Absence of Horizontal Fissure Right Lung

B RAUF M NASIM Q U AIN
Anatomy Department, Fatima Memorial Hospital and College of Medicine & Dentistry, Lahore.
Correspondence to Dr. Bushra Rauf, Demonstrator Anatomy Department E. mail: drbushra_rauf@yahoo.com

Objectives :- To examine the dissected cadavaric right lungs for the presence or absence of minor (horizontal) fissure right lung . **Design:-** Descriptive study.(cadavaric study). **Place and duration: -** The study was conducted in dissection halls of various Medical colleges of Lahore (FMHC, FJMC&KEMC) from January.2003 to February 2004.
Material &methods:-A total number of 112 cadava.ric specimens of right lung were dissected &examined for the presence or absence of minor fissure. **Results:** - Out of 112 specimens 9(9%) of specimens were showing the absence of minor fissure of right lung whereas 103(91%) of specimens of right lungs were showing presence of minor fissure.
Conclusion: - The percentage of anatomical variation (absence)of minor fissure of right lung is 09%. The study of anatomical variations of fissures of lungs is important for anatomists, surgeons& radiologists.
Keywords: Horizontal (minor) fissure, right lung

Apart from anatomists, knowledge on normal and variant anatomy of fissures & lobes of lungs is clearly essential and of practical importance for surgeons & radiologists.

The lungs are a pair of respiratory organs situated in the thoracic cavity .They are spongy in nature .In the young they are brown or grey in colour .Gradually they become mottled black because of deposition of inhaled carbon particles .Right lung weighs about 625gms & it is about 50-100gms heavier than left. Each lung is conical in shape having a blunt apex which reaches above the sternal end of 1st rib .It has concave base overlying the diaphragm, a convex costal surface that corresponds to the concave chest wall & a concave mediastinal surface that is moulded to the pericardium & other mediastinal structures .At about the middle of mediastinal surface is the hilum, a depression through which the bronchus, vessels & nerves enter to & leave the lungs.

The right lung is divided into 3 lobes (right upper lobe, right middle lobe & right lower lobe) by 2 fissures, an oblique (major) & horizontal (minor) fissure. The oblique fissure separates the right upper & right middle lobe from right lower lobe, corresponds closely to left oblique fissure but is less vertical[1] .The short horizontal fissure separates the right upper lobe from right middle lobe passing horizontally forwards from oblique fissure near the midaxillary line to the anterior border of right lung, at the level of fourth costal cartilage whereas onto the mediastinal surface the minor fissure reaches the hilum of right lung[1].

The right upper lobe (RUL) occupies the upper 1/3rd of right lung. Posteriorly the RUL is adjacent to the first three to five ribs whereas on anterior aspect it extends inferiorly as far as the fourth right anterior rib .The middle lobe is typically the smallest of the three and appears triangular in shape, being narrowest near the hilum. The right lower lobe (RLL) is the largest of all three lobes. Posteriorly the RLL extends as far superiorly as the 6th thoracic vertebral body and extends inferiorly to the diaphragm[2]

The right middle lobe may not be completely separated from right upper lobe, the fissure separating it from upper lobe may be incomplete or absent [3, 4] .Radiographic anatomy of interlobar fissure revealed that minor fissure is typically oriented so that its anterior part is lower than posterior part[5, 6]. Embryologically, in the lungs of human embryo, differentiation in lobation of right &left lungs is evident in the early part of sixth week of intrauterine life[1]

Materials and methods

A study on cadavers was conducted from Jan. 2003 to Feb. 2004 to investigate the anatomy of minor fissure & variations in right lung. The study was designed after accidental findings of absence of minor fissure in right lung during routine dissections in Anatomy department of Fatima memorial Hospital and College Of Medicine & dentistry, Lahore.

To collect the relevant data we approached Anatomy depts. Of other medical colleges of Lahore (KEMC & FJMC).All the right lungs were observed for the presence or absence of minor fissure. The variants were listed in Group-B and normal in Group-A. Results were tabulated & percentage of variation was calculated.

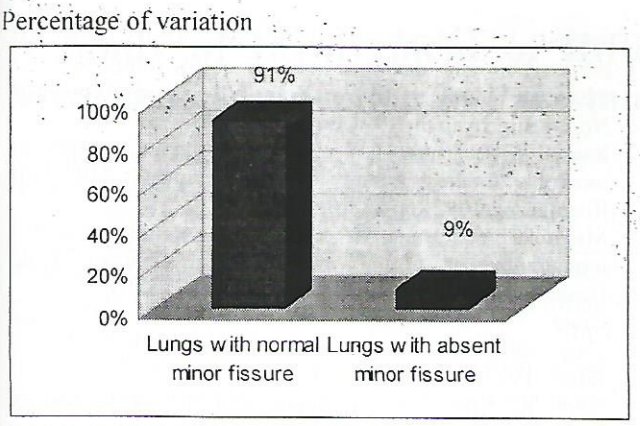
Results

Group A: Out of 112 cadavaric specimens of right lung dissected ,103 were showing the presence of normal horizontal (minor) fissure, passing horizontally forwards from oblique fissure to the anterior border of right lung so that there were three lobes (upper, middle & lower)present in those 103 cadavaric specimens of Right lung .

