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Original Research Article

MORPHOLOGICAL AND MORPHOMETRIC STUDY OF SUPRA SCAPULAR NOTCH AND INCIDENCE OF OSSIFIED SUPERIOR TRANSVERSE SCAPULAR LIGAMENT IN HUMAN DRY SCAPULAE AND ITS CLINICAL IMPLICATION

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ABSTRACT

Background: The supra scapular notch is the common site of supra scapular nerve entrapment causing supra scapular neuropathy. The supra scapular notch present in the superior border of the scapula is roofed by the Superior Transverse Scapular Ligament (STSL) which ossified in some scapulae and form supra scapular foramen.

Aim and objective: In present study we analyze, Morphological and Morphometric variations of supra scapular notch and ossified superior transverse scapular ligament in human dry scapulae.

Materials and Methods: In present study, we studied 136 dry human scapulae of unknown sex. We noted incidence of ossified superior transverse scapular ligament and Morphometric parameters analyzed.

Result: In present study we found 10 scapulae with complete ossified suprascapular ligament and 6 scapulae with partial ossified suprascapular ligament out of 136 dry human scapulae.

Conclusion: Ossified superior transverse scapular ligament is known factor for supra scapular nerve entrapment neuropathy so knowledge of incidence of STSL and anatomy of supra scapular region very useful for clinician, surgeons and orthopaedicians.

KEY WORDS: Supra Scapular Notch, Supra Scapular Nerve, Supra Scapular Neuropathy, Transverse Scapular Ligament.

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INTRODUCTION

The suprascapular notch is a depression or notch on the lateral part of the superior border of the scapula, medial to the coracoid process. This

structure is bridged by the superior transverse scapular ligament, which is sometimes ossified and the foramen which is thus completed, transmits the suprascapular nerve to the supraspinatus fossa [1].

The Suprascapular Nerve passes under the ligament and suprascapular vessels pass above the ligament. The Suprascapular Nerve gives motor nerve supply to the supraspinatus and infraspinatus muscles sensory nerve supply to the rotator cuff muscles and also supply the shoulder and acromioclavicular joint.

The suprascapular notch is frequently bridged by bone rather than a ligament, converting it into a bony foramen in some animals [2]. But in human, the STSL is sometimes ossified [1, 3].

The size and shape of suprascapular notch may be a factor in suprascapular nerve entrapment neuropathy because narrow notch has been found in patient with this neuropathy [4, 5].

The suprascapular notch is one of the potential site for compression of the nerve. Other causes associated with Suprascapular Nerve neuropathy include direct trauma, rotator cuff tear, ganglion cysts causing compression, sports injury due to repeated traction, variation of the SN morphology[6].

The presence of an ossified STSL may also pose a challenge during decompression of the suprascapular notch if the condition is not fully appreciated [7].

MATERIALS AND METHODS

In present study, we studied 136 dry human scapulae of unknown sex. This study carried out in Department of Anatomy of Pacific Medical College and Hospital and Pacific Institute of Medical Science Udaipur (Rajasthan). In this study damaged scapulae are excluded. We noted incidence of ossified superior transverse scapular ligament and following Morphometric parameters analyzed by digital Vernier caliper.

1. Vertical diameter of foramen
2. Transverse diameter of foramen
3. Area of supra scapular foramen
4. Superior maximal length of STSL
5. Inferior maximal length of STSL

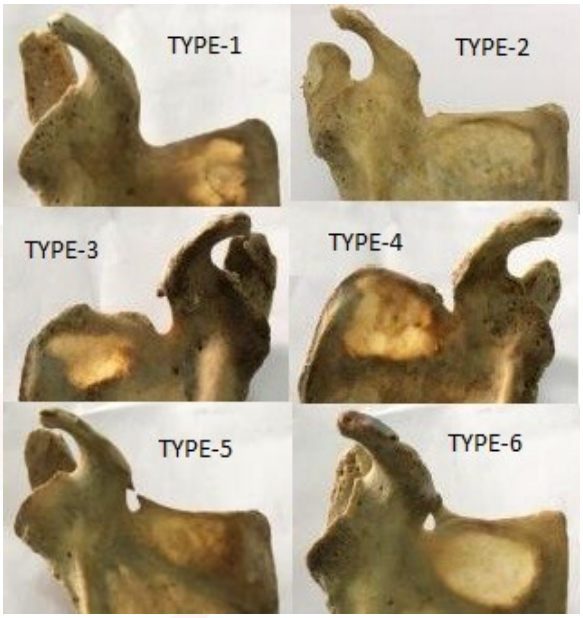
Area is count by area=π ×D1×D2/2

D1=Vertical diameter of suprascapular foramen

D2= Transverse diameter of suprascapular foramen

Also we classified suprascapular notch according Rengachary et al., Type I –complete absence of notch. Type II -wide blunted V shaped notch. Type III -symmetrical and U shaped notch with parallel lateral margins. Type IV -small V shaped notch. Type V- partial ossification. Type VI -complete ossified ligament

Fig. 1: Showing the different types of supra scapular notch.



