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Absence of Horizontal fissure with bilateral Inferior accessory fissure and accessory fissure on upper lobe of right lung a rare association of fissure pattern, an incidental finding

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Abstract

Variation in Lung fissure pattern is reported frequently**.** During routine dissection hours a case of absence of Horizontal fissure in the right lung was observed, which was associated with inferior accessory fissure and accessory fissure on upper lobe. The left lung had an inferior accessory fissure along with the normal oblique fissure. Such fissure patterns are to be taken into account while interpreting a chest radiograph or surgical intervention of any lung lesion.

Introduction

The right lung is divided into superior, middle and inferior lobes by its oblique (major) and horizontal (minor) fissures. The left lung is divided by the oblique fissure into upper and lower lobes. The oblique fissure starts on the posterior border at either level with the spine of the fourth thoracic vertebra or slightly lower, then descends across the fifth intercostal space crossing the inferior border of the lung approximately 7.5 cm behind its anterior end. The shorter horizontal fissure separates the superior and middle lobes. It passes from the oblique fissure, near the mid-axillary line, horizontally forwards to the anterior border of the lung, level with the sternal end of the fourth costal cartilage.[(1)] The more vertical left oblique fissure is approximately indicated by vertebral border of scapula in fully abducted arm.[(2)] Defective pulmonary development give rise to variations in fissures and lobes. The knowledge of variation of anatomy of fissures of lung helps in radiographic interpretation of different conditions and spread of various diseases through different pathways.[(3)] We present a unique pattern of fissure association, observed during routine dissection practical.

Case Finding

Observation in Right Lung: The right lung shows the complete oblique fissure which descends on costal surface from the posterior border to the middle of the inferior border whence it passes along the diaphragmatic surface to reach the hilum. The horizontal fissure is absent. The right lung is thus divided into two lobes.

Two incomplete accessory fissures are observed in right lung. The inferior accessory fissure, starting from the oblique fissure passes behind and separates the medial basal segment from the main lower lobe. The other accessory fissure is seen on the upper lobe. It extends from the oblique fissure to the anterior end of inferior border thus separating a lateral segment from the main lobe.

Observation in Left lung: The left lung showed the normally situated complete oblique fissure and an inferior accessory fissure separating the medial basal segment from the lower lobe.

All these observations were made while taking a heart lung specimen from a cadaver to prepare a museum specimen after regular dissection class.

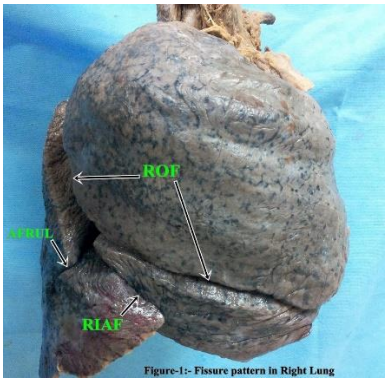

Fig. 1: Fissure pattern in Right Lung
ROF: Right Oblique Fissure
RIAF: Right Inferior Accessory Fissure
AFRUL: Accessory Fissure In Right Upper Lobe

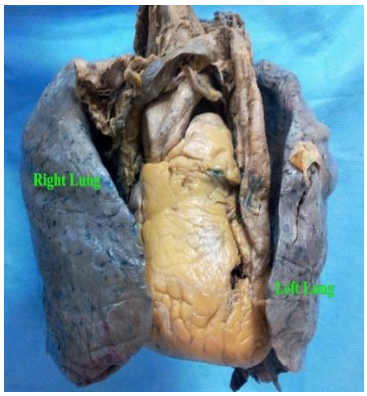

Fig. 2: Heart Lung Specimen Horizontal Fissure Absent

Fig. 3: Fissure Pattern in Left Lung
LOF: Left Oblique Fissure
LIAF: Left Inferior Accessory Fissure

Discussion

The mesodermal tissue trapped between the lungs parenchymal tissues of a lobar bronchi gives rise to the pleura and thus fissure. Most of these fissures are obliterated leaving the complete oblique and horizontal fissure in right lungs and oblique fissure in left lung.[4] Radiologic and cadaveric studies have frequently shown varying percentage of incomplete fissures, accessory fissures and in some, absence of the main fissures. Absence or incomplete oblique or horizontal fissures indicates obliteration of these fissures either completely or partially. Accessory fissure may be the result of non-obliteration of spaces which normally are obliterated.[5]

Literature review reveals the prevalence of incomplete and absence fissures in different cadaveric and specimen studies as follows.

