



FUSION AT MANUBRIOSTERNAL JOINT IN LIVING POPULATION THROUGH X-RAY STERNUM- LATERAL VIEW.

Anatomy

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ABSTRACT

Medicolegal autopsy is one of the important jobs of forensic experts dealing in medicolegal work. Medicolegal autopsy is done in all the unnatural cases of human death. However, medicolegal autopsy in unknown cases, putrefied cases and murder cases creates a grave challenge to forensic experts. Forensic experts are frequently asked to give age and sex in these cases. During autopsy, we study fusion at various joints and sutures like skull sutures, fusion in body of sternum and fusion of inner end of clavicle. We rely on the data available in the books and few articles. So, the purpose of our study is to estimate age from manubriosternal joint by digital radiographs. Fusion at manubriosternal joint is seen after taking X-Ray Sternum lateral view. The earliest age of fusion at manubriosternal joint is found to be at 60 years, latest age of non-fusion at manubriosternal joint is seen at 65 years and average age of fusion comes out to be 62.5 years.

KEYWORDS

Age Estimation, Autopsy, Manubriosternal joint, Angle of Louis, Forensic experts.

Introduction

The joint between the manubrium and upper part of body of sternum is known as Manubriosternal joint or angle of Louis. It is important landmark in respect of surface anatomy [1]. The manubriosternal angle is at the level of intervertebral disc of T4 and T5 vertebrae. The sternal angle also indicates the level of the second costal cartilages; hence it is a reference point in counting ribs. Medicolegal experts are frequently looking at the fusion of the joint in all the unknown unnatural human deaths. In living also, forensic experts are asked to give age in cases like rape, kidnapping and pension cases. The digital data records for age is still not complete especially in the middle to old age population. We usually rely on literature which is predominantly of the western world.

As per available literature, the opinion of various authors are variable in respect of fusion at manubriosternal joint is concerned. Few authors mentioned that Manubrium unites with the body in old age, at about 60 to 70 years [2] and other authors mentioned [3, 4, 5] that it rarely unites, except in old age.

Few author opined that manubrium fused with the body of sternum in old age after 50 years [6, 7] and other suggest that only 10 % of population has fusion at this joint [8]. Gatzoulis et al in Gray's Anatomy edited that Manubrio-sternal joint is usually symphysis, which ossify in old aged [9].

Jit and Bakshi studied about time of fusion of the human mesosternum with manubrium & xiphoid process in sterna obtained from 772 male and 208 female subjects from Punjab, Haryana and Chandigarh (India) varying in age from 5 to 85 years. Complete fusion of manubrium with the mesosternum was seen at 21 years or above in both sexes; though non-fusion could be seen even in a person above 60 years of the age [10, 11].

There are few autopsy studies on sternum in India also. But, the studies on living population is lacking. So, the purpose of our study is to estimate age from Manubriosternal joint by digital radiographs in living population of our area and enrich the corresponding database. We had taken the digital Lateral radiograph of the chest in the available population and fusion at the Manubriosternal joint was studied.

Material and Methods

The present study comprised of 108 subjects between the age group of 22-85 years. The study was done in Gian Sagar Medical College and hospital, Rajpura, District Patiala, Punjab from year 2014 to 2015. Only those cases were considered where proof of exact date of birth was available as per date of birth certificate. The cases showing any

disease or damage in respect to anterior chest wall were not considered. X-Ray Sternum Lateral view were taken, reported and analysed. The X-ray films which show complete fusion at manubriosternal joint were labelled as positive or fused and all other cases showing unfusion and partial fusion were labelled together as negative or nonfused. The present study is also compared with earlier studies.

Result

The total of 108 cases was studied. 3 cases were discarded because of lack of good x-ray exposure or breast overshadowing and doubt of date of birth. The studied cases were divided into age groups as follows: -

- 26–35 years
- 36–45 years
- 46–55 years
- 56–65 years
- 66–above years

Refer Table 1, 2 and 3 at the end of article. The sexwise distribution of cases is shown in Table 1.

Discussion

It is observed in the present study that in age group of 26 to 55 years, there is 100 % non fusion at manubriosternal joint. The percentage of fusion is increasing in age group of 56 to 65 years (Table 2). The earliest age of fusion of the joint has been observed at the age of 60 years in males and females.

The 100 percent fusion of manubriosternal joint is observed after the age of 66 years. (Table 2). However, the latest age of non-fusion of the joint has been observed at the age of 65 years in males.

The average age of fusion of manubriosternal joint comes out to be 62.5 years which is comparable with previous studies [12, 13 and 14].

The present study is compared with the study conducted by previous authors as shown in table 3.

Fig 1 is showing fusion at manubriosternal joint at 60 years. Fig 2 is showing nonfusion at manubriosternal joint at age of 60 years. Fig 3 is showing non fusion at manubriosternal joint even at 65 years of age.

Conclusion

As per current study, fusion at manubriosternal joint was seen at the earliest at 60 years of age and Latest age of non fusion is seen even at the age of 65 years in an individual. This study is also showing wide variation.

So it can be concluded that if we find complete fusion at the manubriosternal joint during autopsy, then we can safely say that age of person is more than 65 years. And if we did not find any fusion at manubriosternal joint during autopsy, then we can say that age is not above 60 years.

So, it is also suggested that we should take multiple bones and other parameter into consideration while giving age during autopsy and also in living population. From this study, it is also concluded that fusion at manubriosternal joint is not reliable parameter for estimation of age alone.

Conflict of interest: None.

Table 1 showing sexwise distribution of cases.

Age Group	Total	Male	Female
26-35	13	10	3
36-45	35	23	12
46-55	20	12	8
56-65	21	13	8
66-above	16	14	2
Total	105	72	33

Table 2 showing distribution of cases according to fusion and their percentage.

Age Group	Total	Fusion	% Fusion	Non Fusion	% Non Fusion
26-35	13	0	0	13	100
36-45	35	0	0	35	100
46-55	20	0	0	20	100
56-65	21	7	33.3%	14	66.67%
66-above	16	16	100	0	0
Total	105	23		82	

Table 3 showing comparison of study with previous studies by various authors in respect of manubriosternal joint.

Author	Year	Location	Earliest age of fusion (years)	Age of Completed (years)	Mean age (years)
Gautam et al [7]	2003	Ahmedabad	31-35	Male 50, Female 50	-
Garg et al [10]	2011	Punjab	Male 37, Female 35	-	Male 50.04, Female 46.42
Sethi et al (Present study)	2015	Patiala,	60	65 years	62.5 years

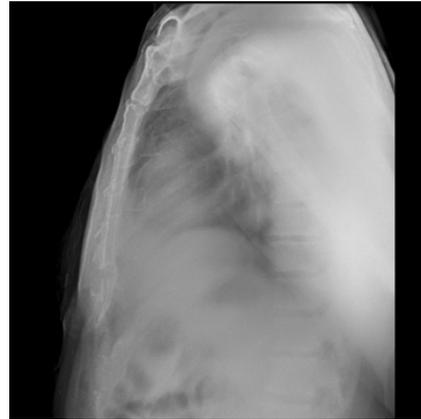


Fig 3 showing non fusion at manubriosternal joint at 60 years.

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Fig 1 showing fusion at manubriosternal joint at 60 years of age



Fig 2 showing non fusion at manubriosternal joint at 65 years