



A CADAVERIC STUDY ON ACCESSORY FISSURES OF HUMAN LUNGS

Anatomy

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ABSTRACT

Background: A variety of accessory fissures are present in human lungs. They are usually situated between the bronchopulmonary segments of lungs and develop when adjacent lobules retain some separation from each other during growth. The knowledge of accessory fissures is important during lobectomies, segmental resections and radiological examinations of lungs. Hence, the present work has been carried out to study the incidence, course, completeness and morphological parameters (length and depth) of the accessory fissures of human lungs.

Methods: The study was carried out in 92 adult human lungs (46 right and 46 left) in the Department of Anatomy, Gauhati Medical College and Hospital, Guwahati. After collection and preservation in 10% formalin, the lungs were observed for accessory fissures and the incidences were calculated. Also, the course and completeness of the fissures were noted, and the lengths and depths of the fissures were measured using Vernier caliper.

Results: In the present study, out of 92 lung specimens, 3 lungs (2 right and 1 left) showed SAF (3.26%), 1 left lung showed IAF (1.08%). Also, out of 46 left lungs, 8 showed LMF (17.39%) and 1 showed A_p-A_s (2.17%). The average length and depth of SAF were 3.13 cm and 2.72 cm respectively, those of IAF were 3.52 cm and 0.11 cm respectively, those of LMF were 4.27 cm and 1.14 cm respectively, and those of A_p-A_s in left lung were 2.25 cm and 1.22 cm respectively. All the accessory fissures belonged to the grade III variety of Craig and Walker's fissural classification.

Conclusion: The incidences of accessory fissures vary among populations and its knowledge helps in the management of different lung pathologies.

KEYWORDS

accessory fissures, lungs, segmental resection

INTRODUCTION

An accessory fissure is a cleft of variable depth, lined by visceral pleura¹. They develop when adjacent lobules retain some separation from each other during growth². They are usually located between the bronchopulmonary segments. However, they may also occur within a segment, between the subsegments of lungs¹. They are the most common congenital anomalies of lungs², and are more common in fetuses and neonates³. They may vary from an incomplete to a complete fissure⁴. Several accessory fissures are described in the literature. They may occur between the superior segment and rest of the segments of lower lobe, the superior accessory fissure (SAF), or may surround the medial basal segment of lower lobe, the inferior accessory fissure (IAF)⁵, or may be present between the lingula and rest of the left upper lobe, the left minor fissure (LMF)⁶. Sometimes, an accessory fissure may be found between the apicoposterior and anterior segments of the upper lobe (A_p-A_s) in left lung⁷, between the medial and lateral segments of the middle lobe, between the superior and inferior segments of the lingula, and due to abnormal course of the azygos vein, the azygos fissure⁸.

An accessory fissure may be responsible for formation of a sharply demarcated pneumonia or may be misinterpreted in a chest x-ray for a scar tissue¹. The knowledge of accessory fissures helps the surgeons to identify it during operation⁹ and study its completeness to prevent postoperative complication¹⁰. Further, the accessory fissures may be associated with altered bronchial tree branching pattern¹¹, the knowledge of which is important during bronchoscopic examination of lungs¹².

Hence, the present work has been carried out to study the incidence, course, completeness and morphological parameters (length and depth) of the accessory fissures of human lungs.

MATERIALS AND METHODS

A total number of 92 lung specimens (46 right and 46 left) were collected from adult human cadavers (aged between 18 and 70 years), from the Department of Anatomy and Department of Forensic and State Medicine, Gauhati Medical College and Hospital, during 2015-16, after obtaining ethical clearance from the Institutional Ethical Committee, and preserved in 10% formalin. Lungs with previous injuries, pathologies and surgical resections were not included in the study. Then, the lungs were observed for accessory fissures and the

incidences were calculated in Microsoft Excel sheets. The course of the fissures were also noted on the lungs surface and the completeness was determined following Craig and Walker's fissural classification¹³ into four grades: grade I- complete fissure with entirely separate lobes; grade II- complete visceral cleft but parenchymal fusion at the base of the fissure; grade III- visceral cleft evident for a part of the fissure; and grade IV- complete fusion of the lobes with no evident fissure line. The lengths of the fissures were, then, measured on the lungs surface, using thread and external jaws of a Vernier caliper, the depths (maximum) were measured using depth measuring blade of the caliper and the average values were calculated.

RESULTS

Accessory fissures were present in 13 lungs out of total 92 lung specimens. Out of these 92 lungs, 3 (2 right and 1 left) showed SAF (3.26%) (Fig: 1) and 1 left lung showed IAF (1.08%) (Fig: 2). Also, out of 46 left lungs, 8 showed LMF (17.39%) (Fig: 3) and 1 showed A_p-A_s (2.17%) (Fig: 4).

On studying the course of the accessory fissures, it was found that, in three lungs (both right and left), SAF started from the oblique fissures and extended on the costal surfaces for an average of 3.13 cm (Fig: 1). In one left lung, IAF surrounded the medial basal segment of the lower lobe and continued medially, and superiorly most of the way to the hilum for 3.52 cm (Fig: 2). In all the eight left lungs, LMF started from the anterior borders and extended on the costal surfaces for an average of 4.27 cm (Fig: 3). In one left lung, A_p-A_s started from the anterior border and extended on the costal surface for 2.25 cm (Fig:4).

On studying the completeness of the accessory fissures, all the lungs showed grade III variety of Craig and Walker's fissural classification¹³.

