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Original Research

A Study of the Anatomical Variations in the Shape of Suprascapular Notch in Indian Population

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***ABSTRACT*:**

Background: The suprascapular notch which is present on the superior border of the scapula, is converted into suprascapular foramen by the attachment of the superior transverse ligament to its edges. The suprascapular nerve passes through this foramen and the suprascapular vessels pass above the ligament. During its course through the foramen, the suprascapular nerve can get entrapped due to the different shapes of the suprascapular notch. **Materials &Methods:** The present study was conducted on 85 dry human scapulae (44 Right and 41 Left) obtained from the Department of Anatomy, GGS Medical College, Faridkot. The scapulae were examined for different shapes of the suprascapular notch. Absence of notch was also noted and the data was recorded. **Results:** In the present study three different shapes (U, V and J) of suprascapular notch, ossification of superior transverse ligament and the absence of suprascapular notch were noted. Out of 85 scapulae, 30 (35.29 %) had U-shaped, 26 (30.58%) had J-shaped and 3 (3.52%) had V-shaped suprascapular notch. The suprascapular notch was absent in 24(28.23%) of the scapulae and the superior transverse ligament was seen ossified in 2 (2.35%) of the scapulae. **Conclusion:** The knowledge of these variations in the shapes of the suprascapular notch should be kept in the mind by physicians, radiologists, surgeons and orthopaedicians in the diagnosis and treatment of suprascapular nerve entrapment syndrome.

Key words: Scapula, anatomical variations, suprascapular notch, suprascapular nerve.

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INTRODUCTION

The scapula is a large, flat, triangular bone which lies on the posterolateral aspect of the chest wall, covering parts of the second to seventh ribs. It has costal and dorsal surfaces, superior, lateral and medial borders, inferior, superior and lateral angles, and three processes, the spine, its continuation the acromion and the coracoid process. The superior border at its anterolateral end it is separated from the root of the coracoid process by the suprascapular notch. The notch is bridged by the superior transverse ligament which extends from the root of the coracoid process to the limit of the notch. The ligament is sometimes ossified. The foramen, thus completed, transmits the suprascapular nerve to the supraspinous fossa, whereas the suprascapular vessels pass backwards above the ligament.[1] The suprascapular nerve gives motor branches to the supraspinatus and infraspinatus muscles and sensory branches to musculo-tendinous and ligamentous structures of the shoulder joint.[2]

Different types of classifications have been proposed by various authors depending upon the measurements and shapes of suprascapular notch. Iqbal et al[3] classified the suprascapular notch into three types depending upon its shape. Natsis et al[4] had classified suprascapular notch into five different types based on vertical and horizontal diameters of the notch whereas Rengachary et al[5] in his study had classified six basic types of suprascapular notches.

Anatomical variations in the suprascapular notch shape or the complete/partial ossification of superior transverse

ligament may lead to the compression of suprascapular nerve during shoulder movements. Several factors can lead to suprascapular nerve entrapment but the most common factor is the variations in the shape and size of the suprascapular notch.[6] Various authors have described that the most common factor for the suprascapular nerve compression at the suprascapular notch is the partial or complete ossification of superior transverse ligament with the formation of suprascapular foramina.[7-9]

Therefore, the present study to note the variations in the shapes of the suprascapular notch was carried out which would be very useful to the physicians, surgeons and orthopaedicians in the diagnosis and treatment of suprascapular nerve injuries and in the decompression of the entrapped suprascapular nerve.

MATERIALS & METHODS

The study was performed in the Department of Anatomy, GGS Medical College, Faridkot, Punjab. A total of 85 unpaired human scapula bones were studied from teaching collection of the Anatomy department. Of the 85 scapulae, 44 were from the right side, and 41 were from the left side. All the scapulae selected were dry, complete and showed normal anatomical features and were of unknown age and sex. The scapulae were macroscopically examined for the anatomical variations in the shape of suprascapular notch.

