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# Absent oblique fissure and lingula in the left lung – a rare anatomical variation

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Case Report

# Absent oblique fissure and lingula in the left lung – a rare anatomical variation

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## Abstract

In the course of a routine dissection class for medical students, it was observed that there was no oblique fissure, cardiac notch, and lingula in an embalmed cadaver. Due to their absence, the superior and inferior lobes of this lung could not be distinguished clearly. The lobes were attached together, however, there were no structural variations in its hilum. No variation was found in the fissures and hilum of the right lung in this cadaver. We opine that this variation can be helpful to cardiothoracic surgeons, mainly during the resection of the lobe of the left lung.

**Key words:** Cardiac notch, Lingula, Lung, Oblique fissure.

## Introduction

The fissura obliqua incises the lung in its whole thickness excluding at its hilum and divides the left lung into superior and inferior lobes.[1] The fissure goes downwards obliquely, then turns forwards, crossing its round posterior border around about six centimetres below the apex and inferior border around five centimetres from the median plane. Due to the fissura obliqua, the lung can expand more uniformly. Maximum expansion takes place in the inferior direction.[1] These fissures help in the coordinated movement of the lobes, which in turn facilitate adequate expansion and air filling of the lobes during respiration.[2,3] In either lung, the level of division for two lobes by oblique fissure is at T4-T5 level on the posterior side. The oblique fissure ends just above the hilum of the lung at the mediastinal surface, whereas it continues with the diaphragmatic surface and then it turns upwards in the costal surface and comes at the inferior part of the hilum.[4] The lingula is a tongue-like projection from the anterior border of the left lung in the lower end, which represents the middle lobe of the right lung. Awareness about the morphological variants of the lung is of utmost importance to specialists while diagnosing various diseases of the lung and planning treatments like surgical removal of lobes.[3]

There are few cases reported in the literature about the incomplete oblique fissure[2] and the complete absence of oblique fissure[5] in the left lung. However, this case report is different from those which are available in the literature that, there was the absence of oblique fissure, cardiac notch, and lingula.

## Case report

Certain variations were observed on examination of the left lung (Figs. 1 and 2), which was removed from the cadaver of a 60-year-old female, during a routine dissection class held for medical students.

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Oblique fissure was not present in the left lung (Fig. 1) and there was a fusion between the upper and lower lobes (Fig. 2). There were no other fissures in the left lung. Therefore, the left lung was not divided into lobes. The lingula and cardiac notch were also absent (Figs. 1 and 2). We did not further dissect the bronchial tree of this lung specimen. The right lung was having normal morphology with respect to fissures, lobes, and hilum. There was no variation found in the arrangement of structures at the hilum of either lung.

The medical history of the body donor did not reveal any lung pathology and the cause of death was not related to the pulmonary disease.

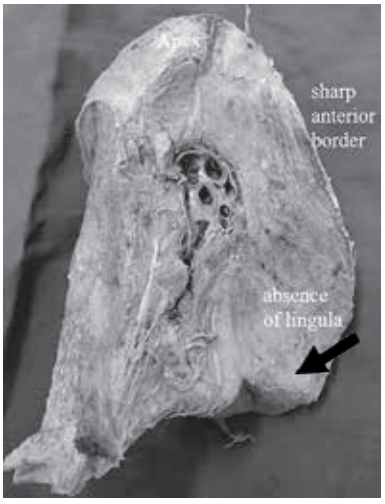


**Fig 1:** Shows the medial surface of the cadaveric left lung with the absence of oblique fissure, cardiac notch, and lingula.

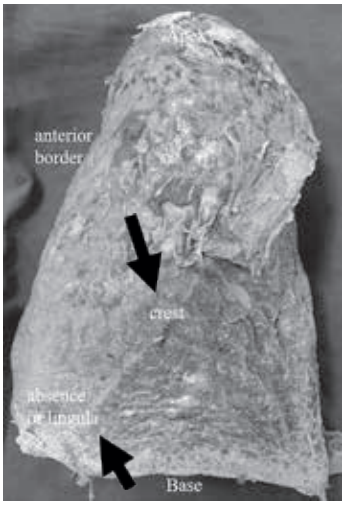


**Fig 2:** Shows the costal surface of the cadaveric left lung with the absence of oblique fissure, cardiac notch, and lingula. There was a fusion between the upper and lower lobes of this lung (arrow).

