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A morphological study of suprascapular notch on adult dry scapulae of Udaipur region

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Abstract:
Background*: Suprascapular entrapment neuropathy can occur due to compression of suprascapular nerve at suprascapular notch or spinoglenoid notch, suprascapular notch being more frequently involved. Knowledge of anatomical variations in shapes of suprascapular notch is crucial for clinicians for an early diagnosis and management of such neuropathies.*
Materials and Methods*: Present study was done to find out various shapes of suprascapular notch on 118 scapulae collected from the department of anatomy R.N.T. Medical College, Udaipur (Rajasthan).*
Results*: Based on Rengachery et al classification, type I suprascapular notch or absence of notch was the most prevalent (30%) type of notch, followed by type II suprascapular notch (21%) in our study.*
Conclusion: *Suprascapular nerve entrapment is an infrequent lesion but an undiagnosed lesion can proceed to atrophy of supraspinatus and infraspinatus muscle.*
Key Word*: Suprascapular notch, Entrapment neuropathy*

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I. Introduction

Suprascapular notch is present on the lateral end of superior sharp border of scapula. This notch is bridged by superior transverse or suprascapular ligament, attached medially to notch and laterally to root of coracoid process. Suprascapular nerve, a branch from the upper trunk of brachial plexus (C5 & C6), enters the supraspinous fossa through suprascapular notch inferior to superior transverse scapular ligament. It supplies supraspinatus muscle here and then curves around lateral border of spine of scapula through spinoglenoid notch and supplies infraspinatus muscle. It also gives articular branches to the shoulder and acromioclavicular joint. Some-times the suprascapular ligament may be ossified, converting the suprascapular notch into a foramen. Foramen will transmit suprascapular nerve while suprascapular vessels pass backwards above the ligament[1].

Compression of suprascapular nerve may occur at suprascapular notch or spinoglenoid notch. A small notch[2], complete absence of suprascapular notch[3] or an ossified transverse scapular ligament[4] increases the risk of compression, leading to suprascapular entrapment neuropathy. Such neuropathies present with nonspecific pain and may progress to atrophy of supraspinatus and infraspinatus muscle, if remain undiagnosed.

Knowledge of anatomical variations in shapes of suprascapular notch is crucial for clinicians for an early diagnosis and management of such neuropathies. Present study was done to find out various shapes of suprascapular notch prevailing in our region.

II. Material And Methods

Present study was done on 118 scapulae collected from the department of anatomy R.N.T. Medical College, Udaipur (Rajasthan). Scapulae were of unknown age and sex. Eleven scapulae with broken or deformed superior border were excluded from the study. 52 intact scapulae were of right and 55 of left side. All the scapulae were numbered and marked R for right and L for left. The study was conducted for a period of six months from May 2020 to October 2020. Shape of suprascapular notch on each scapula was carefully noted and photographed and classified according to Rengachary et al (1979)[2] classification as follows-

Type I-Complete absence of notch or wide depression of the entire superior border of scapula.
Type II- Blunted V-shaped notch occupying the middle one third of the superior border of scapula.
Type III- U-shaped notch in the superior border of scapula with symmetrical, parallel lateral borders.
Type IV- Small V shaped groove in the superior border of scapula.
Type V- U shaped notch with partial ossification of medial part of suprascapular ligament.
Type VI-Complete ossified ligament with bony foramen of variable size.

III. Result

Total intact scapulae included in the study-107 (11 scapulae with damaged upper border were excluded from the study)
52 were from right side and 55 were of left side.
Types of suprascapular notch are shown in table below.

	RIGHT	LEFT	TOTAL	
TYPE I **(Fig-1)**	14	18	32	30% (Absence of suprascapular notch)
TYPE II **(Fig-1I)**	10	13	23	21% (Blunted V shaped notch)
TYPE III **(Fig-1II)**	8	10	18	17% (U shaped notch)
TYPE IV (**Fig-1V)**	7	4	11	10% (Small V shaped notch)
TYPE V **(Fig-V)**	12	7	19	18% (U shaped notch with partial ossification of suprascapular ligament)
TYPE VI(**Fig-VI)**	1	3	4	4% (Complete ossification of suprascapular ligament)
TOTAL	52	55	107	

In the present study type I suprascapular notch or absent suprascapular notch was the most prevalent type, while complete ossification of suprascapular ligament converting the suprascapular notch into a foramen was the least prevalent type. Type II notch was the next commonest type of suprascapular notch.

