

A Morphological Study of Suprascapular Notch in Population of Bihar.

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ABSTRACT

Background: Variation in the morphology of suprascapular notch is associated with suprascapular nerve entrapment neuropathy. So, the knowledge about different shapes of suprascapular notch is important for clinicians in understanding the source of the entrapment syndrome. The aim of this study is to document the incidence of morphological variations in shape of suprascapular notch in dry scapulae which belongs to population of Bihar & compare it with incidence among various races of world to know its clinical significance.

Methods: A total of 226 dry human scapulae of both sides are analyzed to see the variation in the shape of suprascapular notch on superior border of scapula. **Results:** In the present study, we found five different shapes of suprascapular notches. Out of 226 scapulae, 81 (35.84%) scapulae has Deep U Shaped, 72 (31.86%) scapulae has shallow U Shaped, 49 (21.68%) scapulae has J Shaped, 13 (5.75%) scapulae has V Shaped & 11 (4.87%) scapulae has indented suprascapular notch. Among these different types, Deep U shape is most common & Indented is least common type of shape of suprascapular notch. **Conclusion:** The knowledge about the different shapes of suprascapular notch and its involvement in suprascapular nerve entrapment neuropathy helps the clinician in early diagnosis and planning about the most suitable surgical intervention.

Keywords: Scapula, Suprascapular notch, suprascapular nerve entrapment, Superior transverse scapular ligament.

INTRODUCTION

The scapula which is also known as shoulder blade, is a triangular flat bone present on posterolateral aspect of thoracic wall, against the second to seventh ribs. It has two surfaces costal & dorsal. The concave dorsal surface divided into a smaller supraspinous fossa and larger infraspinous fossa. The convex costal surface has also a fossa named sub scapular fossa. It has three borders namely medial, lateral and superior which also forms three angles i.e. lateral, superior and inferior. Among the three borders, superior is thinnest and shortest.^[1] At its anterolateral end near the base of coracoid process, there is a deficient portion known as suprascapular notch. A foramen is formed after bridging of this notch by a strong fibrous band like structure namely suprascapular ligament or transverse scapular ligament. A branch from superior trunk of brachial plexus, the suprascapular nerve which passes through this foramen and gives motor branches to the supraspinatus & infraspinatus muscles & sensory branches to rotator cuff muscles, ligamentous structures around the

shoulder & acromio clavicular joints while the suprascapular vessels goes backward above this ligament. Sometimes this ligament becomes ossified.^[1] The different variations in the shape of suprascapular notch along with partial and complete ossification of suprascapular notch leads to nerve compression during movements of shoulder joint. The common site of compression of suprascapular nerve are at the suprascapular notch or at the spinoglenoid notch in nerve entrapment syndrome, a acquired neuropathy. This syndrome is characterized by vague pain on the posterolateral aspect of shoulder joint and atrophy of supraspinatus & infraspinatus muscles. Kopell and Thompson first of all describe this syndrome in 1959.^[2]

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They found abduction and adduction of shoulder joint exerted traction on suprascapular nerve, which leads to its compression against the transverse scapular ligament. This syndrome is commonly found in volleyball players, tennis player, weight lifter, dancer and athletes which requires extreme abduction and external rotation for overhead works. Variation in the shape of suprascapular notch is one of the cause of suprascapular nerve entrapment syndrome.^[3]

Aim: The aim of this study is to document the incidence of morphological variations in shape of suprascapular notch in dry scapulae among population of Bihar & compare it with incidence among various races of world to know its clinical significance.

MATERIALS AND METHODS

The present study has been carried out on 226 (Right-111, Left-115) dried human scapulae of unknown sex & age, which are obtained from Department of Anatomy & Department of Forensic Medicine & Toxicology of Indira Gandhi Institute of Medical Sciences, Patna Medical College, Nalanda Medical College & Katihar Medical College, Lord Buddha Koshi Medical College of Bihar state of India. Each scapula is observed carefully for different shapes of suprascapular notches on superior border of scapula. Representative photographs of different shapes of suprascapular notch are taken using a digital camera.

Exclusion criteria:

Scapula having marked deformities and damaged superior border.

RESULTS

In the present study, we found five different shapes of suprascapular notches. Out of 226 scapulae, 81 (35.84%) scapulae has Deep U Shaped [Figure 2], 72 (31.86%) scapulae has shallow U Shaped [Figure 3], 49 (21.68%) scapulae has J Shaped [Figure 4], 13 (5.75%) scapulae has V Shaped [Figure 5] & 11 (4.87%) scapulae has indented suprascapular notch [Figure 6]. Among these different types, Deep U shape is most common & Indented is least common type of shape of suprascapular notch. [Table: 1 & Figure: 1]

Table 1: Shapes of suprascapular notch with its incidences

Sr. No.	Shapes	Number	Percentage
1.	“Deep U” Shape	81	35.84%
2.	“Shallow U” Shape	72	31.86%
3.	“J” Shape	49	21.68%
4.	“V” Shape	13	5.75%
5.	Indented	11	4.87%
Total		226	100%

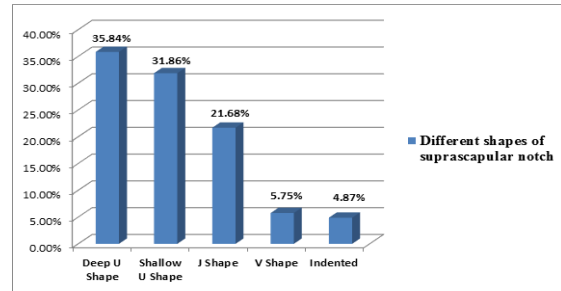


Figure 1: Distribution of different shapes of suprascapular notch.



