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A Radiological approach: In Fusion of Sternal joints with Sternum and its correlation with gender and age in Living Individuals with the help of Multidetector computerized tomography (MDCT)

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Abstract
Age estmation is one of the important methods of identification of person Identification means determination of individuality of a person. Article 6 of the universal declaration of human rights states that everyone has the right to recognition everywhere as a person before the law. The sternum is a strong bone therefore it can be used for age and gender prediction and it does't deform easily for a long time, therefore it can be used for age and gender prediction. Gold standard to evaluate bone tissue that easily provides a detailed imaging of the sternum is Multidetector computerized tomography (MDCT) imaging. Aim is to study the pattern of fusion of manubrio-sternal & xiphi-sternal joint in correlation with age and gender of individuals in Gurugram region.. A total of 120 individuals participated in this study. The subjects included were individuals of 30-70 years of age from Gurugram city.. The present study concluded that, fusion of xiphi-sternum with body of sternum was 40 years in both male and female which was more reliable for determination of age as maximum number of fusion was found in this age group. For fusion of manubrio-sternum with body of sternum was 59 years in male and 60.35 years in female.

Key Words: Manubrium, Sternum, Xiphoid, Gurugram, Multidetector computerized tomography (MDCT) imaging**.**

Introduction

Age Estimation of human being, living or dead is a challenging job in forensic medicine. Age estmation is one of the important methods of identification of person Identification means determination of individuality of a person. Article 6 of the universal declaration of human rights

states that everyone has the right to recognition everywhere as a person before the law. The

identification of a living person is based entirely on known fingerprints or birthmark or several personal impressions with regard to characteristic denture or other features of teeth,eyes,hair but they are not useful in the identification of dead[1]. Different authors have evolved different techniques for age determination. The age of foetus can be determined from Haase's rule ,age can also be determined by closure of fontanelles,eruption and calcification of primary teeth, secondary sexual characters before the age of 25 years but after the age of 25 years the estimation of age become more uncertain. So, the estimation of age after 25 years is based on secondary changes in teeth, changes in skeleton, fusion of body of sternum with manubrium and xiphoid process. Due to extreme variability of closure of the cranial sutures, they cannot be considered dependable for precise age estimation. The age estimation from pubic symphysis is also variable as the changes occuring in the articular surface of the symphysis pubis are considered a reliable index for aging male skeletons but in females skeleton parturition has modifying effects on changes.Hence in individual less than 25 years many landmarks are available which help in estimation of age with close approximation. Beyond this, age determination is associated with high percentage of deviation.[2,3,4,5,6,7,8] The sternum is a strong bone therefore it can be used for age and gender prediction and it does't deform easily for a long time, therefore it can be used for age and gender prediction. Gold standard to evaluate bone tissue that easily provides a detailed imaging of the sternum is Multidetector computerized tomography (MDCT) imaging.[9]

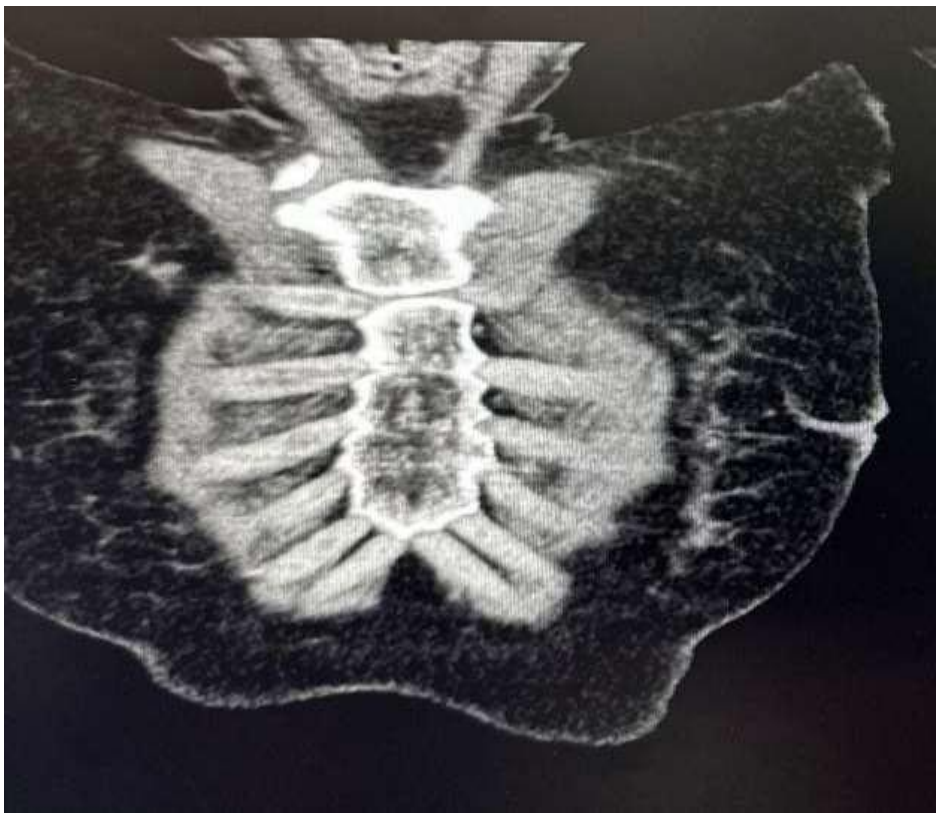
Data available from corpses is difficult to apply on living people for age determination. So this study was designed to get Multidetector computerized tomography (MDCT) imaging of sternum from living person whose exact age was available from birth records and note the fusion or non fusion of the manubrio-sternal joint and xiphi-sternal joint.