Lydia S. Quadros et.al. (2014) reported the prevalence of incomplete and absent right oblique fissures in 5.55% & 0% cases, incomplete and absent left oblique fissures in 2.5% & 0% cases, incomplete and absent right horizontal fissures in 25% & 11.11% cases.[6]

Jacob et.al (2013) reported the prevalence of incomplete and absent right oblique fissures in 50% & 3.4% cases, incomplete and absent left oblique fissures in 38.9% & 0% cases, incomplete and absent right horizontal fissures in 83.4% & 6.6% cases.[4]

Devi NB et. al (2011) reported the prevalence of incomplete and absent right oblique fissures in 9% & 0% cases, incomplete and absent left oblique fissures in 36.3% & 9% cases, incomplete and absent right horizontal fissures in -18% & 9% cases.[7]

Nene AR et.al (2011) reported the prevalence of incomplete and absent right oblique fissures in 6% & 2% cases, incomplete and absent left oblique fissures in 12% & 0% cases, incomplete and absent right horizontal fissures in 8% & 14% cases.[8]

Meenakshi S et.al. (2004) reported the prevalence of incomplete and absent right oblique fissures in 36.6% & 0% cases, incomplete and absent left oblique fissures in 46.6% & 0% cases, incomplete and absent right horizontal fissures in 63.3% & 16.6% cases.[5]

The prevalence of accessory fissures is in 13.3% cases in right and 27.7% cases in left lungs(Jacob), 13.88% cases in right and 22.5% in left lungs (Lydia Shobha Quadros), 1/30 cases in right and 3/30 cases in left lungs (S. Meenakshi et al), 8.69% cases in right and 15% cases in left lungs (Azmera Gebregziabher et al), 17.5% cases in right and 20% cases in left lungs (Hemanth. Kommuru1), 30% on the right, 14% on the left, and 12% bilaterally (Godwin, J. D).[3,4-6,9,10]

They usually occur at the boundaries between bronchopulmonary segments and the most common are the inferior accessory fissure, which demarcates the medial basal segment; the superior accessory fissure, which demarcates the superior segment; and the left minor fissure, which demarcates the lingula. The inferior accessory fissure surrounds the medial basal segment of the lower lobe, which when thus demarcated from the main lobe has been called the inferior accessory, cardiac, retrocardiac, or infracardiac lobe, analogous to the cardiac lobe that is present in most lower mammals. Other less common locations are between medial and lateral segments of the middle lobe and between anterior and lateral segments of the lower lobes and sometimes fissures occur within a bronchopulmonary segment, usually separating sub-segments.[10]

Our case shows the presence of complete right and left oblique fissure with absence of horizontal fissure thus dividing the right lung into two lobes i.e. upper and lower lobes. Also it shows the presence of bilateral inferior accessory fissures (reported in very few literatures Godwin, J. D)[10] in both lungs separating the respective medial basal segments from the lower lobes. Addition to that it shows the presence of accessory fissure in upper lobe of right lung separating the lateral segment from the main lobe indicating the fusion of medial segment of middle lobe with the 3 segments of upper lobe.

Clinical significance

Radiologically an accessory fissure can produce a sharply marginated pneumonia, which may be misinterpreted as atelectasis or consolidation[10] or it can be mistaken for a lung lesion[11] or sometimes may go undetected.[12] Accessory fissure also helps in preoperative planning and strategy for segmental resection or pulmonary lobectomy[8] and handling of potential problems that might be encountered during surgical intervention.[13] An incomplete fissure is also a cause of postoperative air leakage.[14]

Conclusion

A number of case reports and studies shows different form of fissure patterns i.e. Complete, incomplete or absence oblique and horizontal fissures with many forms of accessory fissures in both lungs. Knowledge of all these patterns are essential for

radiologists, physicians and surgeons to overcome the challenges in diagnosing and planning for surgeries in case of a fissure or lesion margins. This incidental finding of absence of horizontal fissure, bilateral inferior accessory fissures with accessory fissure in right lower lobe is a rare combination of fissure pattern.

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