

Original article:

Study of Sexing the Human Sternum: Observational study

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Abstract:

Determination of Sex and Age is a challenge to a Anatomist when remains of the deceased are available. Hip bone and Skull bone have been studied extensively for the same. But if other bone are available, they can also help in this process. This study was carried out to know the value of Human Sternum in determination of Sex of an individual. For this study 136 Sternum of known sex were examined from various Medical colleges from Maharashtra. The results obtained were statistically significant in determination of Sex from the length of Sternum. High percentage of accuracy was found with combined length of Manubrium and body of Sternum. The study will be additional help in determination of sex in deceased along with the established criterias.

Key words: Human Sternum, Sex dimorphism,Medicolegal

Introduction :

Determination of Sex and Age from remains of the deceased in Medicolegal cases is a challenging job for a Anatomist. Conventionally Hip bone, Pelvis as a unit, Skull bones to a large extent help in identifying the sex and age of the deceased. These bones are studied extensively and large data is available of the same. But many cases face difficulty if these major bones are not available. So it is justified to study other bones in the body which may be helpful in determining the age and sex of the deceased. So this attempt is to find out the sexual dimorphism in the Human Sternum.

Material and Methods :

The material for the study consists of 136 sterni of known sex (92 male and 54 Female). The bones were obtained from Government medical college, Aurangabad, Government Medical college Miraj and B J Medical College , pune.

Human Sternum has three parts. Uppermost broad part is called as Manubrium. The succeeding piece is called as body or Mesosternum. The lowermost part is called as Xiphoid process. Xiphoid process most of the time remains cartilaginous in life and so not available with dried bones. The measurements were taken in Millimetres with the help of Osteometric board, Sliding calliper and spreading calliper. The parameters taken were – M – Length of Manubrium

S – Length of Mesosternum (body)

M + S – combined length of Manubrium and Mesosternum

From the above parameters the following index was derived –

Manubrium-corpus index = $M \times 100 / S$

The data obtained was analysed statistically and results were noted

Results:

1. Length of Manubrium – M

	Range (mm)	Mean	S.D.	P	% lying in apposite Sex
Female	31 - 56	43.38	6.51	<0.05	74.07%
Male	40-70	51.25	4.90		91.46%

The difference between the two means is statistically significant but percentage lying in apposite sex is very high

2. Length of Mesosternum (body) – S

	Range (mm)	Mean	S.D.	P	% lying in apposite Sex
Female	40-100	70.57	12.09	<0.05	74.07%
Male	64-120	93.57	10.52		71.96%

Again the difference in mean is statistically significant but percentage lying in apposite sex is high.

3. Combine length – M+S

	Range (mm)	Mean	S.D.	P	% lying in apposite Sex
Female	73-145	113.96	16.15	<0.05	35.18%
Male	119-175	145.13	11.16		56.10%

The difference in mean is highly significant and the percentage lying in apposite sex is low.

Discussion :

Sex dimorphism in Human sterni was first studied by Wenzel in 1788¹. He showed the difference in the ratio between the length of Manubrium and Mesosternum. This study was further supported by Feigel J (1837), Hyrtl (1853)² and Dwight (1881, 1890)^{3,4}. These lead to the enunciation of Hyrtl's law, according to which Manubrium –corpus index ($M/S \times 100$) exceed 50 in Females and is less in Males.

Many workers like Krause W (1897)⁵, Paterson (1904)⁶, Pons (1955)⁷, Ashley (1956)⁸, Teige K (1983) studied the sexual dimorphism in Human Sterni. In India also many studies were carried out in various parts of India¹⁰

1) Length of Manubrium – (M)

According to Dwight (1890)⁴ variation in length of Manubrium in two sexes is minimal, But Ashley (1956)⁸ found that European females defiantly Males in have shorter Manubrium than Males. Inderjit (1980)⁹ stated that the difference in average length of Male and Female Manubria is statistically significant, but not helpful if applied to the individual specimens.

Our study also shows statistically significant difference in average length of Manubria in Males and Females, but the percentage of specimens lying in the apposite sex is very high.

2) Length of Mesosternum – (S)

Ashley found female mesosternum shorter by about 13mm in both European and East African population. Inderjeet (1980)⁹ stated that Female mesosternum is shorter by 16.75 mm which is statistically very significant. Our study shows the actual difference in the mean of Male and Female mesosternum was 23mm which is highly significant. But again not useful for individual specimens.

3) Combined length of Manubrium and Mesosternum (M+S)-

The combined length of Manubrium and Mesosternum was found to be most significant in all the studies.

Ashley (1956)⁸ gave the rule of 149 to differentiate Male and Females with about 80% accuracy. While Inderjeet (1980)⁹ gave the rule of 136 for the north Indian population with about 80% accuracy.

Our study we found out cut off value 132 for the Maharashtra population with about 90% accuracy.

4) Hyrtl's Law-

According to Hyrtl's law Manubrium-corpus index ($M/S \times 100$) is Less than 50 in Males and More than 50 in Females. Ashley (1956)⁸ and Inderjeet (1980)⁹ found this law unreliable. In our study 47 out of 54 (87.03%) of female specimens and only 25 out of 82 (30.5%) male specimen obey this law.

Conclusion :

Length of Manubrium (M) alone is not helpful in sex determination. Length of Mesosternum (S) to some extent may be helpful in determining the sex. But combined length of Manubrium and mesosternum (M+S) is highly significant for determination of sex. Our study give a rule of 132 with 90% accuracy to differentiate between Male and Female sterni.

Acknowledgment:

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