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# Anatomical Variation in the Lobar Pattern of the Left and Right Lungs: A Case Report

# Fafure Adedamola Adediran<sup>1</sup>\*, Enye Linus Anderson<sup>1</sup>, Adekeye Oloruntoba Adeshina<sup>1</sup>, Ishola Azeez Olakunle<sup>1</sup>, Adetunji Adedeji Enitan<sup>1</sup> and Fafure Oluwabukola Eniola<sup>2</sup>

<sup>1</sup>Department of Anatomy, College of Medicine and Health Sciences, Afe-Babalola University, Ado-Ekiti, Ekiti State, Nigeria <sup>2</sup>Department of Mathematics and Statistics, The Federal Polytechnic Ado-Ekiti, Nigeria

\*Corresponding Author: Fafure Adedamola Adediran, Department of Anatomy, College of Medicine and Health Sciences, Afe-Babalola University, Ado-Ekiti, Ekiti State, Nigeria. Received: November 24,2021 Published: March 08, 2022 © All rights are reserved by Fafure Adedamola Adediran., et al.

### Abstract

The left and right lungs are vital organs, which oxygenate the blood by bringing inhaled air close to the venous blood in the pulmonary capillaries. The right lung possesses oblique fissure and transverse fissure that divide it into three lobes (superior, middle and inferior). The left having only an oblique fissure that divides it into two lobes (superior and inferior). During a dissection of an adult male cadaver between the age of 35 to 40 years, the presence of a single oblique fissure was observed in the right lung making it similar to that of left lung. The two lungs possess two right lobes (superior and inferior). The right lung was lesser in weight than the left.

Keywords: Lungs; Morphology; Dissection; Oblique Fissure Pulmonary Capillaries

### **Implication for Practice**

- Research and reports have made it known that variations can occur in the lobes of the lung.
- These lobes may confuse radiologists in X-ray scans and surgeons during surgery in cases of lung cancer (lobectomy- removal of one lobe).

### Background

The lungs are a paired cone-shaped bilateral organ necessary for respiration [10]. The lungs, which are embedded in the thoracic region, constitute part of the lower respiratory tract. The respiratory tract consists of the larynx, trachea, bronchi and lungs. The development of the lung is subdivided into three periods that are overlapping; these stages are the embryonic period, fetal period and postnatal period [9]. Segmentations are displayed in the human respiratory tissue development and this gives rise to two lobes on the left lung separated by the oblique fissure. The development of the lungs is by division and re-distribution of the respiratory diverticulum (lung buds) which surface from the endodermal fore-

gut. Imperfect development from the respiratory diverticulum will bring about variations such as non-appearance or incomplete fissures of the right or left lung [7]. The lung consists of an apex, three borders, and three surfaces located in the thoracic cavity on either side of the mediastinum where it provides oxygen to the blood. The lungs apex lies about 2cm above the clavicle. The borders consist of the anterior, posterior, and inferior borders. Its surfaces include the costal, medial, and diaphragmatic surfaces. The costal surface associated with the sternum and the rib is enclosed by the costal pleura [4]. At the anterior and posterior border, the costal surface unites with the medial surface and diaphragmatic surface respectively. The lungs are divided into lobes by their horizontal, and/or oblique fissure. The right lung is divided into upper, middle and lower lobes by oblique and horizontal fissures, which function in the movement of the lobes against each other during respiration. While the left lung is divided into upper and lower lobes by its oblique fissure. The previous study has shown that an average adult human lungs weigh approximately 1000g and that oblique fissures begin at about 6cm below the apex of each lung, and are situated 2cm from

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the medial plane [6]. It is also at the level of the 3<sup>rd</sup> and 4<sup>th</sup> spinous process of the thoracic vertebra. On the other hand, at the level of the midaxillary line, the horizontal fissure overlies the 4<sup>th</sup> rib to join the oblique fissure. The lung from the routine dissection varied in not just weight but in appearance, length, and distance from the costal region to mediastinum [1]. This study aims to make known possible and observable variations in the lungs of humans.