RESULTS

In our study we used 136 dry human scapulae and measure various parameter, we found various types of suprascapular notch and shape of it noted in tables. We found 8% scapulae with complete suprascapular foramen and 5 % partial ossified suprascapular ligament. Other

Table 1: Showing the types of supra scapular foramen and its incidence.

	Type-1	Type-2	Type -3	Type-4	Type -5	Type -6
Number of scapulae	48	14	55	3	6	10
Percentage	35	10	40	2	5	8

Table 2: Morphometric Parameter of Supra Scapular Foramen and Superior Transverse Scapular ligament.

Parameters	Lt (mm)	Lt (mm)	Lt (mm)	Lt (mm)	Rt (mm)	Rt (mm)	Rt (mm)	Rt (mm)	Rt (mm)	Rt (mm)
Vertical diameter of foramen	8.2	7.8	9.6	8.8	6.8	14.2	7.1	8.2	10.2	9.6
Transverse diameter of foramen	7.1	4.62	5.1	4.3	4.1	7.39	5.4	6.5	8.3	6.4
Area of supra scapular foramen	46.2	57.1	38.8	29.7	21.8	82.4	30.4	83.9	132.9	48.6
Superior maximal length of STSL	10.2	9.1	9.3	8.9	8.9	11.72	9.6	11.2	10.1	9.6
Inferior maximal length of STSL	8.4	6.9	6.7	6.5	5.9	10.2	7.1	8.2	9.8	9.5

Table 3: Various study showing frequency of types of Suprascapular notch.

Study	Population	Type I (%)	Type II (%)	Type III (%)	Type IV (%)	Type V (%)	Type VI (%)
Paolo Albino et al 2013 [8]	Italian	12.4	19.8	22.8	31.1	10.2	3.6
Sinkeet et al. 2010 [9]	kenya	22	21	29	5	18	4
Khan, M. A. 2006 [2]	Indian	20	10	52	4	4	10
Rengachary et al., 1979 [5]	American	8	31	48	3	6	4
Sangam MR, et al 2013 [16]	Indian	21.15	8.65	59.61	2.88	5.76	1.93
Present study	Indian	35	10	40	2	5	8

DISCUSSION

In our study, we found the ossification of the STSL which convert notch in suprascapular foramen in 10 scapulae(8%) and partial foramen seen in 6 scapulae [5]. According to Paolo Albino et al,In Italian population complete foramen seen in 3.6 % of scapulae, same as in Kenyan population according to Sinkeet et al is 4%[9].

The suprascapular nerve entrapment may be due to traumatic or non-traumatic causes. The suprascapular nerve is commonly found to compress mainly at two sites, at the level of the suprascapular notch and the base of the scapular spine[10].

Compression and entrapment of the suprascaspular nerve at the suprascapular notch was first suggested by Kopell and Thompson and they also suggest Irritation of the SN gives rise to pain which is deep and poorly localized and because of this the cause of the pain and tenderness is difficult to discover in any individual and the muscle atrophy starts [11], According to ticker at al the shape of the suprascapular notch or the ossification of the STSL to predispose to suprascapular nerve entrapment.

Micha Polguj at al suggested that the mean area of the suprascapular foramen in the specimens with anossified band-shaped STSL is significantly smaller than in those with a fan-shaped STSL. Therefore, he confirm that band-shaped type of ossified STSL forms less space for the passage of the suprascapular nerve. Such an observation may explain why there is no increase in suprascapular nerve entrapment, even when the frequency of ossified STSL is very high, for example, 30.76% in the Brazilian population[12] According to Soni, G etal ,excessive movement of the shoulder exerts traction on the suprascapular nerve which leads to its compression-against the superior transverse scapular ligament[13]. Sandow & Ilic describe that specific volleyball movements and their implications at suprascapular nerve compression. The characteristically gestures e.g. of volleyball players as abduction associate lateral (external) rotation are factors that predispose the neuropraxis[14].

Gosk et al. state that peripheral nerves are highly susceptible to injury from stretching and compression. Both of these mechanisms result in nerve ischemia, edema, micro environmental changes, and conduction impairment [15].

Rengachary et al. first proposed an etiopathogenesis of suprascapular nerve entrapment known as the sling effect. It assumes that during maximum arm motioncause the irritates of nerve and induces microtrauma that can result in suprascapular[5]. Neuropathy, Most of studies showing incidence of suparascapular foramen but in our study we studied morphometric analysis of suprascapular notch and its suprascapular foramen knowledge is very important for decompression of suprascapular nerve.

Incidence of suprascapular foramen and STSL in other study are shown in table 3.

CONCLUSION

Ossified superior transverse scapular ligament is known factor for supra scapular nerve entrapment neuropathy so knowledge of incidence of STSL and anatomy of supra scapular region very useful for clinician, Surgeons and Orthopaedicians for diagnosis and treatment.

ABBREVIATIONS

STSL - Superior Transverse Scapular Ligament

Conflicts of Interests: None

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