Section: Anatomy

Original Research Article

MORPHOMETRIC STUDY OF SUPRASCAPULAR NOTCH IN SOUTH INDIAN POPULATION

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Abstract

Background: Along the superior border of scapula, in the medial end lies the Suprascapular notch. Variations in the morphology of suprascapular notch is identified. The transverse scapular ligament sometimes converts the suprascapular notch into foramen. The suprascapular variations may affect suprascapular nerve and cause nerve entrapment syndrome. **Aim**: The aim of the study is to find the variations in the suprascapular notch morphology and its clinical importance. **Material & Methods:** This study was conducted in 80 dried human scapulae selected from the stock of bones in the Institute of Anatomy, Madras Medical College, Chennai. The dried scapula were randomly selected. Age and sex of the scapulae were not known. The shape and the presence and absence of the notch were observed. The morphometric parameters are measured by the digital vernier calipers and the accuracy is converted to 0.1 mm. The parameters like Transverse Diameter, Vertical Diameter and Distance from base of the suprascapular notch to the rim of glenoid cavity were measured. The data collected was entered in the MS Excel and statistical analysis done through SPSS 23. **Results:** In our study, Type I observed in 8 (10%) Type II in 13(16%), Type III in 32(40%), Type IV in 17(21%), Type V in 7(9%) and Type VI in (3(4%) of the study participants. The most common was Type III. The mean vertical diameter was 6.33 and that of transverse diameter was 9.71. **Conclusion:** The study of morphometric parameters of the suprascapular notch is very important clinically as it helps surgeons to decide the surgical techniques keeping in mind the variations found among the Indian Population.

INTRODUCTION

The triangular flat bone, Scapula (shoulder blade) lies on the posterolateral aspect of the thorax, overlying the 2nd to 7th ribs. It has two surfaces, dorsal and costal surfaces. It has three borders ie superior, lateral and medial borders. It also has three angles superior, inferior and lateral angles. It also has three processes. Among the three borders the superior border is the shortest and thinnest border. It is marked by suprascapular notch, near the junction of medial two thirds and lateral third. Suprascapular notch is found at the base of the corocoid process where the superior border joins.[1]

This notch is converted into a foramen by a ligament called transverse scapular ligament. Below this ligament runs the suprascapular nerve and vein through the notch. Whereas the suprascapular artery passes above the ligament. The suprascapular nerve originates from the upper trunk of the brachial plexus. Under the Trapezius it runs posteriorly through the suprascapular notch of the scapula to enter the supraspinous fossa. The nerve first supplies the supraspinatous muscle which is a shoulder abductor and then deep sensory fibres of the glenoacromial, acromioclavicular joints and corocoacromial ligaments. After supplying all these it enters the infraspinatous fossa where it supplies the infraspinatous muscle motor fibres.

Generally the suprascapular nerve gets compressed often in the suprascapular notch and results in "Suprascapular nerve entrapment syndrome". In 1956 it was Kopell and Thompson who described this pathology.[2]

The patients who suffers from the Suprascapular nerve entrapment syndrome will have pain in the lateral and posterior aspects of the shoulder. On deep palpation over the suprascapular notch tenderness is elicited.[3] As supraspinatus and infraspinatus muscles gets affected relative weakness is observed

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on shoulder abduction and external rotation.[4] The size of the notch plays major role in the predisposition of the entrapment.[5,6] If the size of the notch is smaller, then the chance of nerve entrapment is greater.

Suprascapular neuropathy incidence is 7%-10%. The incidence mostly reported in athletic population ranging from 12-33%, among them volleyball players are the most common population.[6] Knowing the anatomical variations in detail along the course of suprascapular nerve is important for a better understanding of the location and to find the entrapment syndrome source. The aim of the study is to find the variations in the suprascapular notch morphology and its clinical importance.

MATERIALS AND METHODS

This study was conducted in 80 dried human scapulae selected from the stock of bones in the Institute of Anatomy, Madras Medical College, Chennai. The dried scapula were randomly selected. The age and sex of the scapulae were not known.

The Ethical clearance was obtained from the Institutional ethical committee. The obtained data was entered in the MS Excel Windows 10. Statistical analysis was done with the help of SPSS 23. Categorical data was expressed in terms of Numbers and percentages. The shape and the presence and absence of the notch were observed. The morphometric parameters are measured by the digital vernier calipers and the accuracy is converted to 0.1 mm. The parameters

1.Transverse Diameter (TD)

The Maximum horizontal distance between the corners of the notch on the superior border of scapula.