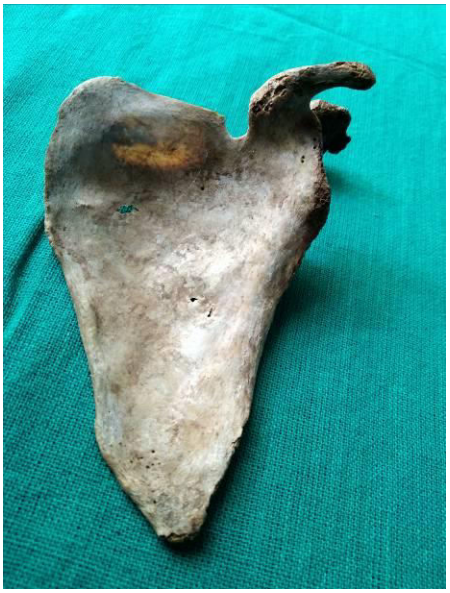
RESULTS

In the present study three different shapes (U, V and J) of suprascapular notch, ossification of superior transverse ligament and the absence of suprascapular notch were noted. Out of all the 85 scapulae (Rt-44, Lft-41), 30 scapulae (Rt-16, Lft-14) had U-shaped suprascapular notch (Fig. 1a.), 3 scapulae (Rt-2, Lft-1) had V-shaped suprascapular notch (Fig. 1b.) and 26 scapulae (Rt-14, Lft-12) had J-shaped suprascapular notch (Fig. 1c.). The suprascapular notch was absent in 24 scapulae (Rt-11, Lft-13) as shown in Fig.1d. and the ossified superior transverse ligament was seen in 2 scapulae (Rt-1,Lft-1) as shown in Fig.1e. The number and the percentage of different shapes of suprascapular notch, absence of notch and ossification of superior transverse ligament are shown in Table 1.

Table1: Incidence of different shapes of suprascapular notch.

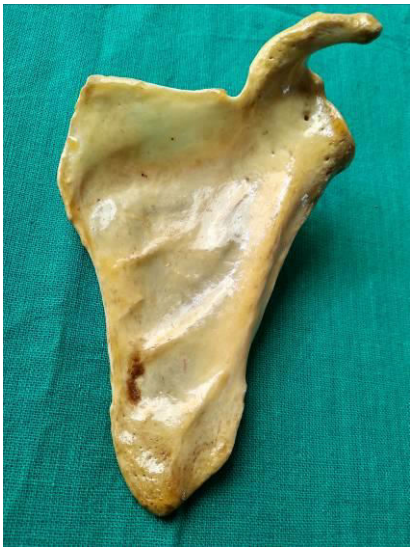
S. No.	Shape of Notch	Right(n=44)		Left(n=41)		Total
		No.	%	No.	%	N (%)
1	U	16	36.36	14	34.14	30(35.29)
2	V	2	4.54	1	2.43	3(3.52)
3	J	14	31.81	12	29.26	26(30.58)
4	Absent	11	25	13	31.70	24(28.23)
5	Ossified Superior Transverse ligament	1	2.27	1	2.43	2(2.35)

