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INCIDENCE AND MORPHOMETRIC STUDY OF CLAVICULAR FACET OF CORACO-CLAVICULAR JOINT IN ADULT POPULATION IN TELANGANA REGION.

KEYWORDS: Challenging behavior, behavior modification, consequence mapping, rewards

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ABSTRACT

Introduction: The aim of this study was to determine the incidence and morphometry of articular facet of CCJ on conoid tubercle of clavicle in Telangana population, as studies in this particular topic are scanty and incomplete.

Materials and Methods: The study was done on 100 adult human clavicles (44 right and 56 left) collected from Department of Anatomy, Kakathiya Medical College, Warangal, Telangana state. The presence of articular facet on the Conoid tubercle was determined and Maximum Antero-Posterior diameter (MAPD) and maximum transverse diameter (MTD) was measured by vernier calliper. The incidence was compared on the basis of side and with other studies in the world.

Results: Articular facet on conoid tubercle was found in 20 cases (20%). 8 (18.2%) were present on the right side and 12 (21.4%) on the left side. The facets were generally oval, with MAPD and MTD of 18mm and 20 mm respectively. A significant side variation was present with Lt sided facet being more common. The left sided facet was more transversely elongated than right.

Conclusion : The Indian population showed an incidence of 20%, which was comparable to other ethnic groups in world population.

INDRODUCTION:

Coracoclavicular Joint (CCJ), an anomalous synovial articulation between the conoid tubercleon the inferior surface of the clavicle superiorly and the superior surface of the horizontal part of the coracoiod process of the scapula inferiorly, is a well studied entity that has been used as an anthropological marker for human migration. Many authors have stated that an articular facet on the conoid tubercle or the cranio-medial surface of the coracoid surface indicates the existence of a coracoclavicular joint [1-3]. The shape of articular facet on the conoid tubercle varies from oval to circular usually, with the long axis horizontally directed [4-6].

The frequency of CCJ is highest in Mapuche native population (22.9%), followed by Central Asian (9.8-9.9%), Northwest Indian (9.7%) and South African population (9.4–10%) and is lowest in Southern European population (0.3%) [4]. The analysis of the global distribution of this anatomical variant provides a pattern that suggests that this trait arose long ago in Central Asia and that the farther one progresses away from this locus, the lower is the prevalence of the finding[7].

It is a rare but well-established cause of shoulder pain and upper-limb paresthesia. It is being considered responsible for restriction of shoulder joint movements, degenerative changes of joints of pectoral girdle and undiagnosed shoulder pains [8-10].The cause of CCJ is debatable, even though there have been many suggested explanations given such as developmental, environmental, occupational, congenital, genetic or age related.Previous study by Kaur & Jit was done only on Northwest Indian (Punjabi) population, 24 years back and showed incidence of 9.7% which may not be a representative of whole Indian population [5].

The present study was undertaken to find out the frequency of the articular facet on the conoid tubercle of the clavicles in Telangana region.

MATERIALS AND METHODS:

The study was conducted on a sample of 100 adult human clavicles (44 right and 56 left) collected from Department of Anatomy, Kakathiya Medical College, Hyderabad, Telangana. Bones were documented with number. The study material consisting of 100 of unknown sex was segregated and assessed . The side of each bone was determined and the sample collected involved 44 bones of right side and 56 bones of left side. Clavicle exhibiting obscuring pathologies such as cortical bone deterioration were excluded from the study.

The presence of CCJ was determined by inspecting the occurrence of a distinct articular facet on the conoid tubercle. It was recorded according to the side and was photographed using digital camera. The following measurements were taken on all articular facets using a vernier calliper: (1) maximum transverse diameter (MTD), (2) maximum antero-posterior diameter (MAPD). All the observations and results were tabulated and compared with previously reported studies.

RESULTS:

Out of 100 clavicles studied (56 Lt.clavicles & 44 Rt.clavicles), articular facet on conoid tubercle was present in 20 (20%) clavicles. Out of twenty 8 (18.2%) were present on the right side and 12 (21.4%) were present on the left side (table-1).

TABLE-1: Incidence of articular facet on the conoid tubercle of clavicles in Indian Population on the basis of side.

	Right (n=44)	Left (n=56)	Total
Presence of facets (no.)	8	12	20
Incidence (%)	18.2%	21.4%	20%

The facets were typically oval, with horizontally directed long axis. The maximum transverse diameter and maximum antero-posterior diameter of articular facets was 20 mm and 18mm respectively. Thus, articular facet in left is more transversely elongated than in right. A significant side variation was present with Lt sided facet being more common.

TABLE – 2 : Comparison of articular facet on the conoid tubercle of clavicles in Indian Population on the basis of side.

Parameters	right/left	Measurement	mean
Max. Anterior Posterior Diameter	Right	15mm	12.5mm
	Left	18mm	14.7mm
Max. Transverse Diameter	Right	18mm	11.5mm
	Left	20mm	14.0mm

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TABLE - 3 : Comparison of incidence of CCJ in world population from osteological specimens.