2.Vertical Diameter (VD)

The Maximum vertical distance between the deepest point of the notch to the midpoint on the imaginary plane between the superior corners of the notch.

3.Distance from the base of the suprascapular notch to the rim of the glenoid cavity.

RESULTS

Table 1: Distribution of various shapes of suprascapular notch based on Rengachary classification[8]

S.No	Shape of notch	Number (N) /Percentage (%)
1	Type I	8(10%)
2	Type II	13(16%)
3	Type III	32(40%)
4	Type IV	17(21%)
5	Type V	7(9%)
6	Type VI	3(4%)

In our study , based on Rengachary et al study Type I observed in 8(10%),Type II in 13(16%),Type III in 32(40%),Type IV in 17(21%) ,Type V in 7(9%) and Type VI in (3(4%) of the study participants.

Table 2: Suprascapular notch Morphometric measurements

Parameter	Mean (mm)
Vertical Diameter	6.33
Transverse Diameter	9.71
Distance from base of suprascapular notch to superior rim of glenoid	32.29

In our study the transverse diameter measurement was found to be more than vertical diameter among >70% of the study participants. Whereas in 8% of the study participants the vertical diameter is more than transverse diameter.

Table 2: Distribution of various types of suprascapular notches in different populations.

Type	Rengachary et al	Natis et al	Muralidhar et al(16)	Sinkeet et al[17]	M Venkata Raga et al[18]	Usha Kannan et al[20]	Present study
I	6%	8%	21.5%	22%	10%	20%	10%
II	24%	31%	8.65%	21%	16.6%	10%	16%
III	40%	48%	59.61%	29%	40%	52%	40%
IV	13%	3%	2.88%	5%	21.67%	4%	21%
V	11%	6%	5.76%	18%	3.33%	4%	9%
VI	6%	4%	1.93%	4%	8.33%	10%	4%

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Image 1 Showing various types of notches

Type 1-No Notch

Type 2-Wide Blunt V shaped

Type 3: Symmetrically U shaped

Type 4: Small V shaped

Type 5- U shaped with medial part of ligament ossified

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Type 6-Ligament completely ossified

DISCUSSION

A review on the existing literature reveals the number of methods used to classify suprascapular notches in different studies. Many authors have classifed the notches based on their shapes.[9,10,11,12] They have classifications which lacks qualitative and specific geometric parameters. Three parameters were used by Polguj et al[13] to measure the suprascapular notch. Natis et al[14] classification was the simpler and easy to understand as they have few parameters and quantitative. The morphological variations of the transverse scapular ligament will not alter Natis et al typing method. It is also easily identified by the radiographs. Iqbal et al also studied among the Islamic population and classified the notches into three types U,V and J[15] Rengachary et al did a study among the American Population and classified the scapular notches into six types.

In our study Type I observed in 8(10%),Type II in 13(16%),Type III in 32(40%),Type IV in 17(21%), Type V in 7(9%) and Type VI in 3(4%) of the study participants. Type III was most common type in our study followed by Type IV and Type II. Similar results was also seen in previous studies one by Rengachary SS et al (1979), Sinkeet SR et al (2010), S. Muralidhar et al (2013) and Usha Kannan et al (2014). This was in contrast to Paolo Albino et al[18] study where he examined five hundred dry human scapula and recorded type VI as the most common notch (31.1%).In our study type VI is the second most common class constituting 21%.

In our study the frequency of Type I was less in our study 10% compared to Muralidhar et al[16], Sinkeet et al (17%) and Usha Kannan et al (20%). The study done by Rengachary et al suggested that suprascapular notch absence plays important role in the suprascapular nerve compression. People with narrow suprascapular notch were also prone to develop suprascapular nerve entrapment syndrome. This means that people with Type III suprascapular notches are at higher risk of developing this pathology.

Th limitations in our study was as we conducted on the dry bone available in the museum we lack in data related to age and sex. We also lack data on their medical history, signs and symptoms of suprascapular nerve entrapment.

CONCLUSION

The study concludes that suprascapular notch anatomical location is important for the suprascapular nerve injury. The various types and presence of foramen is important for the clinician for their diagnosis and treatment of suprascapular neuropathies and suprascapular nerve decompression. As the shape of the notch alters the distance between it and supraglenoid tubercle which is important for the determination of the safe zone which helps in minimizing the risk of iatrogenic injury to the suprascapular nerve during arthropscopic procedures and other procedures requiring dissection of the posterior glenoid neck.

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