### **Case History**

A case of cadaveric variant lungs fissures and lobes was identified in the gross anatomy laboratory of Afe Babalola University Ado, Ekiti State of Nigeria. This case was noticed on the sixth of May, 2021 during cadaveric dissection of the thoracic region of the adult male body, which is suspected to be between the age of 35 to 40 years. The features of the lungs were studied, necessary measurements were recorded and pictures were taken. Figure 1-5 below shows the measurements and photographs of the lungs specimen. The medical history of the individual was not known. The thoracic cavity as shown in Figure 1 below revealed that the width of the right cavity (10.5cm) and the width of the left cavity (11cm). The lungs as shown in Figure 2 had the presence of two lobes each (superior and inferior lobes) with the appearance of the only oblique fissure. The left and right lungs were divided into the upper and lower lobe with the presence of oblique fissure and show the absence of transverse or horizontal fissure. The right lungs weigh approximately 535.8g while the left lungs weigh approximately 612.2g. The average length of the right lungs is 19.3cm, and the average length of the left lungs is 21.2cm. The width of the right lungs measures 10.5cm, while the width of the left lungs is 12.5cm (Table 1).





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**Figure 2:** Photograph of the anterior surface of the right and left lung showing: the oblique fissure (OF); A: Apex of the.

Figure 3: Photograph of the posterior surface of the right and left lung showing: the UL: upper lobe; LL: lower lobe

**Figure 4:** Photograph of the posterior surface of the right lung showing: PA: Pulmonary artery, Bronchus and Pulmonary vein. IVF: Incomplete variant fissure.

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Organ	Length (cm)	Width (cm)	Weight (g)
Right Lungs	19.3	10.5	535.8
Left Lungs	21.2	12.5	612.2

Table 1: Showing the measurement of the left and right lungs.

Before the surgery, that has to do with the lungs, especially in the pre-operative planning of lobectomy, It is very important to know about variant fissures. The presence of a variant fissure will likely affect and change the procedure of the surgery to avoid postoperative complications like air leakage. It is also important to take note of this variant fissure during pleural effusion, to avert complications. This case of lungs variations experienced may give insight to some unusual X-ray presentations.

### Conclusion

The lungs variation presented in this study varies from what is majorly documented in literatures and have implications in both radiology and surgery that can be extrapolated to ensure a successful diagnosis and treatment.

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#### **Conflicts of Interests**

No conflicts of interest

### **Authors Contribution**

FAA: Original draft, investigation, conceptualization, methodology.

- ELA: writing review and editing, resources.
- IAO: Methodology, review and editing.

AOA: review and editing.

AAE: writing - review and editing.

FOE: Data collection or management.

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opment of the lungs progresses in the 8-week-old embryo, at this stage, numerous bronchopulmonary segments are formed from the subdivision of lobar buds [8]. They later fuse completely except at the sites of fissure formation. This results in the formation of lobes and fissures. This study revealed the presence of an oblique fissure in both the right and left lungs and the absence of the horizontal fissure (Figure 2 and 3). The oblique fissure separates the upper lobe from the lower lobe, therefore, the absence of the horizontal lobe neutralizes the middle lobe (Figure 3). Incomplete fissure formation could be due to partial obliteration of these fissures. All the variations noted in lobulation and fissures in both lungs might be because of altered pulmonary development [5].

Reports have shown that the use of organ weights in determining or interpreting the cause of death is one of the leading criteria to be considered in autopsy. Our findings show that the right lungs weigh approximately 535.8g while the left lungs weigh approximately 612.2g (Table 1). This is in contrast to the findings of Govender., et al. who measured post-mortem organ weights, and reported that the right lungs weigh more than the left lungs [2]. The average length of the right lungs is 19.3cm, and the average length of the left lungs is 21.2cm. The width of the right lungs measures 10.5cm, while the width of the left lungs is 12.5cm (Table 1).

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Figure 5: Photograph of the posterior surface of the left lung showing: PA: Pulmonary artery, Bronchus and the Pulmonary vein.

Cadavers are the human remains used in studying anatomy and

#### Discussion

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