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MORPHOLOGICAL VARIATIONS OF FISSURES AND LOBES OF LUNG

Anatomy

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ABSTRACT

Introduction: The fissures in lung enhance uniform expansion. These fissures may be complete, incomplete or absent. A detailed knowledge of variations of classical and accessory fissures is necessary for proper radiological interpretation. It is a guide to cardiothoracic surgeons performing segmental lung resections, lobectomies. So, the cadaveric study was done to note the morphological variation of the fissures of lung.

Materials & Methods: Thirty lungs (16 right lungs and 14 left lungs) taken from the dissected cadavers in the Department Of Anatomy, Tirunelveli Medical College, Tirunelveli.

Results: Among the right lungs 62.5% had two fissures and 37.5% had single fissure. 25% right lungs had complete both fissures,12.5% had absent oblique fissure and 25% had no transverse fissure. Among the left lungs all the lungs 100% had single fissure. 85.7% left lungs had complete oblique fissure. Accessory fissure present in only one lung in both right and left side.

Conclusion: This knowledge of anatomy of fissures of lung may also help clarifying confusing radiographic findings.

KEYWORDS

Lung Fissures,oblique Fissure, Transverse Fissure & Accessory Fissure.

Introduction

Lungs are the essential organs of respiration. Right lung has two fissures namely oblique and transverse which divide the right lung into upper, middle and lower lobes. Left lung has only one oblique fissure which divides the left lung into superior and inferior lobes.

Lung buds develop from the foregut and divides into two primary bronchial buds at around 28 days after fertilization. Then they develop into right and left lung. As development progresses, the formation of numerous broncho-pulmonary buds take place. The spaces or fissures that separate individual broncho-pulmonary segments become obliterated except along two planes evident in fully developed lungs as oblique and transverse fissures. Absence or incomplete fissures could be due to obliteration of these fissures either completely or partially. Accessary fissures could be the result of the non-obliteration of spaces which normally get obliterated.

Lung fissures
1) Help in greater distension and movement of lobes.
2) Help in uniform expansion of the whole lung.
3) Form the boundaries for lobes of lungs.

The position of fissure could be used as a reliable landmark in specifying lesions within the thorax or within the lung.

Incomplete fissures alter the spread of disease within the lung.

Sometimes the accessory fissure delimiting the anomalous lobe corresponds to normal broncho-pulmonary segment. In X- rays accessory fissures can be mistaken for lung lesion.

The knowledge of anatomical variations of the fissures and lobes of lung is important for identifying bronco-pulmonary segments and surgical resection involving individual segments.

Aim

To study the lung specimens with respect to the morphology of fissures and lobes.

To observe the variations and compare them with previous studies and its clinical significance.

Materials and methods

Thirty lungs (16 right lungs and 14 left lungs) taken from the dissected cadavers in the Department Of Anatomy, Tirunelveli Medical College, Tirunelveli.

Inclusion criteria

Specimens in good physical conditions without damage were included in this study.

Exclusion criteria

The specimens having pathological lesions, marks of previous surgery, damaged during removal with gross abnormalities were not included in this study.
Details ofthe following parameters recorded.
1) Details of fissures and lobes
2) Presence of accessory fissures

Observations

Right lungs

Among the 16 lungs, 10 lungs having two fissures (oblique and transverse) either complete or incomplete.Six lungs having single fissure either transverse or oblique fissure.

Among the 16 lungs, oblique fissure is absent in two lungs and transverse fissure is absent in four lungs. In remaining 10 lungs, oblique fissure is incomplete in four lungs, transverse fissure is incomplete in two lungs and both fissures complete in four lungs.

Only one lung has accessory fissure which starts in the anterior border of lung 2-3cm above inferior border and goes to costal surface and meet the oblique fissure at 6th costal impression. The accessory fissure is between the upper and lower lobe.

Number of fissures in right lungs(Table 1)

No of Fissures	No of lungs N=16	Percentage
Single	6	37.5%
Two	10	62.5%

Pattern of fissures in right lungs (Table 2)

Pattern of fissures	No of lungs (n=16)	Percentage
Both fissures complete	4	25%
Oblique fissure absent	2	12.5%
Transverse fissure absent	4	25%
Incomplete oblique fissure	4	25%
Incomplete transverse fissure	2	12.5%

Left lung

Out of 14 left lungs, all the lungs having single fissure either complete or incomplete.

Among the 14 left lungs, complete oblique fissure present in 12 lungs and remaining two lungs having incomplete oblique fissure. Only one left lung has accessory fissure which starts 3cm above inferior border cutting the anterior border reach the costal surface meet the oblique fissure.

