Research Paper

Volume : 2 | Issue : 6 | June 2013 • ISSN No 2277 - 8179

Morphometric Study And Variations of the Lobes and Fissures of the Lungs

Medical Science

KEYWORDS : Oblique fissure, Horizontal fissure, Accessory fissure, Accessory lobe

Rajeev Mukhia	Post Graduate, Anatomy, MGM Medical College, Sec-18, Kamothe, Navi Mumbai-410209
Pooja Pant	Post Graduate, Anatomy, MGM Medical College, Sec-18, Kamothe, Navi Mumbai-410209
Haritha Kumari N	Lecturer in Anatomy, MGM Medical College, Sec-18, Kamothe, Navi Mumbai-410209
Dr. Aruna Mukherjee	Professor and Head, Anatomy, MGM Medical College, Sec-18, Kamothe, Navi , Mumbai-410209

ABSTRACT

The fissures form the boundaries for the lobes of the lungs, knowledge of their position is necessary for the appreciation of lobar anatomy and thus for locating the bronchopulmonary segments which is significant both anatomically and clinically. Hence, our main objective is to find out the variations in the fissures and lobes of the lungs as well as prevalence of the variation. Total 100 lungs were included in present study. The dissection was performed in the dissection hall of Anatomy Department, MGM Medical College, Kamothe, Navi Mumbai. The length of oblique fissure of left lung is longer than that of right lung, the left lung shows more normal pattern of fissures & lobes than that of right. The presence of accessory fissure in case of right lung was 12% & left lung was 22%, which shows that the accessory fissure was seen more on the left lungs.

Introduction:

Lungs are divided into lobes by the oblique and the transverse fissures. The oblique fissure cuts the vertebral border of both the lungs at the level of 4th or 5th thoracic spine. Horizontal fissure, seen only in the right lung begins laterally at the oblique fissure and runs almost transversely across the costal surface to the anterior margin and around this margin back to the hilum.[1] As the fissures form the boundaries for the lobes of the lungs, knowledge of their position is necessary for the appreciation of lobar anatomy and thus for locating the bronchopulmonary segments which is significant both anatomically and clinically. Hence, the awareness of their variations is essential in performing lobectomies and in segmental resection. It could also be of significance in interpreting radiological images (Rosse C, 1997).[1]

Materials and Methods:

The study was conducted in department of Anatomy, Mahatma Gandhi Mission's Medical College, Kamothe, Navi Mumbai. A total of thirty cadavers were dissected. Other than these 40 separate lung specimens were studied. Dissection was done irrespective of age and sex. The thoracic wall of properly embalmed and formalin fixed cadavers was dissected and the lungs were exposed to study the morphological features including number, lobes, and fissures. The anatomical classification proposed by Craig and Walker (1997) was followed to determine the presence and completeness of pulmonary fissures.[11] The dissection was done according to the "Cunningham's manual of practical anatomy 15th ed." & "Grant's dissector 15th ed." [12, 13]

Observations and Results:

The Mean length of oblique fissure of right lung was noted as 19.97cm where as mean length of horizontal fissure of right lung was 9.24cm. Mean length of oblique fissure (inferior) on medial surface from hilum of right lung was 8.31cm where as mean length of oblique fissure (Postero-superior) on medial surface from hilum of right lung was 2.87cm where as mean distance between anterior border and ending of oblique fissure on inferior border of right lung was 6.56cm.

Mean length of oblique fissure of left lung was noted as 22.20cm. Mean length of oblique fissure (inferior) on medial surface from hilum of left lung was 8.45cm. Mean length of oblique fissure (Postero-superior) on medial surface from hilum of left lung was 3.03cm and mean distance between anterior border and ending of oblique fissure on inferior border of left lung was 3.22cm.

Discussion:

During the developmental stage, the lung tissue grows as multiple bronchopulmonary buds. Later the spaces or fissures that separate individual bronchopulmonary buds / segments become obliterated. The spaces remain along the interlobar planes to give rise to major (oblique) and minor (horizontal) fissures in a fully developed lung. Absence or incompleteness of a fissure could be due to obliteration of these fissures either completely or partially. On the other hand, accessory fissure could be the result of non-obliteration of spaces which normally are obliterated. Incomplete pulmonary fissures indicating partial fusion between lobes are common and more than half of the pulmonary fissures are incomplete. [14]

Comparative prevalence of anatomical variations of fissures of lung was given in the following table (Table4). The fissures in the lung help even expansion of lung tissue and serve as a reliable landmark on the lung. Accessory fissures when present at abnormal locations in the lungs give rise to abnormal lobes of the lung aerated by normal bronchus. Such finding is more common in infants.[1] From a radiological point of view, an accessory fissure may commonly be misinterpreted as a lung lesion.[3] In patients with endobronchial lesion, an accessory fissure might alter the usual pattern of lung collapse and pose difficulty in diagnosing a lesion and its extent by giving an unusual appearance. An incomplete major fissure causes the odd appearance of fluid tracking within the fissure. Incomplete fissures may also alter the spread of disease within the lung. Pneumonia in a particular lobe is contained within the confines of the lobe by complete and normal fissure. In patients with incomplete fissures, pneumonia may spread to adjacent lobes through the parenchymal continuation. Odd lobar involvement with carcinoma of the lung may be explained on a similar basis. [5]

Many diseases require accurate segmental localization of the lesion and the knowledge of accessory fissure is of much clinical importance to the clinician. Preoperative planning and strategy for segmental resection or pulmonary lobectomy may also change during presence of such accessory fissure. An incomplete fissure is also a cause for postoperative air leakage. Often these accessory fissures act as a barrier to spread of infection, creating a sharply marginated pneumonia which can wrongly be interpreted as atelectasis or consolidation. [4]

The knowledge of anatomy of fissures of lung may help clarifying confusing radiographic findings like extension of fluid into an incomplete major fissure or spread of various diseases through different pathways. [15]

Conclusions:
The length of oblique fissure of left lung is longer than that of right lung, the left lung shows more normal pattern of fissures & lobes than that of right. The presence of accessory fissure in case of right lung was 12% & left lung was 22%, which shows that the accessory fissure was seen more on the left lungs. Anatomical knowledge of such variations is useful for planning lobectomies and surgical resections involving individual segment. Similarly, it might help the surgeon to plan, execute and modify a surgical procedure. This will help to reduce the morbidity and mortality associated with lung surgeries.

