

## **A STUDY OF MORPHOLOGY AND VARIATIONS** **OF LUNGS IN ADULTS AND FOETUS**

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### **INTRODUCTION**

In the light of increase in incidence of pulmonary diseases, there is a concomitant increase in study of lungs and bronchial tree morphological and clinically. The knowledge of this study is of immense value in endoscopic procedures for diagnostic and therapeutic purposes. Lung is more a space than an organ (Spencer). The lungs are vital organ of respiration. In newborn the lungs are rosy pink, in children yellowish pink. The lungs from fetuses that have not respired differ from those infants who have taken a breath.

The knowledge of the anatomical position of the fissures and lobes of lungs assume significance in surgical resection of lungs in cases of tumors, lobotomies. The increasing opportunities to consider fetal intervention in selected cases of life threatening malformations have necessitated airway management of fetuses. The purpose of study is to know any abnormalities of airways like pneumonia, bronchial obstructions, foreign bodies, mediastinal mass. The location of the fissures in the lung results in uniform expansion and they are usually the landmarks in specifying lesions. Knowledge of an accessory fissure is helpful for clinicians; an incomplete fissure is also a cause for postoperative leakage

### **MATERIALS AND METHODS**

Adult lungs 40 were obtained from gross anatomical dissections of 20 embalmed cadavers from department of Anatomy, Siddhartha medical college, Vijayawada. An incision was done on either side of sternum, the ribs and the clavicles were cut with the bone cutter. The sternopericardial ligaments were cut. The sternum is dissected down; the pericardium is incised to view the pulmonary vessels entering the lung and are cut and separated. The trachea is

cut at the lower end of the cricoids cartilage and separated from the oesophagus posteriorly. The lungs are removed en mass from thoracic cavity and thoroughly washed with water. Fetal specimens 10 are collected from department of obstetrics & gynecology, Government general hospital, Siddhartha medical college, Vijayawada. Fetal dissection- The thorax was opened by vertical incision from suprasternal notch to xiphoid process and horizontal incision along clavicular line. The following parameters taken in the fetal lungs: Age of the fetus, sex of fetus, weight, crown-rump length.

### **CLASSIFICATION OF FISSURES:**

CRAIG AND WALKER have proposed a fissural classification based on both the degree of completeness of the fissures and the location of the pulmonary artery at the base of the oblique fissure.

#### **Four stages have been described:**

Grade I-complete fissure with entirely separate lobes;

Grade II-complete visceral cleft but parenchyma fusion at the base of the fissure.

Grade III-visceral cleft evident for a part of the fissure;

Grade IV-complete fusion of lobes with no evident fissure line.

## **RESULTS**

### **Morphological variations of lobes and fissures of the lungs**

**RIGHT ADULT LUNGS** -Absent Horizontal fissure-3lungs,Incomplete horizontal fissure-5lungs,Incomplete oblique-3,Both absent horizontal & oblique fissure-3lungs,Bilobed lungs-3

**LEFT ADULT LUNGS** -Incomplete oblique fissure-9lungs,One showed Accessory fissure,1Trilobed left lung

Normal pattern of fissures and lobes- Seven.

**RIGHT FOETAL LUNG** -Out of 6 right sided lungs normal pattern of oblique fissure seen in 4lungs. Incomplete horizontal fissure was observed-6,Incomplete oblique fissure seen in 2lungs.

**LEFT FOETAL LUNG** -Out of 6 left sided lungs normal pattern of complete oblique fissure is seen. No accessory fissure or lobe is noted.



Fig.1.Dissection of Lungs showing bilobed Right Lung and Trilobed Left Lung with incomplete horizontal fissure.

## DISCUSSIONS

During the development, as the lung grows, the spaces or fissures that separate individual broncho pulmonary buds/segments become obliterated except along two planes, evident in the fully developed lungs as oblique or horizontal fissures. Absence or incomplete oblique or horizontal fissure could be due to obliteration of these fissures either completely or partially. Accessory fissure could be the result of non-obliteration of spaces which normally are obliterated (Larsen WJ). The accessory fissure may be of varying depth occurring between broncho pulmonary segments. The inferior accessory fissure which demarcates the superior segment is the most common accessory fissures detected on CT scan. Incomplete fissure may also alter the spread of disease within the lung (Tarver RD).

LUKOSE et al, (1999) worked on the morphology of the lungs and variations in lobes and fissures along with a comparative study with the earlier authors stated that incomplete and horizontal fissures was reported as 21% and 10.5% as the study coincides with incidence of others. MEDLAR,(1947) reported that incomplete oblique fissure in right and left lungs as(25.6%&10.6%), incomplete horizontal fissure in right lung(17%) and absent oblique fissure(4.8%&7.3%)absent horizontal fissure(45.2%) which is supported by the present study. The presence of fissures in the normal lungs enhances uniform expansion, and their position could be used as reliable landmark in specifying lesions within the lungs in particular (Kent EM, Blades B).