Group B: Nine out of 112 dissected cadavaric specimens of right lung did not show any horizontal (minor) fissure in right lung & only two lobes were visible in these specimens.

Table 1. Percentage of variation

Group:	No. of Specimens	%age of variation
A	103	91%
B	09	9%



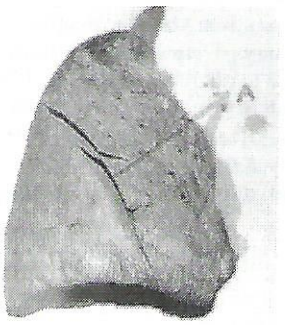


Fig. 1. Right lung with absent horizontal fissure (A: oblique fissure)

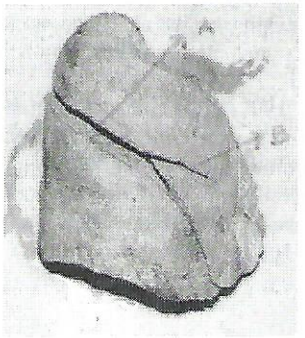


Fig.2. Normal right lung (A: oblique fissure, B: horizontal fissure)

Discussion

The nature & presence of any pulmonary fissure is of great importance in planning operative strategy for pulmonary resection where an incomplete or absent fissure may contribute to the post operative air leakage .Craig SR & Walker[7] proposed a classification of pulmonary fissure which is essentially important in planning the framework for description of operative technique. According to that classification absence of pulmonary fissure is considered to be grade-4 fissure in which there is complete fusion of lobes with no evident fissural line. Assessment of incomplete or absent interlobar fissure is also important with regard to collateral ventilation & pulmonary disease processes[8].

Understanding of normal anatomy of fissure & its variations are highly significant to study the relation of fissure to any tumoral mass located within the lobes of lung . Usually pulmonary tumors located in contact with or in the vicinity of fissure invade the adjacent fissure, whether the fissure is invaded by tumor or not provides an important piece of information for therapeutic choices, especially in patients with respiratory impairment in whom pneumonectomy is contraindicated[9].

In another study Proto AV & Ball JB[10] presented several examples illustrating the significance of presence of fissure & study of its normal anatomy on computed tomographic scans , in interpreting abnormal findings in the lungs especially localization of masses within different lobes of lungs , extension of carcinoma to or across the fissure & presence of fluid in fissure etc. Comprehensive knowledge of various configurations of minor fissure & its anatomical variations is useful in localization of lesions in a lobe or determination of its possible extension beyond fissure in neighboring lobes on computed tomoghraphic scans [11].Furthermore ,although the limited thin section CT-scans through the fissures of lungs delineate the anatomy more clearly & provide greater degree of precision in localizing pulmonary lesions and their extension , but the orientation of horizontal fissure which is almost parallel to the plane of sections makes the study of its relation with adjacent mass difficult even in high resolution CT[9]. So if there is absence of horizontal fissure, there is loss of demarcation between different lobes of right lung & pulmonary lesions cannot be localized precisely in different lobes on gross examination as well as radioghraphicaly .Pulmonary diseases especially those located in anterior segment of upper lobe of right lung and medial segment of middle lobe of right lung may present with confusing radiographic manifestations due to the presence of anatomical variations of minor fissure [12].

The surgeons must always remember anatomical variations of lung lobes & fissures especially in planning for lobectomies and segmental resections[13] .Accurate knowledge of lung fissure is crucial for VATS lobectomy, as an isolation of pulmonary arterial branches within the fissure is necessary for this type of surgery which is hindered in the presence of largely fused fissure .Although according to the Nomori etal[14], a largely fused fissure is not a limiting factor for VATS (Video Assisted Thoracoscopic Surgery) lobectomy but only the cost of procedure is more , as number of staples required to close the incision is more than those with separated fissure, otherwise no post-operative mortality or morbidity is found .In patients with fused fissure, undergoing VATS lobectomy the fused fissure should be divided in last following the division of pulmonary vasculature and the bronchus . So in cases of fused minor fissure of right lung

lobectomies can be accomplished only with proper intraoperative planning and experience.

