Original Research Paper

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Anatomy

MORPHOMETRY OF SUBCARINAL ANGLE OF TRACHEA IN HUMAN ADULTS USING CT SCAN AND ITS COMPARISON WITH CADAVERIC DATA

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ABSTRACT **INTRODUCTION:** Subcarinal angle is an angle between the right and left primary bronchus increase of which is an indirect sign of pathology in the heart or mediastinum such as left atrial enlargement, generalized cardiomegaly, lobar collapse, subcarinal mass or pericardial effusion. **METHODS:** Formalin fixed 30 adult cadaveric lungs procured from the Department of anatomy & Forensic Medicine from autopsies of unclaimed and donated corpses. CT chest of patients in comparable age groups obtained from Dept of Radio-diagnosis, Dr. RML Hospital and PGIMER. Subcarinal angle was measured with goniometer . Standard deviation (SD) and test of significance were calculated using students't' test. **RESULTS:** Mean of subcarinal angle in cadavers was 76.90±11.58 . The mean of subcarinal angle in CT studies was 76.93±7.58 . The p-value was 0.99 which was >0.05 showing that it remains the same after death. **CONCLUSION:** Morphometry of subcarinal angle is of use for optimizing surgical & anaesthesiological procedures.

KEYWORDS :

INTRODUCTION

The exchange of respiratory gases is the basic essentiality of life process in all organisms. The pathway in human beings includes nasal cavity, pharynx, larynx, trachea, bronchi and their terminal ramification in lungs. Subcarinal angle is the angle between first few centimeters of the lines drawn along inferior margins of two main bronchi. Carcinoma of the subcarinal lymph nodes is a challenge for the radiologist and pulmonologist as the subcarinal lymph nodes are among the most difficult to detect on chest radiographs. Presence of a widened and distorted subcarinal angle enables the detection of subcarinal mass. In the present study 30 adult individuals in the age group of 18-60 years were studied including both cadavers and live individuals. Cadaveric studies are compared to the radiological study done in live individual of same age group .

MATERIALS AND METHODS

Formalin fixed 30 adult cadaveric lungs categorized into 18 years and above procured from the Department of anatomy & Forensic Medicine from autopsies of unclaimed and donated corpses . Subcarinal angle between the medial border of two primary bronchi was measured at the level of carina with the help of goniometer. CT chest of patients in comparable age groups obtained from The Department of Radiodiagnosis, Dr. Ram Manohar Lohia Hospital and PGIMER For CT chest imaging.Philips Brilliance 40 slice Contrast Enhanced CT scanner was used. A lung window image sequence with a slice thickness of 1.5mm was used for the measurement. The standard deviation (SD) and test of significance were calculated using students 'T' test.

Image 1 : Specimen showing lobar bronchus, subcarinal angle and levels of measurement

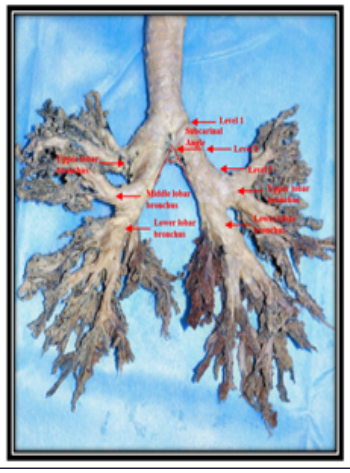


Image 2 : Coronal CT view showing trachea and primary bronchus

OBSERVATIONS

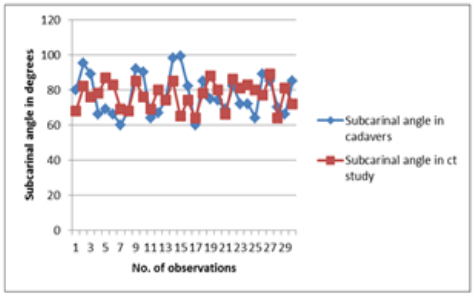
The subcarinal angle in cadavers was observed as 76.90±11.58 with the range of 60-99. The subcarinal angle in CT studies was observed as 76.93±7.58 with the range of 64-89.

Table 1: Comparison Between Subcarinal Angle In Cadavers And CT Images

	SUBCARINAL ANGLE IN CADAVERS	SUBCARINAL ANGLE IN CT IMAGES
Mean	76.9	76.93
Median	74	78
Mode	66	80
SD	11.58	7.58
Range	39	25
Minimum	60	64
Maximum	99	89
t value-	-0.013	
p value	- 0.99	

*All dimensions in degree

Image 3: Comparison Between Data Of Subcarinal Angle In Cadavers And Ct Images



This graph shows that all values were around 76º on x-axis and the values in cadavers shows more variation then values in CT studies. The values in cadavers and CT images was showing correlation with each other.

STATISTICAL COMPARISON : The data of subcarinal angle in cadavers and CT images was compared by using the independent t-test, we found that the t value of subcarinal angle was -.013 and the pvalue of the two groups (Group 1: subcarinal angle in cadavers and Group 2: subcarinal angle in CT images) was 0.990, which was >0.05, showing that the difference between the two groups was insignificant. This implies that the subcarinal angle were same in cadavers and CT, which shows that the subcarinal angle do not change after death.

DISCUSSION

The subcarinal angle is the angle between the right and left main bronchus. Increase in the angle was mentioned as an indirect sign of pathology in the heart or mediastinum such as left atrial enlargement, generalized cardiomegaly, lobar collapse, subcarinal mass or pericardial effusion. This knowledge was also helpful for smooth conduction of some maneuvers like endotracheal intubation and bronchoscopic procedures. The mean of subcarinal angle in cadavers was observed as 76.90±11.58 with the range of 60-99mm. The mean of subcarinal angle in CT studies was observed as 76.93±7.58 with the range of 64-89mm. The data of subcarinal angle in cadavers and CT images was compared statistically by using the independent t- test, we found that the t value of subcarinal angle was -.013 and the p-value of the two groups was 0.990, which is >0.05, showing that the difference between the two groups was insignificant. This implies that the subcarinal angle were same in cadavers and CT, which showed that the subcarinal angle remains the same after death.

Table 2 : Comparison Of Subcarinal Angle In Cadavers

GROSS	PRESENT STUDY	JIT H & JIT I [1]	HASKIN ET AL[2]	CHUNDER R & GUHA R [3]	CHUNDER ET AL [4]
SUBCARINAL ANGLE	76.9	51.28 IN MALES 55.01IN FEMALES	61.5	59.1 in males 53.1 in females	54.4

Table 3 : Comparison Of Subcarinal Angle In Ct Images

CT	PRESENT STUDY	KHADE B ET AL[5]	ZHANG ET AL[6]	CHOORAT ET AL[7]
SUBCARINAL ANGLE	76.93	79.9	77.4	62

The present study correlates with Zhang et al and Khade B et al more than it correlates with the study done by Choorat et al.

CONCLUSION

Morphometry of subcarinal angle is of use for optimizing surgical & anaesthesiological procedures like resection, reconstruction procedures, bronchoalveolar lavage, endobronchial biopsy and tracheal intubation.

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