Figure1: Different shapes of the Suprascapular Notch



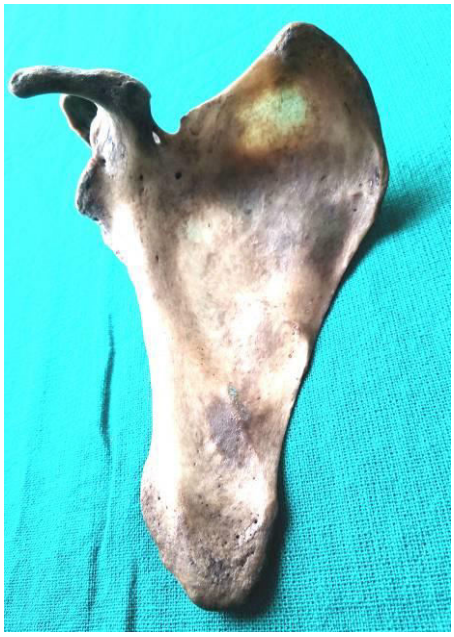
a. U-shaped

b. V-shaped



c. J-shaped

d. Absent Suprascapular Notch



e. Ossified Superior Transverse ligament

DISCUSSION

Several authors have studied the variations in the shape of the suprascapular notch and have done various classifications in the different populations of the world. In the present study, it was observed that 35.29% of the scapulae had U-shaped suprascapular notch with approximately parallel sides and a round base, 30.58% had J-shaped notch with one side short and the other side long and 3.52% had V-shaped notch with the two sides converging towards a narrow base. The suprascapular notch was absent in 28.23% of the scapulae. It was seen that in the present study the most common shape of the notch was U- shaped whereas the least common shape was V-shaped. In 2.35% scapulae the transverse ligament was ossified as a result of which the notch was converted into suprascapular foramen. Dunkelgrun et al[10] stated that the larger area of U-shaped notch as compared to the V-shaped notch can lead to the assumption that a V-shaped notch would more likely be associated with nerve entrapment. In the present study, the higher incidence of the U-shaped notch (35.29%) and the much lower incidence of the V-shaped notch (3.52%) would indicate that suprascapular nerve entrapment is less likely to occur.

In the present study, the complete ossification of the superior transverse ligament with the formation of suprascapular foramen was found in 2.35% of scapulae which coincides with the study done in other populations of the world. The less incidence of this condition observed in the present study was similarly reported in Egyptians (2.35%) [11], Kenyans (2.96%) [12], Chinese (4.08%) [13], Americans (5%) [10] and in Germans 7.3% [3].

In 1979 Rengachary SS et al[14] classified the suprascapular notch into six types. Type I - the superior border forms a wide depression from the medial angle to the coracoids process of scapula. Type II- blunted, large V- shaped notch .Type III - U-shaped having parallel margins. Type IV- narrow, very small V-shaped notch. Type V - notch is minimal and U-shaped with a partially ossified superior transverse scapular ligament. Type VI- presence of foramen. In their study they noted that incidence of type I, II, III, IV, V, VI supracapular notches was 8%, 31%,48%,3%,6%,4% respectively. Iqbal et al [4] in a study in population of Pakistan recorded that U-shaped notches were 13.2%, V-shaped notches were 20%, J-shaped notches were 22%, ill-defined notches were 26.8% and in 18% cases it was absent. In a study done in South India, Udayasree et al[15] noted that 47.6% scapulae had U-shaped

notches, 21% J-shaped, 2 % V shaped and absent in 11.9% scapulae .Ossification of the suprascapular ligament (partial/ complete) was seen in 14.2% scapulae. Kannan et al [16] in their study recorded that in 52% scapulae the notch was U-shaped, V-shaped in 14%, absent in 20%, partial foramen in 4% and complete foramen in 10%. Fatima et al [17] noticed out of 226 scapulae, 81 (35.84%) scapulae had deep U Shaped, 72(31.86%) scapulae had shallow U Shaped, 49 (21.68%) scapulae had J Shaped, 13 (5.75%) scapulae has V shaped and 11 (4.87%) scapulae has indented suprascapular notch. Among these different types, deep U shape was the most common and indented was the least common type of shape of suprascapular notch.

The causes commonly associated with suprascapular nerve compression may be a narrow V- shaped notch, the absence of notch or the ossification of the superior transverse ligament. The variability in the readings of different authors can be attributed to racial and regional differences.

CONCLUSION

Since the suprascapular notch is the most common site of both injury and compression of the suprascapular nerve, a thorough knowledge of this region is essential. Therefore the need to study the various varieties of the suprascapular notch in Indian population arose. The knowledge of these variations in the shapes of the suprascapular notch should be kept in the mind by physicians, radiologists, surgeons and orthopaedicians in the diagnosis and treatment of suprascapular nerve entrapment syndrome.

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