Acknowledgements:
We thank Mr. Pandurang Thatkar, Statistician, MGM Medical College for his great statistical evaluation of the results of present study.

Tables

Table: 1- Observations of variations of major & minor fissures & lobes of right lungs.

Right Lung	Normal pattern of fissures & lobes	52%
	Absence of O.F	2%
	Incomplete O.F	12%
	Absence of H.F	20%
	Incomplete H.F	14%
	Presence of A.F	12%

Table: 2- Observations of variations of major & minor fissures & lobes of left lungs.

Left Lung	Normal pattern of fissures & lobes	72%
	Absence of O.F	2%
	Incomplete O.F	4%
	Presence of A.F	22%

Table: 3- Observations regarding accessory fissures of the lungs

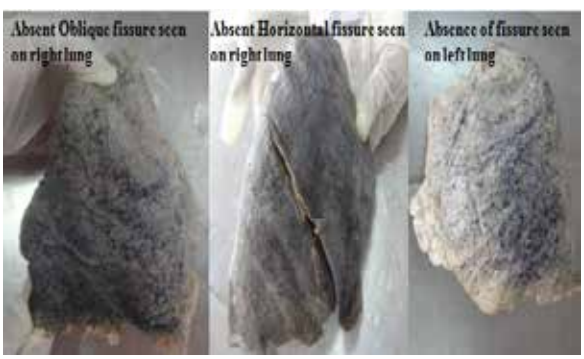
Accessory Fissure	Right lung	Left lung
S.A.F	4%	-
I.A.F	8%	10%
L.M.F	-	12%

SAF-Superior accessory fissure,
IAF- inferior accessory fissure,
LMF- left minor fissure

Table: 4- Comparative prevalence of anatomical variations of fissures of lungs

Author(s) and year	Method of study	Prevalence of absent or incomplete H.F of right lung (%)	Prevalence of incomplete O.F of right lung (%)	Prevalence of incomplete O.F of left lung (%)
Medlar, 1947	Cadaver & specimen	62.3	25.6 - 30	10.6 – 18
Aziz et al., 2004	High resolution CT	63	48	43
Meenakshi et al., 2004	Cadaver & specimen	63.3	36.6	46.6
Bergman et al., 2008	Cadaver & specimen	67	30	30
Prakash et al., 2010	Cadaver & specimen	57.1	39.3	35.7
Bhimai Devi et al., 2011	Cadaver & specimen	18	9	36
Present study	Cadaver & specimen	34	12	4

Figure showing variations seen on both lungs.



REFERENCE

1. Rosse C, Gaddum-Rosse P. (1997). Hollinshed's Textbook of Anatomy. Philadelphia: Lipincott-Raven; 441-61. | 2. Kent EM, Blades B. (1942). The surgical anatomy of the pulmonary lobes. J Thoracic Surg; 12: 18-30. | 3. Aldur M.M., Denk C.C., Celik H.H., Ascioglu A.B. (1997). An accessory fissure in the lower lobe of the right lung. Morphologie; 81: 5-7. | 4. Godwin JD, Tarver RD. (1985). Accessory fissures of the lung. AJR Am J Roentgenol ; 144:39-47. | 5. Tarver RD. (1995). How common are incomplete pulmonary fissures. And what is their clinical significance? AJR; 164-761. | 6. Berkmen T, Berkmen YM, Austin JH. (1994). Accessory fissures of the upper lobe of the left lung: CT and plain film appearance. AJR Am J Roentgenol; 162:1287-93. | 7. Keith L. Moore, Arthur F. Dalley, Anne M. R. Agur. (2010). Clinically oriented Anatomy, 6th ed. Lippincott Williams and Wilkins; 111-14. | 8. Standring S. Thorax. (2008). Gray's Anatomy. 40th ed. Edinburgh: Churchill Livingstone; 992-95. | 9. Medlar EM. (1947). Variations in interlobar fissures. AJR; 57: 723-25. | 10. Raasch B.N., Carsky E.W., Lane E.J. (1982). Radiographic anatomy of the interlobar fissures: a study of 100 specimens. Am. J. Roentgenol.; 138: 1043-49. | 11. Craig S.R., Walker W.S. (1997). A proposed anatomical classification of the pulmonary fissures. J. R. Coll. Surg. Edinb.; 42: 233-234. | 12. G. J. Romanes.(1986). Cunningham's manual of practical anatomy 15th ed., Oxford medica publication, Vol 2 Thorax & Abdomen, 25-30 | 13. Patrick W. Tank (2013). Grant's Dissectors 15th Edition Lippincott Williams & Wilkins. 63-71. | 14 Larsen WJ. (1993). Human Embryology. New York: Churchill Livingstone; 111-30. | 15. Richard L. Drake, Wayne (2010). Gray's anatomy for students, Churchill Livingstone 2nd ed; 141 |