Aims & Objectives

To study the pattern of fusion of manubrio-sternal & xiphi-sternal joint in correlation with age and gender of individuals in Gurugram region.

Materials and Methods

The present study was carried out in the Department of Radiology, SGT Medical College Gurugram in association with Department of Forensic Medicine, Amrita School Of Medicine Faridabad . A total of 120 individuals participated in this study. The subjects included were individuals of 30-70 years of age from Gurugram city. They are born to parents living in Gurugram and have lived here since birth. The subjects do not have any disease/deformity pertaining to bones . Only those cases were considered whose records for date of birth were available. The Multidetector computerized tomography (MDCT) Sternum was taken of study cases after obtaining their written informed consent. In this study only bonafide residents, who do not show any disease in respect to anterior chest wall were considered. The status of Fusion of Xiphisternum and Manubrium with the body of sternum was studied.



Results

S.No.	Age Group	Total cases	Fused Male + Female	Not Fused Male + Female
1	30-35	20	5	15
2	36-40	20	14	6
3	41-45	20	19	1

Table- 1. Table showing fusion and non fusion of Xiphi-sternal joint in the age group of 30 to 45 years.

Sex	Fused	Not Fused	Total
Male	18	12	30
Female	20	10	30
Total	38	22	60

P value = 0.592

Table- 2. Table showing Sex wise distribution of fusion and non fusion of Xiphi-sternal joint in the age group of 30 to 45 years.

S.No.	Age Group	Total cases	Fused Male + Female	Not Fused Male + Female
1	50-55	20	3	17
2	56-60	20	1	19
3	61-70	20	8	12

Table- 3. Table showing fusion and non fusion of Manubrio-sternal joint in the age group of 50 to 70 years.

Sex	Fused	Not Fused	Total
Male	6	24	30
Female	6	24	30
Total	12	48	60

P value = 1.00

Table- 4. Table showing Sex wise distribution of fusion and non fusion of Manubrio-sternal joint in the age group of 50 to 70 years.

Discussion:

The present study included total 120 participants from both sexes between the age group of 30-70 years for xiphi-sternal (30-45 years) & manubrio-sternal (50-70years) joint.

For the age group 30-35 years 15% male & 10% of female had fused xiphi-sternal joint i.e. total 25% had fused xiphi-sternal joint which was the least number of fusion in that age group.

In 36-40 years 30% male & 40% female i.e. 70% had fused xiphi-sternal joint in this age group which was moderate in number.

In 41-45 years 95% i.e. 45% male & 50% female had fused xiphi-sternal joint which was maximum number of fusion of xiphisternum with body of sternum.

In the age group 30-45 years 63% individuals had fused xiphi-sternal joint out of 60 participants.

Present study results were comparable with the research of Krogman & Subrahmanyam which concluded at 40 years xiphoid process fuses with the body.[10,11]

For the age group 50-55 years 10% male & 5% of female had fused manubrio-sternal joint i.e. total 15% had fused manubrio-sternal joint which was the moderate number of fusion in that age group.

In 56-60 years no fusion found in male & only 1 female i.e. 5% had fused manubrio-sternal joint in this age group which was least in number.

In 61-70 years 40% i.e. 20% male & 20% female had fused manubrio-sternal joint which was maximum number of fusion for this age group.

Present study results were comparable with the research of Krogman & Dogra [12] which concluded that in advanced life the manubrium is occasionally joints the body.

Summary And Conclusion:

The present study concluded that, fusion of xiphi-sternum with body of sternum was 40 years in both male and female which was more reliable for determination of age as maximum number of fusion was found in this age group.

For fusion of manubrio-sternum with body of sternum was 59 years in male and 60.35 years in female.

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