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Incidence of Rhomboid Impression in the Adult Human Clavicles

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ABSTRACT

Background and Aims: The attachment of the ligament on the inferior surface of medial two third of clavicle produce various patterns like tubercles, grooves etc. called as the rhomboid impression. This impression although a normal morphological variant may be misdiagnosed as pathological lesion like necrosis, tumour in radiological images besides this, the study of rhomboid impression is very scanty in North Indian population. So a curious desire has developed to conduct this study.

Material and methods: The present cross-sectional descriptive study was done on dried specimens of adult human clavicles (60) obtained from the department of Government medical college Jammu. This study was done over a period of one year. The morphology of the clavicles was studied, and various types of rhomboid impression were observed.

Results: The various patterns of rhomboid impressions found in our study were flat and rough, flat and smooth, depressed and rough, depressed and smooth, elevated and rough and elevated and smooth.

Conclusions: The results of present study concluded that the impression on the inferior surface of medial two third of clavicle i.e. Rhomboid impression was present in all clavicle bones. The predominant type of rhomboid impression on both sides was type1 (flat and rough).

Key words: Clavicle, costoclavicular ligament, rhomboid impression

INTRODUCTION

The clavicle bone is one of the bones of shoulder girdle in humans and in those mammals who use their hands for prehension (Sen S *et al.*, 2018). It exhibits high variability in its shape and size more frequently than other long bones of human skeleton (Sehrawat JS and Pathak RK 2016). The clavicle or collar bone is the long bone situated in front of the root of the neck and its shape resembles italic letter f' being convex forwards in its medial two-thirds and concave forwards in its lateral third (Sahana SN, 1982). The clavicle bone consists of a cylindrical part called as shaft and two ends i.e. lateral or acromial end and medial or sternal end (Chaurasia BD, 2019). The medial two third of shaft is cylindrical or prismoid in form and present four surfaces namely anterior, posterior, superior and inferior surface. The inferior surface of medial two third of shaft is marked near its sternal end by a roughened oval impression (costal impression) which is often depressed below the surface and its margins gives attachment to the costoclavicular ligament (Lambert SM, 2016). The costoclavicular ligament also known as rhomboid ligament because of its shape, connects the medial end of clavicle to the upper surface of anterior end of first rib and its costal cartilage. This ligament plays an important role in stabilization of pectoral girdle (Shane TR *et al.*, 2009). The costoclavicular ligament (ligamentum costoclavicular) or

rhomboid ligament on its insertion on the inferior surface of medial two third of clavicle can produce skeletal traits that may be tubercles, roughened impressions, shallow groove like fossae, deep fossae or leave no trace (Rogers NL *et al.,* 2000).

This rhomboid impression although a normal morphological variant may be misdiagnosed as pathological lesion like necrosis, osteomyelitis or tumour in radiological images. Determination of gender and estimation of age are the two most important attributes of biological identity of an individual. Both the morphological and morphometric traits of human skeletal elements have been widely used in establishing identity of a person. Rhomboid fossa of the clavicle is one of the morphological traits which have been studied as an estimator of age and sex (Bhat S *et al.,* 2015). The presence of rhomboid impression (impression for costoclavicular ligament) can be used as qualitative criterion for the differentiation of sex (Prado FB *et al.,* 2009).

No study has been conducted pertaining to the rhomboid impression in clavicle bones in Jammu region. So a curious desire has developed to conduct this study. Our study will furnish morphological data which will form an anatomical baseline.

MATERIAL AND METHODS

The present study was conducted on 60 clavicle bones of unknown age and sex, which were obtained from the Department of Anatomy, Govt. Medical college (GMC) Jammu. The bones were sorted out and only dry, clean and complete clavicles were selected. The clavicles which were deformed, excluded from the study. Data was analyzed using Microsoft excel. Impression on inferior surface of medial two third of clavicle (Rhomboid impression) was observed to note:

a) Presence: Inferior surface of clavicle in medial two third looked for, whether impression was present or not.

b) Surface: The impression was examined to notice its surface architecture (whether rough or smooth) and projections (elevated /depressed/flat). These characters were combined to evaluate various patterns of rhomboid impression. Rhomboid Impression was divided into six different types as per CAVE AJE,1961 classification.

c) Size: Impression was looked for size whether small, medium or large. Arbitrarily, an approximate size of more than 25mm along its longitudinal axis was considered as large, 15-25 mm as medium and less than 15 mm was taken as small.