Number of fissures present in left lungs (Table 3)

Number of fissures	No of lungs (N=14)	Percentage
Single	14	100%
Double	0	0%

Pattern of Oblique fissure in left lungs (Table 4)

Pattern of Oblique fissure	No of lungs (N=12)	Percentage
Complete	12	85.7%
Incomplete	2	14.3%

Discussion

Table 5 Comparison of variations in fissures and lobes among various studies

Name of the study	No of specimens	Right lung						Left lung	
		Complete oblique fissure	Complete transverse fissure	Oblique fissure absent	Transverse fissure absent	Incomplete oblique fissure	Incomplete transverse fissure	Complete oblique fissure	Incomplete oblique fissure
[1]S. Meenakshi et al (2003)	60	13.3%	13.3%	-	16.6%	36.6%	63.3%	53.4%	46.6%
[3]Enakshighosh et al (2013)	82	5.52%	26%	2.17%	47.8%	19.56%	9%	5.5%	13.88%
[4]SumitaDutta et al (2013)	102	26.92%	-	6%	34.62%	61.54%	38.89%	44%	48%
A.K.Singh et al (2014)		-	-	-	-	6.67%	26.67%	70%	30%
[5]Zareena.SK et al (2014)	40	56.2%	22.8%	-	13.6%	22.7%	50%	11.6%	31.8%
[7]AzmeraGebregziabher et al (2015)	23R+ 20L	52.17%	14.19%	0%	17.39%	47.82%	68.42%	65%	35%
[8]AmitMagadum et al (2015)	80	-	-	10%	12.5%	60%	52.5%	7.5%	42.5%
[6]Dr. K. Lakshmi Kumari et al(2015)	50	64%	59%	20%	4%	12%	33%	60%	28%
[9]Y. Mamatha et al (2016)	40	-	-	0%	0%	15%	50%	60%	35%
[10]K.Gopalakrishna et al (2017)	100	86%	74%	0%	6%	14%	20%	6%	8%
Present study	**16R+14 L**	**25%**	**25%**	**12.5%**	**25%**	**25%**	**12.5%**	**85.7%**	**14.3%**

Inthis study, the incomplete oblique fissures are more reported in the right lungs. This was correlated with the [1]S. Meenakshi et al (2003), Enakshighosh et al (2013)[8]AmitMagadum et al (2015),[7] Azmera Gebregziabher et al (2015)and[4]SumitaDutta et al (2013) studies.

But [10]K.Gopalakrishna et al (2017), [9]Y. Mamatha et al (2016), [6]Dr. K. Lakshmi Kumari et al(2015), [5]Zareena.SK et al (2014)andA.K.Singh et al (2014) studies were reported that incomplete oblique fissures were more on left lungs.

Absent oblique fissure in this study reported as 12.5% which is more are less similar to the findings seen in the [8]AmitMagadum et al (2015) study. [6]Dr. K. Lakshmi Kumari et al(2015) study reported highest percentage of 20% absent oblique fissures in right lungs.

85.7% specimens having complete oblique fissure in left lung in this study. This is similar to the [10]Dr. K. Lakshmi Kumari et al(2015), [9]Y. Mamatha et al (2016) and AzmeraGebregziabher et al (2015) studies.

Table 6 Presence or absence of accessory lobes in the lungs

Name of the study	Accessory lobes	
	Right lung	Left lung
[1]S. Meenakshi et al (2003)	3.3%	10%
[7]AzmeraGebregziabheret al (2015)	8.69%	15%
[8]AmitMagadum et al (2015)	7.5%	7.5%
[6]Dr. K. Lakshmi Kumari et al (2015)	4.5%	0%
[10]K.Gopalakrishna et al (2017)	12%	4%
Present study	**6.25%**	**7.14%**

In this study, the accessory lobes more reported on the left lungs. This was correlated withmost of the studies. In K.Gopalakrishna et al (2017) study, accessory lobes were more reported on right lungs and [6]Dr.LaksmiKunmari et al (2015) study, no accessory lobe reported on left lungs.

Conclusion

Results of present study and its comparison with the previous studies showed a wide range of differences in occurrence of fissures. This implies that a variety of genetic and environmental factors might affect the development of these fissures.

Fig 1Right lung has single fissure



Fig 2 Right lung has complete both fissures



Fig 3 Right lung has incomplete oblique fissure



Fig 4 Right lung has incomplete transverse fissure



Fig 5 Right lung has absent oblique fissure



Fig 6 Right lung has absent transverse fissure



Fig: 7 Accessory fissure in Right lung:



Fig 7 Left lung has single fissure



Fig:8 Left lung with complete oblique fissure



Fig 9 Left lung with incomplete Oblique fissure



Fig;9 Accessory lobe in Left lung:



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