**According to Craig and Walker:**

				Present study
Grade 1	Complete	oblique fissure right lung left lung	53.3% 13.3%	56.2% 11.6%
		horizontal fissure right lung	20%	22.8%
Grade 2	partial incomplete		Nil	Nil
Grade 3	Incomplete	oblique fissure Right lung Left lung	36.6% 46.6%	22.7% 31.8%
		Horizontal fissure Right lung	63.3%	50%
Grade 4	Absent	Horizontal fissure Right lung	16.6%	13.6%

Knowledge of an accessory fissure is helpful for clinicians in order to differentiate it from other normal anatomical and pathological structures. Interpretations of various radiographic appearances of inter lobar fluid are important for clinicians. 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 (Godwin JD, Tarver RD).

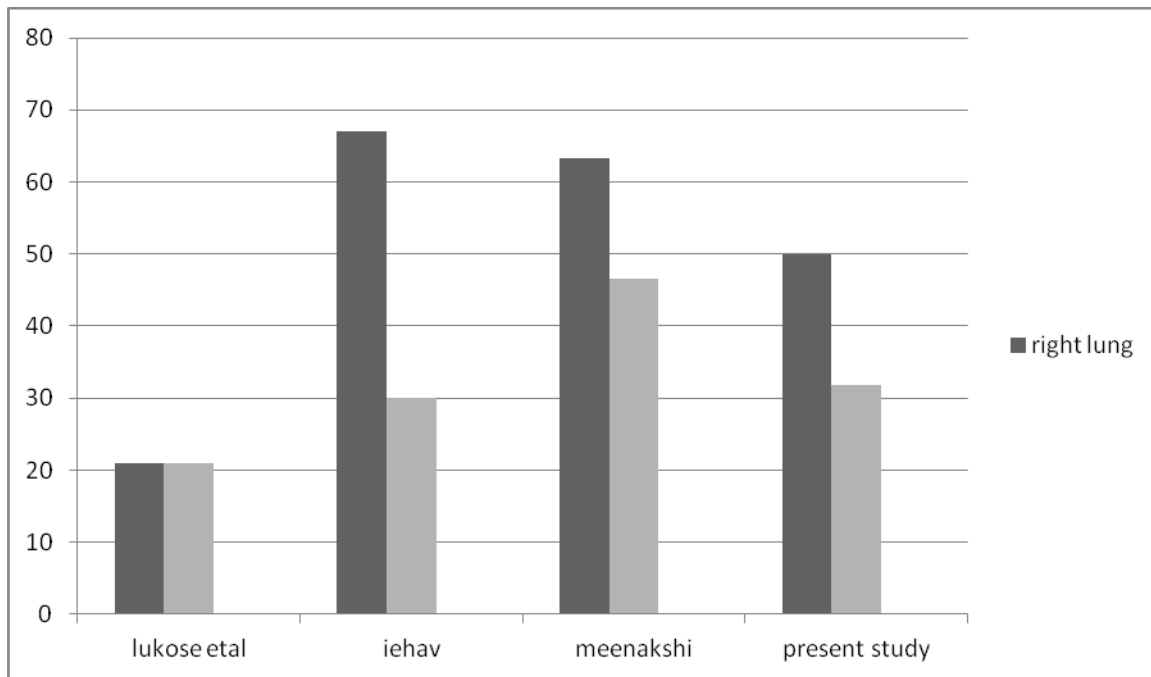
In X-ray, incomplete fissure always give an atypical appearance of pleural effusion. Many a times the accessory fissure fails to be detected on CT scans, because of their incompleteness, thick sections and orientation in relation to a particular plane (Ariyurek Om, Gulsun M, and Demirkazik FB). An incomplete fissure is also a cause for postoperative air leakage (Walker WS, Craig SR). The lobes of lungs show partial fusion as a result of incomplete pulmonary fissures. Absence or incomplete oblique or horizontal fissures could be due to obliteration either completely or partially (meenakshi et al 2004).

### COMPARATIVE INCIDENCE OF VARIATION OF FISSURES

	Lukose et al (1999)	IEHAV (2002)	Meenakshi et al(2004)	Present study(2014)
<b>Right Lung</b>				
Horizontal fissure				
Absent	10.5%	21%	16.6%	13.6%
Incomplete	21%	67%	63.3%	50%
Incomplete oblique fissure	---	30%	36.6%	22.7%
Absent horizontal fissure and incomplete oblique fissure	5.3%	---	6.66%	13.6%
<b>Left Lung</b>				
Incomplete oblique fissure	21%	30%	46.6%	31.8%

IEHAV: illustrated encyclopedia of human anatomic variation. According to Shields et al (2000) the common accessory lobes are the posterior accessory, inferior accessory, middle lobe of left lung and azygos lobe of the upper right lobe.

## COMPARATIVE STUDY OF INCIDENCE OF VARIATIONS OF LUNGS



**Fig.2.** Dissection of Lungs showing bilobed Right Lung and collection of Fetal Lungs.



**Fig.3.** Dissection of Lungs showing absence of horizontal and oblique fissures.

### **SUMMARY AND CONCLUSION**

Prior knowledge of possible anatomical variants may help the surgeons to reduce the risk of accidental damage. Increasing opportunities to enlighten radiological importance these parameters help us to get the correct size of bronchoscope to be passed. The various ways to study the morphology of lungs are by gross dissection, X rays, CT scans, Virtual bronchoscopy. Awareness regarding anatomical variations is essential for performing Lobectomies and segmental resection and interpreting radiological images.

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