to cross the inferior border at a distance of 2cm from the anterior border. exactly 5cm superior to the lingula there is another fissure separating the lingula from the anterior bronchopulmonary segment.
The right lung is normal in this cadaver.

Fig:- 1. Left lung of first cadaver mediastinal surface showing an additional fissure separating anterior bronchopulmonary segment from the lingula

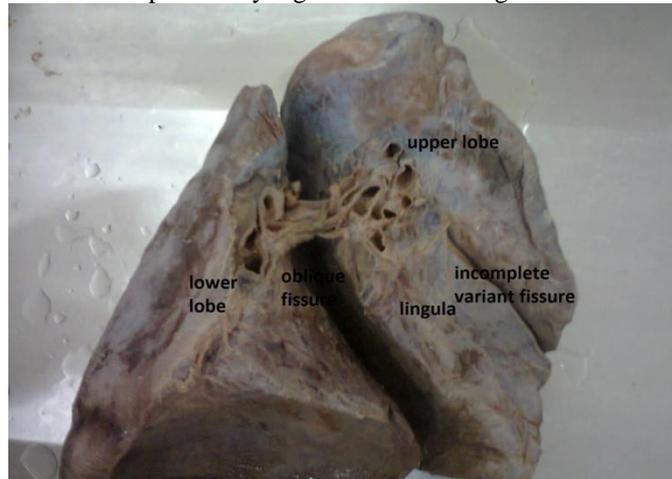
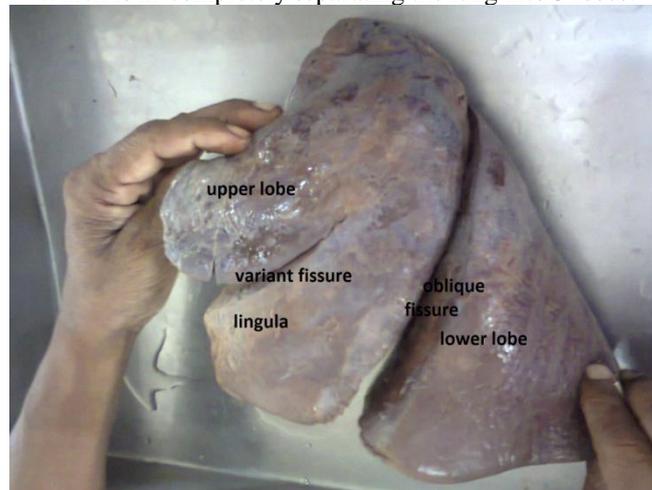


Fig: 2. The same lung on examining from costal surface showing the additional fissure Which is in-completely separating the lung into 3 lobes.

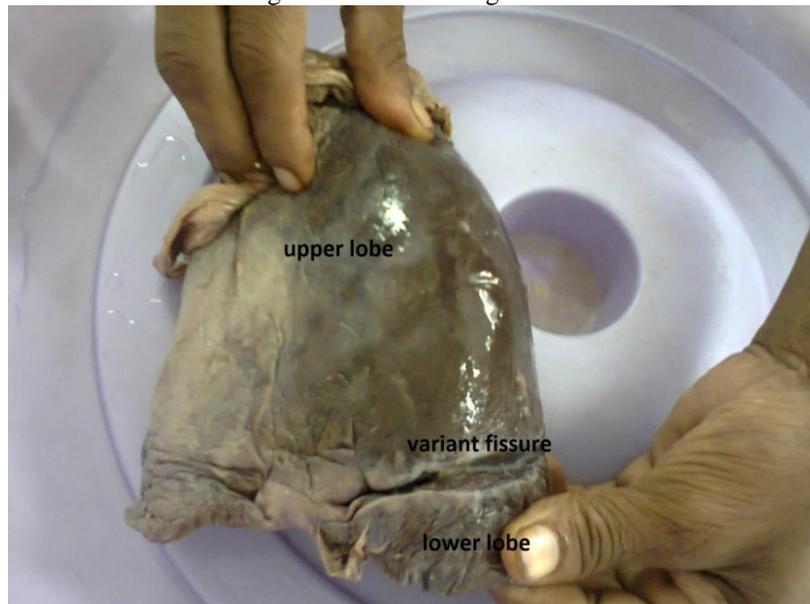


In the second cadaver the left lung not divided into any lobes by fissures, it looking like almost a single lobe. But when seen on the costal surface nearer to the 5th rib there is an in-complete fissure separating a small part of lung (4cm in length) partially from the rest of the lung tissue. The right lung is normal in this cadaver.

Fig:- 3. The left lung of second cadaver mediastinal surface showing no fissures at all the whole lung looking as a single lobe



Fig:- 4. The same lung costal surface showing a partial fissure at the lower part of posterior border dividing the lung into 2 lobes of irregular size



In the third cadaver the left lung showing the classical oblique fissure which is commencing from a distance of 7cm from the apex of the lung on the vertebral part of the medial surface to cross the inferior border at a distance of 2cm from the anterior border. exactly 5cm superior to the lingula there is another fissure separating the lingula from the anterior bronchopulmonary segment.

The right lung of this cadaver showing two fissures The oblique fissures commence 6cm below the apex of the lung, 2cm from the medial plane and at the level of the T3 & T4 spines. The transverse fissure overlies the fourth rib to meet the oblique fissure at the level of the mid axillary line, when examining the diaphragmatic surface there are two variant fissures separating the lower lobe of the lung into three lobes incompletely.