The absence of minor fissure is helpful in diagnosis of various congenital syndromes like Splenogonadal fusion syndrome[15,16] and Scimitar syndrome[17] etc. Splenogonadal fusion syndrome is a rare abnormality occurring due to any teratogenic insult during 5 -8 weeks of gestation leading to the abnormal development of spleen ,gonads limb buds & lungs and its fissures . Features of splenogonadal syndrome includes hypo-plastic lungs with fused pulmonary fissures ,spleen connected to gonads , limb defect , micrognathia & other congenital malformations like VSD etc[15,16]. .Scimitar syndrome is characterized by absence of minor fissure with hyper lucent bilobed right lung associated with mediatinal shift (dextrocardia), small right pulmonary hilum, abnormal venous drainage of affected lung with associated congenital heart disease[17].The Scimitar syndrome is also known as Halasz's syndrome ,Mirror image lung syndrome, Hypo-genetic lung syndrome, Epibronchial right pulmonary artery syndrome & Vena cava bronchovascular syndrome occurring more commonly in females[18] .In these individuals the entire venous drainage from the right lung enters a single anomalous large vein that descend to the inferior vena cava . This descending vein is visible on x-ray chest as a curvilinear density along the right heart border & resembles the curved Turkish sword that gives the condition its name, the Scimitar syndrome[18].

References

1- Grays Anatomy .Peter .L. Williams. Churchill Livingstone ELBS 38th edition 1995. Pg- 1657. 1659 & 178.

2- Electric lung anatomy .Lobar Anatomy. Brad H. Thompson, MD et al .Peer review status. internally Peer Reviewed. Virtual hospital digital library of health information. http://www.uh.org/adult/providers/radiology/lungAnat/Text/MicLobarAnatomy

3- Chummy S. Sinnatamby Lasts Anatomy (Regional & Applied) .International student edition 10th. Churchill Livingston. 1999. Pg- 206.

4- Triebel HJ. Mench J. Beese M. RixJ. Computed tomographic and anatomical studies on the morphology of the minor pulmonary fissure .Roto fortsche Geb Rontgenstr Neven Bilgehvartahr 1991 Dec: 155(6):487-93.

5- Raasch BN& Carsky EW et al. Radiographic anatomy of interlobar fissures: a study of 100 specimens. AJR. AmJ Roentgenol. 1982Jun: 138(6): 1043-9.

6- Matsuoka Y. Oyana K et al. Thin section computed tomography of normal minor fissure .Nippon Igaki Hoshasen Gakkai Zasshi.1990Dec25; 50(12):1504-12.

7- Craig SR & Walker WS. A proposed anatomical classification of the pulmonary fissures. J R Coll Surg Edinb. 1997Aug: 42(4):233-4.

8- Satoh K. Sato A et al. Septal structure of incomplete interlobar fissures of lung .Nihon Kyobu Shikkan Gakkai Zasshi. 1996Nov: 34(11):1216-20.

9- StrotoML. ciccotosoc et al. Neoplastic involvement of pulmonary fissures. Diagnostic possibility of high resolution x-ray computed tomography. J Radiol .1992: 73(12):663-8.

10- Proto AV. Ball JB Jr. Computed tomography of major & minor fissures AJR Am J Roentgenol. 1983: 140(3):439-48.

11- Berkmen YM. Auh YH et al .Anatomy of minor fissure. Evaluation with thin section CT. Radiology 1988Mar: 170(3 pt 1):647-51.

12- Gross BH. Spzarnny DL & Granke DS. Saggital orientation of anterior minor fissure. Radiology & CT. Radiology 1998: 166(3): 717-9.

13- Nomori H et al. Thoracoscopic lobectomy for lung cancer with largely fused fissure. Chest2003Feb;123(2):612-22

14- Aldur MM et al. An accessory fissure in the lower lobe o right lung. Morphologie1997Mar: 81(252):5-7.

15- Luiqui Avolio. MD. Genital Anomalies. e medicine journal. Dec 12. 2003.vol 4. number 12

16- Moore PJ. Hawkins EP et al. Splenogonadal fusion with limb deficiency and micrognathia. South Med J.1997Nov: 90(11): 1152-5

17- Roentgen Ray 1997 urhad.com- Chest Imaging Case of the day Case # 2 by Robert Gilkson,M.D & Mark Sands, M.D. Scimitar syndrome. http://www.urhad.com/ray/chest2a.html

18- Grech V. Xuereb R et al .Late presentation & successful treatment of classical Scimitar syndrome .Images Paediatr Cardiol 2003: 16:49-62.