Table 1: Incidence of accessory fissures of lungs

Lung	Accessory fissure							
	SAF		IAF		LMF		A_p-A_s	
	No. of speci men	%	No. of speci men	%	No. of speci men	%	No. of speci men	%
Right (n=46)	2	4.35	0	0				
Left (n=46)	1	2.17	1	2.17	8	17.39	1	2.17

n= Total number of specimens on each side

Table 2: Average length and depth of accessory fissures of lungs

Mean	SAF (cm)	IAF (cm)	LMF (cm)	A _p -A _t (cm)
Length	3.13	3.52	4.27	2.25
Depth	2.72	0.11	1.14	1.22

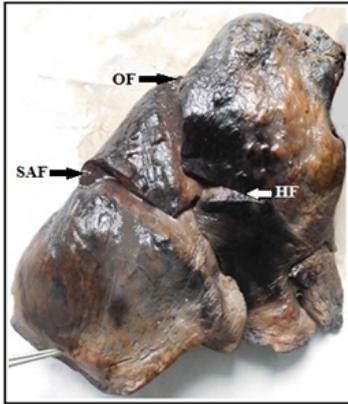


Figure 1: Showing superior accessory fissure (lateral surface of right lung)

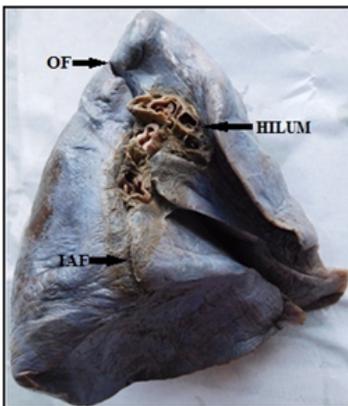


Figure 2: Showing inferior accessory fissure (medial surface of left lung)

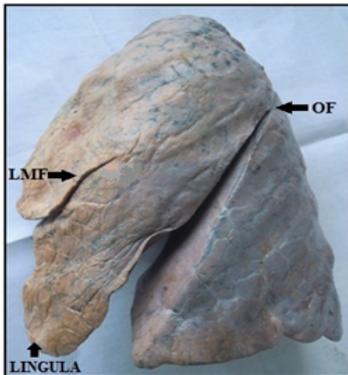


Figure 3: Showing left minor fissure (lateral surface of left lung)

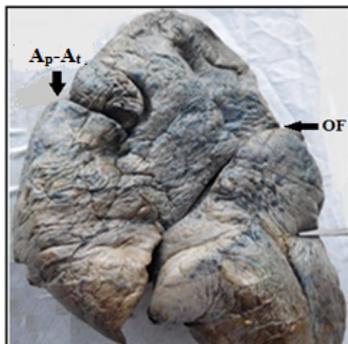


Figure 4: Showing accessory fissure between apicoposterior and anterior segments (lateral surface of left lung)

Abbreviations: Key: SAF= Superior accessory fissure; IAF= Inferior accessory fissure; LMF= Left minor fissure; A_p-A_t = Accessory fissure between apicoposterior and anterior segments; OF= Oblique fissure; HF= Horizontal fissure.

DISCUSSION

Several authors have studied the accessory fissures of human lungs. Austin⁶ observed LMF in 1.6% of cases. Berkmen et al⁷ found LMF in 72% and A_p-A_t in 11% of left lungs. Aziz et al¹⁴ found IAF in 8.6%, SAF in 4.6% and LMF in 6.1% of cases. Nene et al¹⁵ reported SAF in 4% of right lungs, IAF in 14% of right lungs and 24% of left lungs, and LMF in 26% of left lungs. Hwang et al¹⁶ found IAF in 12.3% of right lungs, 1.3% of left lungs and 0.3% bilaterally. Quadros et al¹⁷ observed SAF in 8.33% of right lungs, IAF in 5.55% of right lungs and 5% of left lungs, and LMF in 17.5% of left lungs. In the present study, the incidence of SAF (3.26%) is almost similar to Aziz et al¹⁴, but it is much lower than that of Quadros et al¹⁷; the incidence of LMF (17.39%) is similar to that of Quadros et al¹⁷; the incidence of IAF (1.08%) is much lower than that of Aziz et al¹⁴; and the incidence of A_p-A_t in left lung (2.17%) is also much lower than that of Berkmen et al⁷.

Berkmen et al⁷ reported incomplete accessory fissures in 61% of lungs. Hwang et al¹⁶ observed complete accessory fissures in 0.3% of lungs and incomplete accessory fissures in 12.3% of lungs. In the study by Sreenivasulu et al¹⁸, all the lungs showed grade III accessory fissure, except one, which exhibited grade II fissure. In the present study, all the lungs showed grade III variety of Craig and Walker's fissural classification¹³, which is almost similar to the findings of Sreenivasulu et al¹⁸.

Aldur et al¹⁹ reported the average length and depth of SAF as 12 cm and 3 cm respectively. Sreenivasulu et al¹⁸ found the length and depth of SAF as 8 cm and 4 cm respectively. Hwang et al¹⁶ reported the average length of IAF as 2.23 cm. Kumar²⁰ reported the length of IAF as 9 cm. Kim et al²¹ observed the length and depth of LMF as 5-8 cm and 0.5-1.2 cm respectively. In the present study, the average depth of SAF (2.72 cm) correlates with that of Aldur et al¹⁹, the average length of LMF (4.27 cm) and depth of LMF (1.14 cm) correlate with Kim et al²¹, while the average length of IAF (3.52 cm) is little higher than that of Hwang et al¹⁶.

CONCLUSION

In the present study, the incidences of the accessory fissures of lungs, in the population of Assam, vary with other populations. Thus, preoperative radiological evaluation of the accessory fissures is essential before performing segmental resection of lungs. Moreover, there are limited studies on the completeness of the accessory fissures and their relation to the bronchial tree branching pattern. Thus, more studies have to be conducted in this regard for proper management of lung pathologies.

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