Fig:- 5. Left lung of third cadaver mediastinal surface showing an additional fissure separating anterior broncho-pulmonary segment from the lingula

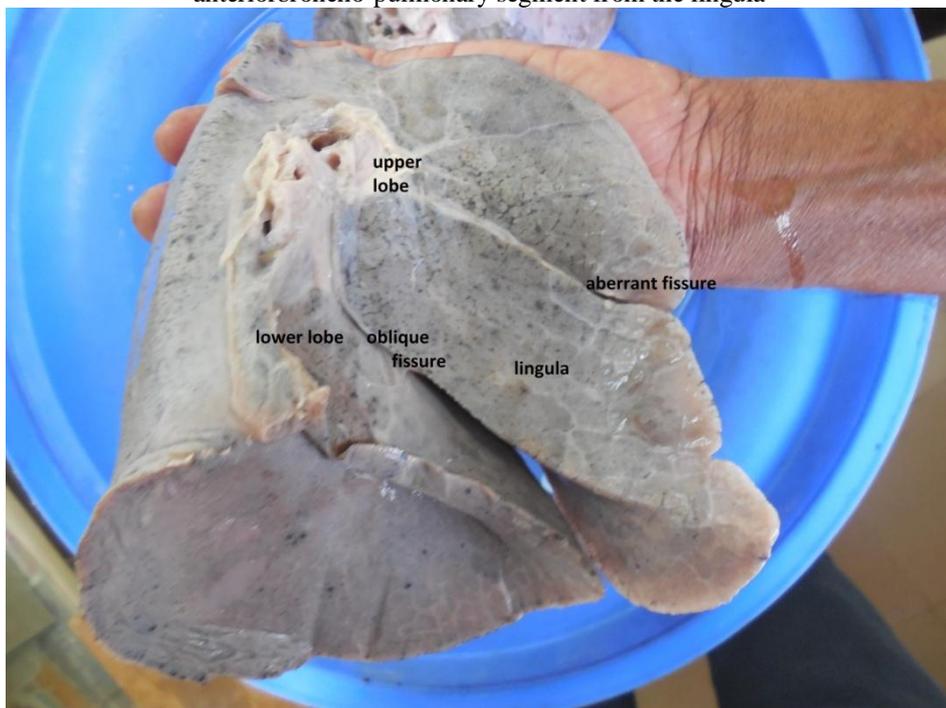


Fig:- 6. The same lung on examining from costal surface showing the additional fissure which is in-completely separating the lung into 3 lobes



Fig:- 7. Right lung of third cadaver mediastinal surface showing two fissures and three lobes



Fig:- 8. The same lung on examining from costal surface showing the two fissures which is in-completely separating the lung into 3 lobes



Fig:- 9. The same lung on examining from diaphragmatic surface showing the two fissures which is incompletely separating the lower lobe of lung into 3 lobes



No other abnormality detected in the thorax region of these cadavers.

Embryology:- the variations noted in lobulation and fissures in these two lungs might be due to altered pulmonary development^{1,2}. The fissures separate the main lobes of the lungs. These lobes develop during intra-uterine life by means of lung bud which divides into a right and left bronchi bud which later forms the corresponding right and left main bronchus. The right main bronchus will give rise to three secondary bronchi for the developing three lobes of the right lung while the left main bronchus will give rise to two secondary bronchi for the two developing lobes^{6,7}. The secondary bronchi of both lungs divide to form the tertiary bronchi which are the primordial structures of the broncho-pulmonary segments. During intra-uterine life the individual segments are initially separated by fissures that fuse as the lungs develop, except along two planes that are represented as the oblique and horizontal fissures, as seen in the right lung and along one plane represented as the oblique fissure in the left lung^{6,7}.

III. Discussion

All the variations noted in lobulation and fissures in both lungs might be as a result of altered pulmonary development. Meenakshi et al. in their study also revealed that the presence of a variant fissure could be due to the failure of obliteration of these fissures either completely or partially.

Clinical Importance:- The fissures of the lung enable even expansion of the lung during respiration^{4,5}. They are usually used as landmarks to specify lesions of lungs. When a variant fissure is present as seen in these cases there can be confusion while interpreting X-ray films^{4,5}. On occasions, they may be mistaken as a pleural effusion also (as variant fissures always give the semblance of pleural effusion). The knowledge of variant fissures is very important especially in the pre-operative planning of lobectomy^{4,5}. Once the presence of a variant fissure is noted the procedure for a segmental resection may also have to change to avoid the post-operative complication of air leakage^{4,5}. The knowledge of variant fissures might be helpful to understand certain radiographic findings such as extension of fluid into a variant fissure and the spread of diseases through different pathways in the lungs.

References

- [1]. Shah P, Johnson D, Standring S. In: Gray's Anatomy. 39th ed. Edinburgh: Churchill Livingstone; 2005. Thorax; pp. 1068–1069.
- [2]. Modgil V, Das S, Suri R. Anomalous lobar pattern of right lung: A case report. *Int. J. Morphol.* 2006;24:5.
- [3]. Meenakshi S, Manjunath KY, Balasubramanyam V. Morphological variations of the lung fissures and lobes. *Indian J Chest Dis Allied Sci.* 2004 Jul-Sep;46(3):179–82.
- [4]. Larsen WJ. Churchill Livingstone, New York: 1993. *Human Embryology*; pp. 111–30.
- [5]. Yamashita H. Tokyo IgakuShoin: 1978. *Roentgenologic Anatomy of Lung*; pp. 49–53.
- [6]. Godwin JD, Tarver RD. Accessory Fissures of the Lung. *AJR Am J Roentgenol.* 1984;144:39–47.
- [7]. Walker WS, Craig SR. A proposed anatomical classification of the pulmonary fissures. *J R Coll Surg Edinb.* 1997 Aug;42(4):233–4.