RESULTS

The Rhomboid impression was present in 32 clavicles on right side and 28 clavicles on left side. Impression was not absent in any bone in our study. Three types of surface projections of rhomboid impression i.e. flat, depressed and elevated were observed in present study and these projections were having either rough or smooth architecture. These characters were combined and six different types of rhomboid impression observed in our study were as follow:

Types	Rhomboid Impression
1	Flat & rough
2	Flat & smooth
3	Depressed & rough
4	Depressed & smooth
5	Elevated & rough
6	Elevated & smooth

In total 60 clavicles, 20 (33.33%) bones were having flat & rough type of pattern, followed by 13 (21.6%) flat & smooth, 11 (18.33%) depressed & rough, 8(13.33%) depressed & smooth, 4 (6.6%) elevated & rough and 4 (6.6%) elevated & smooth. In addition, out of total 60 clavicles, 34 bones were having impressions of medium size followed by 16 of small size and 10 of large size. The flat and rough type of rhomboid impression was more common in both right and left sided clavicle bones in present study. Moreover, most clavicles of both

right and left side, exhibits medium size rhomboid impression

Table 1: Showing presence and absence of impression on inferior surface of medial two third of clavicle (rhomboid impression) in right and left clavicle bones.

Impression on inferior surface of medial two third of clavicle (Rhomboid impression)	Right (n=32)	Left(n=28)	Total (n=60)
Present	32	28	60(100%)
Absent	0	0	0

Table 2: Showing types of rhomboid impression in right, left and total clavicle bones .

Types	Rhomboid Impression	Right(n=32)	Left(n=28)	Total(n=60)
1	Flat & rough	11(34.3%)	9(32.14%)	20 (33.33%)
2	Flat &smooth	7 (21.8%	6 (21.4%)	13(21.6%)
3	Depressed & rough	4 (12.5%)	7(25%)	11(18.33%)
4	Depressed & smooth	5 (15.6%)	3(10.7%)	8(13.33%)
5	Elevated & rough	3 (9.3%)	1(3.5%)	4(6.6%)
6	Elevated & smooth	2 (6.25%)	2 (7.14%)	4(6.6%)

Table 3: Showing various sizes of rhomboid impression in right, left and total clavicle bones

Size of Rhomboid Impression	Right(n=32)	Left(n=28)	Total (60)
Small	8 (25%)	8(28.5%)	16(26.6%)
Medium	16 (50%)	18(64.2%)	34(56.6%)
Large	8 (25%)	2(7.1%)	10(16.6%)

DISCUSSION

The normal variant of rhomboid impression may be sometimes misdiagnosed as pathological condition like tumour osteomyelitis etc. So we professionals should have anatomical knowledge of rhomboid impression, in order to avoid diagnostic errors. Results of present study showed that rhomboid impression was present in all 60 clavicle bones. The impression was found in 100% clavicles in the present study was in accordance with study done by Rai R and Shrestha S (2014). Rathnakar P *et al.,* (2018) in their study found that impression on inferior surface of medial two third of clavicle i.e. rhomboid impression was absent in 6.4% clavicles which negated the results of present study. Rogers NL *et al.,* (2000) found the incidence of impression for costoclavicular ligament i.e. rhomboid impression was 36% and 31% on right and left side clavicles respectively in males whereas in females it was found to be 8% and 3% in right and left side clavicles. The rhomboid impression was found to be of various sizes i.e. small, medium and large in the present study. Majority of rhomboid impressions in the present study were medium (56.6%) followed by small (26.6%) and large 10 (16.6%) size. On the contrary, Rai R and Shrestha S (2014) found the maximum rhomboid impressions were of small (37.1%) followed by large (33%) and medium (30%) size. The various types of rhomboid impression found in the present study were flat & rough, flat & smooth, depressed & rough, depressed & smooth, elevated & rough, elevated & smooth. The incidence of flat & rough impression (type 1) was more in the present study which was in agreement with Cave AJE (1961).

Table 4: Comparison of types of rhomboid impression of current study with other reported studies

Types	Rhomboid impression	Cave AJE (1961)	Rai R and Shrestha S (2014)	Rathnakar P et al (2018)	Present study
1	Flat and rough	31%	40%	7.6%	33.33%
2	Flat and smooth	29%	22.8%	7.6%	21.6%
3	Depressed and rough	18%	20%	29.5%	18.33%
4	Depressed and smooth	10.5%	11.4%	0%	13.33%
5	Elevated and rough	8.5%	2.9%	48.7%	6.6%
6	Elevated and smooth	2.6%	2.9%	0%	6.6%

Rai R and Shrestha S (2014) also studied the rhomboid impression and found rough & flat type was the predominant type, which was also in accordance with the present study. On the contrary, Rathnakar P *et al.,* (2018) found the most common type of

rhomboid impression was rough and elevated.

CONCLUSION

The present study concluded that rhomboid impression was present in 100% clavicles. Majority of bones on both sides exhibit impression of medium size and the most predominant type of rhomboid impression on both sides was type 1 (flat and rough). The presence of rhomboid impression can be mistaken for benign fibrous dysplasia or chromic osteomyelitis. So the knowledge of rhomboid impression is clinically useful for radiologists and orthopaedicians

Declaration by Authors

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