Figure 2: Deep U shaped suprascapular notch.

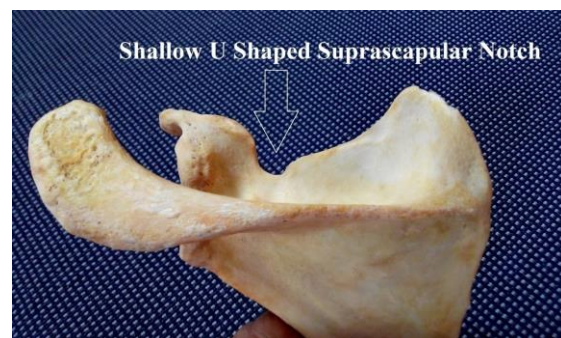


Figure 3: Shallow U shaped suprascapular notch.

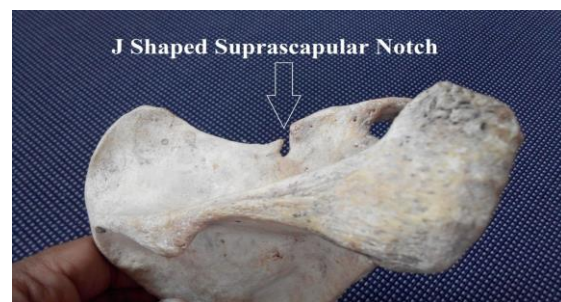


Figure 4: J shaped suprascapular notch.

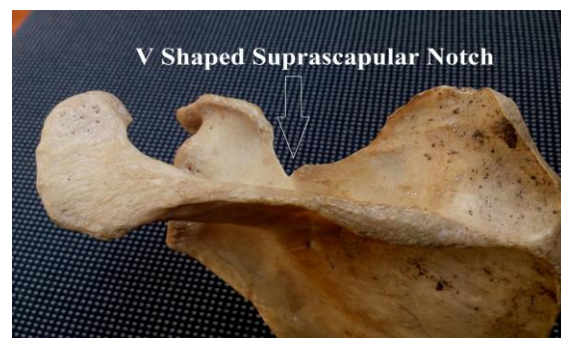


Figure 5: V shaped suprascapular notch.

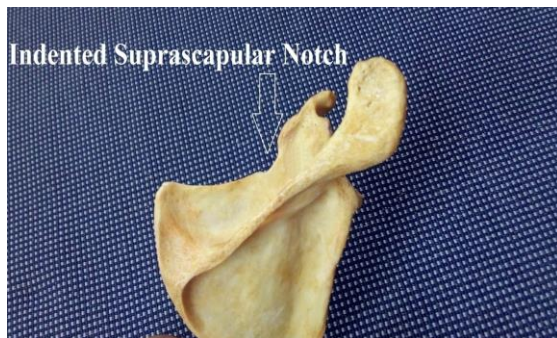


Figure 6: Indented suprascapular notch.

DISCUSSION

The suprascapular notch is a feature of superior border of every scapula. Several morphological variations and classifications of suprascapular notch have been studied in various populations of world. Rangachary et al.^[4-6] conducted a study on 211 American scapulae in 1979 and classified suprascapular notch into six different types (Type I – Type VI). This classification was done on the basis of following criteria's:-- (a) Depth of notch, (b) Width at superior border of notch & (c) Widest point within the notch. They explained that a small notch have greater chance of nerve impingement than a large one. Dunkelgrun et al found in his study that V shaped notches have lesser area than U shaped notches,^[7] so this is a causative factor for suprascapular nerve entrapment syndrome. Cummins et al also found that V shaped suprascapular notch was commonly associated with suprascapular nerve entrapment syndrome,^[8] but no direct correlation found between them clinically. Natsis et al studied on 423 scapulae & also divided the notches into five different types depending upon vertical & horizontal diameters.^[9] Type I – without a discrete notch, type II – a notch with the longest transverse diameter, type III – a notch with the longest vertical diameter, type IV – a bony foramen and type V – a notch and a foramen. Sinkeet et al studied on Kenyan population in 2010 & classified suprascapular notch into 6 different types which also includes degree of suprascapular ligament ossification. According to them,^[10] Type I represent wide 'U', Type II represents 'J' shape, Type III represents symmetrical, Type IV represents 'V' shape, Type V & VI are related to the degree of ossification of STSL. They found type III was the most common. In the present study, Deep U shape is most common & Indented is least common type of shape of suprascapular notch. Iqbal et al found only three different types of notch i.e. U, V & J in their study on Pakistani population in 2010.^[11] In their study, J shaped was most common type. Albino et al studied on 500 dried scapulae of Italian population in 2013 about relationship between suprascapular notch and postero superior limit of the safe zone for the