IV. Discussion

Shape of suprascapular notch has been studied by various authors and a lot of variations in shapes of suprascapular notch have been observed. More-over various authors have followed either classification by Natsis et al[5] or Rengachery et al[2] In the classification by Natsis et al[5] five types of SSN are there:
Type I-without a discrete notch
Type II-a notch that was longest in its transverse diameter
Type III-a notch that was longest in its vertical diameter
Type IV-a bony foramen
Type V-a notch and a bony foramen

We have followed Rengachery et al[2] classification and have observed that, type I suprascapular notch or absence of notch, to be the most prevalent type (30%) followed by type II notch (21%).

Chaitra BR et al[6] and Saha et al[7] have also followed Rengachery et al[2] classification. Chaitra BR et al[6] in a study on 120 scapulae have observed that type II (33%) suprascapular notch was the most prevalent type (V shaped notch) followed by type I (22%) While the study on 290 adult scapulae by Saha et al[7] type III (U shaped notch) was the most prevalent (41.7%) type of suprascapular notch followed by type1 (24.82%) and no type V notch was observed. Mayuri and Sagar[8] in their study on 60 adult scapulae have observed that type III or U-shaped notch to be the commonest type and absence of notch in 10% of scapulae.

In the studies on 250 scapulae by Rajoria S. et al[9], 120 scapulae by Gupta S. et al[10], and 268 scapulae by Kumar et al[11], all have observed that type II (transverse diameter > vertical diameter as per Natsis[3] et al classification) suprascapular notch was the most prevalent type of notch and Rajoria S.[9] et al have also observed that scapulae with type I (without a discrete notch) notch as the least prevalent type (2%). Incidence of absence of notch in the studies by Gupta et al[10] and Kumar et al[11] is 16% and 32.46% respectively.

While in a similar study by Wang et al[12] on 295 scapulae though type II or U-shaped notch was the commonest (58%) but absence of notch was observed in about 28% of scapulae.

In our study incidence of absence of notch (type I) was observed in about 30% of scapulae which is similar to study by Kumar et al[11] & Wang et al[12]

A complete absence of suprascapular notch[3], a small suprascapular notch[2] or an ossified transverse scapular ligament [4]are the risk factors for suprascapular nerve compression. In a MDCT (Multidetector computer tomography) study on 311 patients by Polguj M et al suprascapular nerve is more likely to get injured in a deep and narrow suprascapular notch, due to the sharp bony walls.[13]

Compression of suprascapular nerve can occur at suprascapular notch or spinoglenoid notch, suprascapular notch being more frequently involved, leading to suprascapular entrapment neuropathy. Kopell & Thompson[14] were first to describe such neuropathy as a cause of shoulder pain & weakness. Suprascapular nerve entrapment must be considered in patients of unexplained shoulder pain especially in those persons are involved in overhead activities[15], as suprascapular nerve entrapment has been observed in volleyball players in the dominant arm to the extent of 33% by Holzgraefe M et al.[16]

A late diagnosis of suprascapular nerve entrapment can lead to atrophy of both supraspinatus and infraspinatus muscle in a proximal nerve compression, but an isolated infraspinatus lesion is suggestive of involvement at the spino-glenoid notch.[17]

Diagnosis of suprascapular nerve entrapment by physical examination is difficult, but also needs a specific radiological view or Stryker notch view for suprascapular and spinoglenoid notch evaluation.[18] An arthroscopic release of suprascapular nerve can give relief to the patients of suprascapular entrapment neuropathy.[19]

Knowledge of such variations is essential for clinicians dealing with pain in the shoulder region and an early diagnosis can prevent subsequent muscle atrophy and weakness of shoulder.

V. Conclusion

Suprascapular nerve entrapment is an infrequent lesion but an undiagnosed lesion can proceed to atrophy of supraspinatus and infraspinatus muscle. A timely diagnosis and an arthroscopic surgery can provide relief and prevent complications in such patients.

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Figure 1: Type I Suprascapular Notch

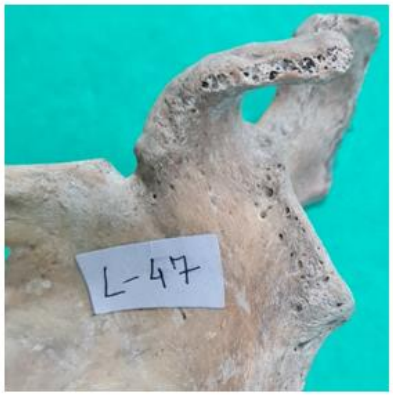

Figure 2: Type II Suprascapular Notch

Figure 3: Type III Suprascapular Notch

Figure 4: Type IV Suprascapular Notch

Figure 5: Type V Suprascapular Notch

Figure 6: Type VI Suprascapular Notch

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