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Case Report

A case of single fissured right lung

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ABSTRACT

Two soft, spongy lungs are located in the chest cavity on either side of the mediastinum. Tripartitions are typically observed in the right lung with oblique and horizontal fissures, and bipartitions are observed in the left lung with a single oblique fissure. Expansion of the lungs during breathing is largely helped by fissures. During undergraduate cadaveric chest dissection, we discovered and examined the right lung with a single fissure. In this case, the right lung has transitioned from trilobular to bilobular, with a single oblique fissure separating the upper and lower lobes. The left lung had a normal shape with one oblique fissure and two lobes. Lung fissures and lobar patterns are often altered due to developmental changes during the fetal period. Clinicians should be aware of these anatomical differences in the lung fissures before performing lung surgery to prevent subsequent complications.

1. Introduction

The main part of the chest cavity, on either side of the mediastinum, contains two soft, spongy lungs. Each lung has a root that connects the mediastinum to its medial portion, through which the bronchi, blood vessels, lymphatic vessels and nerves pass.[1] The trachea divides into two main bronchi at the level of the lower border of the fourth thoracic vertebra, and each main bronchus divides into 3 secondary bronchi on the right side and 2 secondary bronchi on the left side, it enters the lungs through apertures on the surface of the mediastinum.[2] The right lung generally consist of three parts; separated by an oblique and horizontal fissure, and an oblique fissure[1] separates the left lung. In the right lung, the oblique fissure originates from the posterosuperomedial surface of the hilum and goes obliquely, passing the posterior border approximately 6 cm beneath the highest point of the posterior border and passing downward along the anterior surface of lung, The oblique fissure crosses the lower border around 7.5 centimeters behind at its rear end, then ascends on its medial side to reach the inferior to the hilum, From oblique fissure of lung, around midaxillary line, a short horizontal fissure goes horizontally towards anterior border, separating the middle lobe from the upper lobe. The left lung is divided into upper and lower lobes by a deep oblique fissure that is steeper than the right lung.[1] Pulmonary fissures play an important role in lung expansion during inspiration, as the lung lobes can move along the pulmonary fissures during inspiration, which is lined by the expansion of the lung pleura.[3]

2. Case Report

We discovered a single fissure in a 70-year-old male's right lung during a routine undergraduate cadaveric dissection and it was examined. In present case, we found that the right lung having only two lobes instead of three lobes, superior and inferior lobes separated by an antero-inferiorly directed, solitary oblique fissure (Figure 1). Instead of beginning on medial surface, posterosuperior to the hilum (Figure 3),

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the oblique fissure began 5.4 cm behind the hilum, 6.2 centimeters below the highest point of the posterior border, then it passed downwards and forwards over the costal surface. Instead of crossing the inferior border, the fissure crossed 3.5 cm above the lower end of anterior border (Figure 1), then ascended on the medial surface to reach the inferior part of hilum (Figure 3).

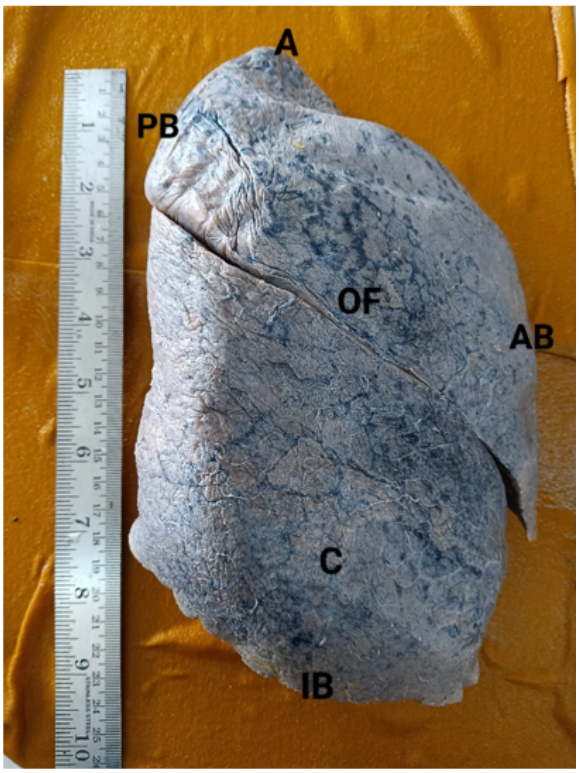

Figure 1: Showing absent horizontal fissure and complete, Antero-inferiorly directed, solitary oblique fissure on costal surface, OF: Oblique fissure, AB: Anterior border, PB: Posterior border, IB: Inferior border, A = Apex, C = Costal surface

Depth of fissures was noted to be 5 cm and weight of right lung measured was 662 grams. Total length of anterior border measured 20.5 cm and posterior border measured 22.5 cm. In this case, right lung showed a grade-1 oblique fissure according to Craig and walker classification (1997) as the fissure was complete and forming two separate lobes.[4] Absence of the horizontal fissure, leads to non-visualization of the middle lobe (Figure 1). There were no other variations in cadaver. The left lung exhibited its normal shape, which consists of an oblique fissure and two lobes.

