



## CT SCAN BASED MORPHOMETRIC STUDY OF THE STERNUM IN POPULATION OF KASHMIR

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### ABSTRACT

### BACKGROUND

The anatomy of sternum is very important in case of sternal injuries and various surgeries. Our study is focussed on CT based morphometry of sternum.

### METHODS

The study was carried on 52 chest CT films between age group of 10 to 60 yrs. CT scans were randomly collected from Department of Radiology, GMC, Srinagar and from some private radiological centres of Srinagar. Through these chest CT films, the parameters measured were manubrium length, sternal body length, xiphoid length and total length of sternum. These parameters were measured in cms. Presence of sternal foramina was noted.

### RESULTS

Mean manubrium length was measured as  $3.42 \pm 0.34$  cms. Mean body length was measured as  $7.81 \pm 0.51$  cms and mean xiphoid length was measured as  $2.52 \pm 0.17$  cms. All the parameters were increased for elderly age group. Mean total length of sternum was noted as  $13.75 \pm 1.19$  cms. Sternal foramen was noticed in 2 cases only

### CONCLUSION

The knowledge of the morphometry of sternum is very important tool in the forensic medicine and in various medicolegal investigations. Sternal foramen in the sternum also holds medicolegal importance.

**KEYWORDS :** Manubrium, CT scan, morphometry.

### INTRODUCTION

A flat bone is present in the anterior thoracic wall, namely sternum [1]. The anatomy of sternum is very important in case of sternal injuries and various surgeries [2]. Sternum is composed of three parts- manubrium, body of sternum and xiphoid process. Identification is an indispensable tool for medicolegal investigation [3]. Manubrium and its body are in different planes, hence forming an angle called angle of Louis [4].

The manubrium is at level with third and fourth thoracic vertebrae. The body of the sternum is at the level of 5th to 9th thoracic vertebrae. The xiphoid process which is a variable part of the sternum, is a sword shaped process [4]. Sternum can have a foramen which is usually present at the level of third and fourth thoracic vertebrae [5]. Sternal foramen which is usually detected by CT scan, can be misinterpreted as gun shot or any stab wound [6]. So, its awareness holds important position in procedures like bone marrow aspiration and acupuncture [7].

### MATERIALS AND METHODS

The study was carried on 52 chest CT films between the age group of 10 to 60 yrs. CT scan were randomly collected from Department of Radiology, GMC, Srinagar and from some private radiological centres of Srinagar. Patients having chest trauma, sternal surgeries, sternal tumours and infections were excluded from our study.

CT scanner was used for all the thoracic CT procedures. Through these chest CT films, the following parameters have been measured:

A) Manubrium length: which is the distance from the center of suprasternal notch to the center of manubriosternal junction.

B) Sternal body length: which is the distance from the manubriosternal junction to the xiphisternal junction.

C) Xiphoid length: which is the distance from the xiphisternal junction to the tip of xiphoid process.

D) Total length of sternum: which is the distance from center of suprasternal notch to the tip of xiphoid process.

All the parameters were measured in cms.

CT scans were read properly to notice the presence of sternal foramen.

### RESULTS

Morphometric parameters of the sternum were measured as: Mean manubrium length was measured as  $3.42 \pm 0.34$  cms (Fig 1). Moreover it was also noticed that the manubrium length was increasing with increasing age.

**Table 1: showing the Mean manubrium length.**

Parameter	Mean[cms]	Standard deviation[cms]
Manubrium length	3.42	0.34

Mean body length was measured as  $7.81 \pm 0.51$  cms (Fig1). Here again it was noticed that in higher age group the length was more as compared to the lower age group.

**Table 2: showing the mean body length of sternum.**

Parameter	Mean[cms]	Standard deviation[cms]
Body length of sternum	7.81	0.51

Mean xiphoid length was measured as  $2.52 \pm 0.17$  cms (Fig1). The xiphoid length was increasing with increase in age.

**Table 3: showing the mean xiphoid length.**

Parameter	Mean[cms]	Standard deviation[cms]
Xiphoid length	2.52	0.17

Mean total length of sternum was measured as  $13.75 \pm 1.19$  cms (Fig1).

**Table 4: showing mean total length of sternum**

Parameter	Mean [cms]	Standard deviation [cms]
Total length of sternum	13.75	1.19

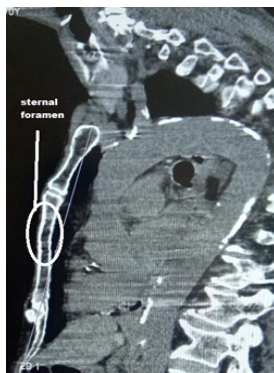
Sternal foramen was seen in 2 cases. They were both seen in the body of the sternum (Fig2).

## DISCUSSION

In this study the mean manubrial length was  $3.42 \pm 0.34$  cms, which is similar to the results of Dkhar [8]. In the current study, the mean body length was recorded as  $7.81 \pm 0.51$  cms which was similar to the results of Dkhar [8]. The results were different from Selthofer et al (2006) [9]. The results were different from various other studies. This can be due to racial, ethnic and regional variations.



**Fig 1: sagittal CT of chest showing length of manubrium, body and xiphoid process of sternum**



**Fig 2: showing sternal foramen in the CT chest**

In our study, the mean xiphoid length was  $2.52 \pm 0.17$  cms. This result was nearly similar to that of Dkhar [8]. It was noted that 2 sternal foramen were present in our study and they were both present in the body of the sternum. Same results were obtained in study of Yekeler et al [10]. The result was different from Boruah et al [11] whose sternal foramen percentage was 11.6%.

## CONCLUSION

The knowledge of the morphometry of sternum is very important tool in the forensic medicine and in various medicolegal investigations. Knowledge of congenital sternal foramen is important in radiology and during bone marrow sampling.

Conflicts of interests: None

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