suprascapular nerve.^[12] They also classified the suprascapular notch according to Rengachary's method into six different types, in which Type IV was most common & Type VI was least common. Vashudha TK et al studied on 115 Indian dried scapulae about different shapes of suprascapular notch & degree of ossification of suprascapular ligament.^[13] They found eight different shapes of suprascapular notch i.e. symmetrical U shaped, shallow U shaped, J shape, wide notch, indented, hockey stick, deep U shape & grooved. Among them symmetrical U shape was most common & groove was least common. In the present study, Deep U shape is most common & Indented is least common among different shapes of suprascapular notch. Udayasree L et al also studied on 42 Indian dried scapulae about different shapes of suprascapular notch & degree of ossification of suprascapular ligament.^[14] They only found three different types SSN i.e. U, J & V shape in which U shape was most common & V shape was least common. They found absence of suprascapular notch in 11.9% cases, partial ossification of suprascapular ligament in 4.7% cases while complete ossification in 9.5% cases. In our previous study, we found absence of suprascapular notch in 15.46% cases among 220 dried scapulae. Absent suprascapular notch was more common in left side.^[15] While in our another study we found 12.5% scapulae with completely ossified STSL & 21.87% scapulae with partially ossified STSL among 224 scapulae. The completely and partially ossified STSL both were more common in right side as compared to left side.^[16] Vandana R et al studied on 134 Indian dried scapulae and classified the SSN into six different types i.e. U, J, V, W, Indentation and absent SSN.^[17] Among all U shaped SSN was most common & W shaped was least common. They also found 12.6% scapulae with completely ossified STSL & 3% scapulae with partially ossified STSL. Patel P et al studied on 80 Indian dried scapulae and found only three different types of SSN i.e. U, J & V shaped,^[18] in which U shaped was most common & V shaped was least common. Kannan U et al classified the suprascapular notch according to Rengachary's method into six different types,^[19] in which Type III was most common & Type V was least common. There is direct correlation between length of scapula and depth of suprascapular notch & inverse correlation in between length ratio/width of body of scapula and depth of suprascapular notch.^[20] In 3.1% population, Polguy M found bifid superior transverse scapular ligament, while in 3% population,^[21] Ticker JB et al found trifid superior transverse scapular ligament.^[22] Bayramoglu et al explained five different types of superior transverse scapular ligament.^[23] The first one is fan shaped, which is the most common type, the second type has an additional anterior coracoscapular ligament.

The third type has two parts i.e. anterior & posterior and in fourth type the ligament is calcified, which is least common type. In open surgical procedure, Warner et al & De Mulder et al found that the distance between margin of the glenoid cavity and suprascapular notch was very critical and it needed dissection of the posterior shoulder joint.^[24,25] A safe zone was explained by them to avoid damage to the suprascapular nerve during the surgeries around this area.^[26] These distances were 1.4 cm from posterior border of glenoid just at the base of spine of scapula & 2.3 cm from glenoid just at the upper rim of glenoid.

Therefore, the surgeons aware about this safe zone during surgical procedures at shoulder joint, to avoid damage of the nerve. The motor supply of supra & infraspinatus muscles comes from suprascapular nerve, but this nerve does not supply the adjoining skin. So, any irritations in the nerve fibers causes deep pain, which is not well localized. When the patient comes to a clinician with his complains, the muscles atrophy had started.^[2] For early & correct diagnosis, every clinician must have detail anatomical knowledge about the course of suprascapular nerve & all possible sites of its compression.

Table 2: Comparison of incidence of different shapes of suprascapular notch studied by different authors.

Sl NO	Shape of SSN	Rengachary et al. ^[4,5,6] (1979)	Natsis et al. ^[9] (2007)	Sinkeet et al. ^[10] (2010)	Iqbal et al. ^[11] (2010)	Albino et al. ^[12] (2013)	Vasudha TK. ^[13] (2013)	Udayasree L et al. ^[14] (2014)	Present study (2014)
1.	Deep U Shape	48%	40%	29%	13.2%	22.8%	34.78%	47.6%	35.84%
2.	Shallow U Shape	31%	24%	21%	-	19.8%	6.08%	-	31.86%
3.	J Shape	-	-	-	22%	-	19.13%	21.4%	21.68%
4.	V Shape	3%	13%	5%	20%	31.1%	-	4.7%	5.75%
5.	Indented	-	-	-	26.8%	-	7.82%	-	4.87%

SSN: Suprascapular Notch, STSL: Superior transverse scapular ligament.

CONCLUSION

Since the suprascapular notch is the common site of nerve entrapment, the knowledge about morphometric variation of suprascapular notch along with the knowledge of complete or partial ossification of superior transverse scapular ligament is essential for clinician in making a proper diagnosis and for planning the most suitable surgical intervention.

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