References	Year	Population	Sample size(n)	Incidence (%)	Rt (%)	Left (%)
Jaluvka [12)	1956	Czechoslovakia	982	5.1	-------	--------
Parsons [13)	1916	England	282	1.4	-------	--------
Bainbridge & Tarazaga [14]	1956	Southern Europe	716	0.3	-------	--------
Ray [15]	1959	Australian aboriginal	584	0.7	-------	-------
Abe [16)	1964	Japanese	182	9.9	--------	-------
Fischer et al., [17]	1971	French	234	6.8	--------	-------
Kaur and Jit [5]	1991	Northwest Indian	2000	9.7	7.6	2.1
Nalla & Asvat [3]	1995	South African	360	9.4	5.6	3.9
		South African (White)	120	10	5	5
Cho & Kang [2]	1998	Korean	204	9.8	5.9	3.9
Gumina et al.,	2002	Italian	1020	1.6	1.2	0.4
Nehme et al., [6]	2004	French	784	1.78	0.8	0.5
Mariano et al., [4]	2013	Mapuche native (Chile)	96	22.9	12.5	10.4
SuShAnt SwAroop das	2015	Indian	144	5.6	9.2	1.5
Present study	2017	Telangana(Indian)	100	20	8	12

DISCUSSION:

CCJ is a regular finding in the Gorilla and Gibbon, but in humans it is rare [(11)]. This entity was described in 1861 [(6)]. Since then, different authors have extensively studied the joint by osteological, cadaveric and radiological methods. Depending upon the approach of investigation and the population sample, a wide variation is noted in prevalence from 0.3% to 22.9% in osteological studies, 1.7% to 30% in cadaveric dissections and 0.04% to 3.0% in radiological studies [(8)].The incidence of articular facet of clavicle (representative of CCJ) in Indian population (20%) as reported in our study is comparable to the Mariano et al., [4], 2013 ,Mapuche native (Chile) people which was shown in Table -3 : Comparison of incidence of CCJ in world population from osteological specimens. The origin of CCJ is still questionable. According to the theory of the development of the shoulder girdle by Gegenbaur, the embryonic coracoid is connected with the clavicle by the cartilaginous procoracoid. In the course of normal development, this bone becomes fibrous and is ultimately transformed into the coracoclavicular ligaments. On their surface, in normal adults, nests of chondrocytes and even small nodules of cartilage are frequently seen. These chondrocytes upon stimulation (localised pressure and friction) may lead to abnormal joint formation or calcification. From the morphogenetic point of view, this theory can provide a suitable basis for the understanding of the congenital and acquired causes [(9)].

Lane [(19)]and Lewis [(1)]thought that this joint was an acquired joint seen in labourers and shoemakers, related to particular movements associated with their work. The highest frequency of CCJ reported in Mapuche ethnic group was associated with occupation or type of movements made by this population which corresponds to a population that collects food from the ground level [(4)]. But, Kaur and Jit concluded that there was no correlation between the existence of CCJ and particular occupations [(5)]. Nalla & Asvat hypothesized that the larger morphometry of the scapulae, clavicles and first ribs in individuals may restrict associated movements of the scapulae, resulting in the development of the coracoclavicular joint [(3)]. Cho and Kang correlated the appearance of coracoclavicular joint with the increase of age and raised the possibility that the joint may develop as a result of degenerative changes and is not related to the size of the scapulae or the slopes and heights of some coracoacromial arch elements [(2)]. Pillay, through family studies, had demonstrated that this anatomical feature is transmitted in a dominant manner and thus, is genetically transferred [(20)]. Kaur and Jit concluded from the absence of the facet in the fetuses, neonates, and young children that it is not a congenital anomaly [(5)].

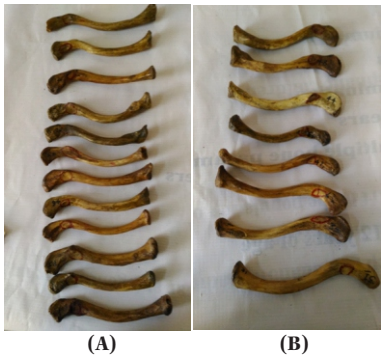
The present study revealed asymmetry in the occurrence of CCJ, with left side being more common than right in contrast to Mariano [(4)]and Olotu [(21)]et al., found similar asymmetry in Mapuche (right – 12.5%, left – 10.4%) and Nigerian (right – 55.5%, left – 33.3%) populations respectively. In the present study, the articular facet on left clavicle is more transversely elongated than in right , which shows that more sliding and gliding movements can take place along these axes. Thus, these variations could be responsible for the different degree of movements associated with this joint.

The frequency of articular facets obtained from radiological studies are generally lower than osteological studies as an articular facet can exit on the conoid tubercle without forming a large bony process which can easily be missed on X-ray [(17)]. For example, Nehme et al., reported frequencies of 0.82% and 1.78% through radiological and osteological studies respectively in French population [(6)].

The significance of the coracoclavicular joint is controversial. This joint is an anatomic variation seen on many radiographs, and is an incidental finding with little clinical significance. Many case studies describing the unnoticed significance have also been reported [(22)]. It is also been reported to be responsible for cervicobrachial syndrome, thoracic outlet syndrome and shoulder joint pain radiating to the arm, neck which persists during rest and increase during exercise [(23-25)]. The presence of this joint also predisposes to degenerative changes of the sternoclavicular and acromioclavicular joints and that the joint itself has an affinity to undergo arthritic changes [(26,27)]An osteochondroma, post traumatic myositis ossificans around the shoulder may mimic pain due to CCJ [(28)]. Thus, knowledge of this joint is useful determining the cause of undiagnosed shoulder pains and its subsequent management.

CONCLUSION:

Coracoclavicular joint, a regressive joint, is not only an interesting occurrence but also compels us to explore out the incidence of this joint in various populations, its functional impact on pectoral girdle movements and its clinical implications. In Indian population the facets were typically oval, with horizontally directed long axis. The maximum transverse diameter and maximum antero-posterior diameter of articular facets was 20 mm and 18mm respectively. Thus, articular facet in left is more transversely elongated than in right. A significant side variation was present with Lt sided facet being more common.



(A) (B)

Fig-1: Inferior view of left clavicle showing an articular facet on the conoid tubercle . (A).Lt.clavicles & (B).Rt.clavicles.

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