## Discussion

The lung develops from the respiratory diverticulum, which appears around the fourth week of embryonic life. During its development, the tissue of the lung buds out and the spaces/fissures separate single bronchopulmonary segments. Most of the spaces/fissures will be obliterated as development proceeds. The spaces which remain in the lobes of the lung will give rise to horizontal (minor) and oblique (major) fissures in the developed lung.[4] Dutta et al.,[3] have done a study on fissures of both lungs, in which they observed that oblique fissure was not present in the left lung in 8% cases and right lung in 11.54% cases from 102 formalin-fixed cadaveric lung specimens. In another study done by Meenakshi et al.,[2] on the fissure of lungs, oblique fissure was not present in one out of 30 paired lungs, but it was on the right side. Nene et al.,[6] did not find a single left lung with absent oblique fissure out of 50 formalin-fixed lung specimens. A cadaveric study on fissures and lobes of the lung in 40 pairs of lungs by Kommuru et al.,[7] showed no record of complete absence of oblique fissure in the left lung. Murlimanju et al.,[5] found only one specimen of the left lung without oblique fissure in their study on fissures and lobes of the lungs in 60 formalin-fixed cadavers. Anyadike et al.,[8] observed the absence of oblique fissure of the left lung in 4.2% of cases in North Indians. Bergman et al.,[9] described that absence of oblique fissure in the left lung was not observed. In the Kenyan population also, the absence of oblique fissure of the lung was not observed.[10]

The comparison of the frequency of absence of oblique fissure of left lung among previous studies from various population groups is represented in Table 1. The frequency had ranged between 0% to 8%. All these studies show that the absence of oblique fissure in the left lung is a rare occurrence. When there is no fissura obliqua in the left lung, there will not be lobes present either which we have noted in our study. The variation in pulmonary fissures is

seen more in the major fissure of the right lung than in the left lung. Variation is the incompleteness of fissures most of the time.[11]

**Table 1:** Comparison of frequency of absence of oblique fissure of the left lung in previous studies.

| Authors | Year of Study | Sample Size | Population Studied | Frequency |
|---|---|---|---|---|
| Meenakshi et al.,[2] | 2004 | 60 | Indian | 0% |
| Dutta et al.,[3] | 2013 | 102 | Indian | 8% |
| Murlimanju et al.,[5] | 2012 | 60 | Indian | 3.60% |
| Nene et al.,[6] | 2011 | 100 | Indian | 0% |
| Anyadike et al.,[8] | 2020 | 48 | North American | 4.20% |
| Bergman et al.,[9] | 2008 | 277 | North American | 0% |
| Mutua et al.,[10] | 2021 | 70 | Kenyan | 0% |

The absence of a cardiac notch was reported earlier by Sharma et al.,[12] but the absence of lingula was not reported before. In this case report, we are reporting the absence of lingula and cardiac notch. The absence of a cardiac notch can lead to the overlapping of the heart by the left lung. This anatomical variation may cause difficulty in the examination of the heart as in percussion and auscultation. The procedures like echocardiography and ultrasound examination may also become difficult. The absence of lingula suggests the absence of lingular bronchus and the middle lobe of the left lung.

During the segmental resection surgeries of the lung, the nature of fissure is very much important in the way of planning the operation. It has been known that postoperative leakage is due to incomplete fissure of the lung. Craig and Walker[13] have classified fissures in order of their completeness into four grades: Grade I-lobes of the lung are separated completely by the fissure; Grade-II- visceral cleft which is complete but with fusion at fissure's base; Grade III- incomplete visceral cleft; and Grade IV- fusion of lobes is the complete and total absence of fissure. The variation in the left lung in our case belongs to Grade IV of the above classification. The fissures restrict pneumonia to the particular lobe. Pneumonia can spread in case of incomplete fissures where lobes have not separated completely. The same theory can be applied to carcinoma of the lung where incomplete fissure and incomplete separation of lobes allow cancer to spread easily and rapidly to involve a large area of the lung, possibly the entire lung.[14] The lungs dilate maximally in the inferior direction as the thorax and diaphragm move towards the base of the lung. The fissure oblique of both lungs allows optimum uniformity in the expansion of the lungs during inspiration. So, in the expansion of the lung, the oblique fissure plays a very important role.

The absence of oblique fissure and lobes in the left lung, in this case, would hinder the proper expansion and air filling of the lung. Diseases like pneumonia and carcinoma can spread to the entire lung very fast as the lung parenchyma is not interrupted by fissures. The knowledge of variations like the absence of fissures in the lung is of utmost importance for cardiothoracic surgeons in resection surgeries of the lobes of the lungs. Thus, the variation of fissures of the lung is useful for radiologists, anatomists, cardiothoracic surgeons, oncologists, pulmonologists, as well as for physicians.

We report a rare variation of the absence of oblique fissure of the left lung, which was revealing the fusion between the superior and inferior lobes. The cardiac notch and lingula were also absent, which makes this case interesting. But the limitation of this study is that the bronchial tree was also not further dissected in this specimen. Any variations in the bronchopulmonary segmental pattern would have added surgical relevance in this case. The future study of this lung can be done with the luminal cast plastination of the bronchial tree.

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