3. Discussion

Around the fourth week of intra uterine life, the lung bud develops as a ventral protrusion from the foregut wall; the lung's epithelial lining is entirely endodermal, while the

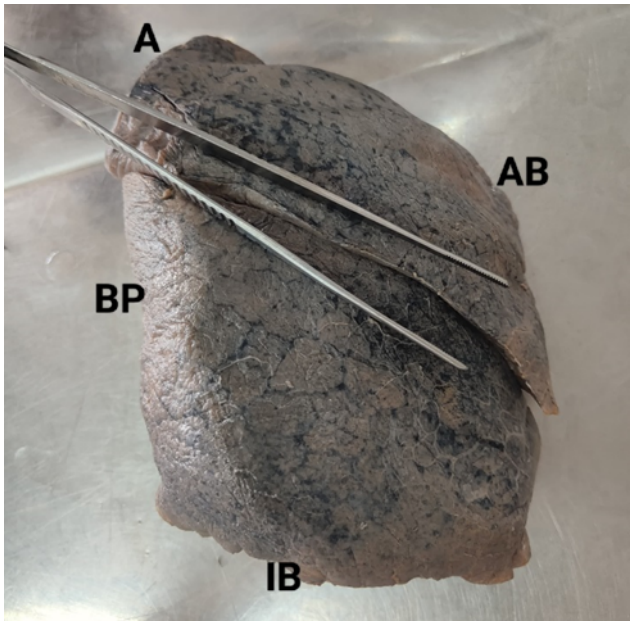

Figure 2: Showing solitary oblique fissure on costal surface, AB = Anterior border, PB = Posterior border, IB = Inferior border, A = Apex

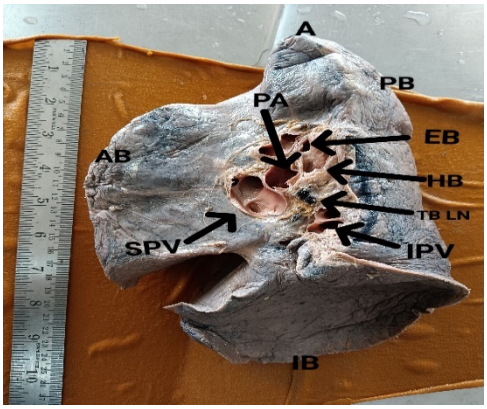

Figure 3: Showing mediastinal surface and hilar region EB = Eparterial bronhcus, HB = Hyparterial bronchus, PA = Pulmonary artery, SPV = Superior pulmonary vein, IPV = Inferior pulmonary vein, TB LN = Tracheobronchial lymph node, AB = Anterior border, PB = Posterior border, IB = Inferior border, A = Apex

connective tissue is derived from splanchnic mesoderm.[5] The lung bud initially divides into principal bronchial buds on the right and left, which correlate to the development of the respective lung then several bronchopulmonary segments will be formed by further extensive branching of the bronchial buds, these segments unite subsequently, with the exception of the location where horizontal and oblique fissures are formed.[6] The mesodermal tissue trapped between the lungs parenchymal tissues of a lobar bronchi gives rise to the pleura and thus fissure.[7] Cadavers in dissection halls helps in studying the variant anatomy of any

organ including lungs which can increase the knowledge of variant anatomy among students.[8] Radiologists may come across cases where there is absence of a horizontal fissure on imaging examinations such as chest X-rays or computed tomography (CT).[5] Surgeons doing thoracic procedures, such as lobectomies or segmentectomies, must be alert of variances in lung morphology as missing horizontal fissure may modify the traditional anatomical landmarks used during these treatments, necessitating meticulous preoperative planning and intraoperative adjustments.[7] In some circumstances, the absence of a horizontal fissure may indicate underlying lung disease or congenital defects. When examining patients with respiratory symptoms or imaging abnormalities, clinicians should take into account this anatomical variance. According to Craig and walker classification (1997),[4] the integrity of fissures is evaluated in four grades.[4] Grade 1 - complete cleavage, lobes completely separated, Grade 2 - complete visceral cleft, but lower part of cleft fused, Grade 3 - prominent visceral cleft for partial cleavage, Grade 4 - complete fusion of lobes, cleft lines not evident.[4] In this case, in the right lung fissure was complete and forming two separate lobes, so it categorized as a grade-1 oblique fissure according to the Craig and walker classification.[4] The horizontal cleft will disappear when the bronchopulmonary section at the level of the horizontal cleft is completely fused. Incomplete or complete loss of clefts during development causes anatomical changes in the lungs.[9] George et al. (2014) found that horizontal slits were absent in both right lungs examined in 65 samples based on human lung morphology from Indian cadavers.[8] Ughade et al. (2018) found that out of 50 right lung examinations, there were no fissures in 2 cases, and 18 lungs were not completely horizontal. All samples of the right lung had oblique fissures.[10]

4. Conclusion

In this case, an oblique fissure was reported in the right lung, creating two separate lobes and the absence of the middle lobe. Surgeons need to be aware of these changes in order to prevent postoperative complications and to interpret radiographs.

5. Source of Funding

None.

6. Conflict of Interest

None.

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