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The Suprascapular Notch: Its Various Shapes In Indian Dry Scapulae

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ABSTRACT

Variations in shape of suprascapular notch have clinical importance because it is one of the potential sites of compression of the suprascapular nerve. Suprascapular nerve neuropathy is a big problem in individuals who have been involved in violent overhead activities. Also, injury to the nerve may result in significant rotator cuff dysfunction. The aim of the present study was to classify the shapes of suprascapular notch by gross examination. Three hundred and ninety two dried scapulae were studied to see various shape of suprascapular notch. We classified all notches into six varieties by gross examination. We observed Type I (without discrete notch) in 7.65 % scapulae; Type II (‘U’) notches in 39.79%; Type III (‘J’) in 20.66%; Type IV (‘V’) in 19.38%; Type V (‘C’) in 7.65%, and Type VI (partially ossified superior teraservers scapular ligament) in 4.84 %. This simple method of classification of suprascapular notch by gross examination will be helpful to clinician and will be able to define easily and quickly the notch type on plain radiograph and even during surgery and perhaps is able to correlate suprascapular nerve entrapment with a specific type of suprascapular notch.

Key words: Suprascapular notch, scapula, variation, suprascapular nerve.

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INTRODUCTION

The suprascapular nerve (SN) is mixed motor and sensory peripheral nerve [3]. It passes through suprascapular notch (SSN) which lies on the lateral part of superior margin of the scapula, medial to the base of the coracoid process. It is bridged by superior transverse scapular ligament (STSL) converting notch into suprascapular foramen [17]. SN supplies motor branches to the supraspinatus, infraspinatus and sensory branches to the coracoacromial and coracohumeral ligaments, subacromial bursa and acromioclavicular and glenohumeral joints [3, 9]. Suprascapular nerve entrapment syndrome (SNES) at the site of SSN was first described by Kopell and Thompson in 1959. Also, they reported that shoulder movements that involve either abduction or horizontal adduction of the shoulder exerted traction on the suprascapular nerve, which led to its compression against the superior transverse scapular ligament. [7]

Number of studies has been carried out to identify various factors which cause Suprascapular Nerve Entrapment Syndrome (SNES). These include injury to SN due to direct trauma, rotator cuff tear, anterior shoulder dislocation or space occupying lesions such as tumors, ganglion cyst which is the most common, and crutch use [5, 14]. In addition, repetitive overhead activities and forceful rotational movements performed during sports activities especially volleyball, badminton and baseball players and weight lifting may produce traction or stretching at SSN [8]. The anatomical variation of the SSN is recognized as one of the risk factor for the SNES which includes variation in shape of notch, partially or completely ossified, calcified, bifurcated or trifurcated Superior Transverse Scapular Ligament (STSL) or passage of suprascapular artery through the SSN [5, 6, 15, 18].

Bayramoglu et al. (2003) observed, close relationship of subscapularis muscle with the suprascapular nerve as a possible risk factor for SNES [2]. It is interesting know that, recently, Economides et al. (2010) reported a case in which the SNES occurred because of improper post-operative patient mobilization [4].

Various workers classified SSN in different population by using parameters such as vertical length of the notch, transverse diameter of the notch and recently Natsis et al. proposed a new method of classification by using specific geometric parameters [10, 15]. All these methods required complex geometrical measurements and calculations and are time consuming. But Iqbal et al. provided an easiest method for classification of SSNs which is based on its shape by gross examination in Pakistani population [6]. However, the detailed studies on different types of SSN in Indian population are scared. Considering all these facts, present study was carried out to see variations in shape of SSN by gross examination in dry scapula on the basis of classification given by Iqubal et al. [6].

MATERIALS AND METHODS

Three hundred and ninety two (Right- 187; Left- 205) scapulas were studied for present work. We excluded those scapula in which superior border was broken. Also, scapulae in which STSL was fully ossified were excluded because in these scapulae notch is converted into foramen. Each scapula was examined carefully for different shapes of SCN. We noted the scapulae with absence of notch and partial ossification of STSL. We classified different types of shapes of SCN by gross examination.

RESULTS

By gross examination we classified 392 scapulae into six different types as given in Table I. Type II: 'U' shaped and Type III: 'J' shaped suprascapular notches were subdivided into two types according to their base.

Table I: Showing the classification and percentage of different shapes of suprascapular notch.

Classification	N=392	Percentage
Type I: Without discrete notch (Fig.1)	**30**	**7.65**
Type II: 'U' shaped: a) With narrow base (Fig.2) b) With wider base (Fig.3)	**55** **101** **T=156**	**14.03** **25.76**
Type III: 'J' shaped: a) With narrow base (Fig.4) b) With wider base (Fig.5)	**32** **49** **T=81**	**08.16** **12.50**
Type IV: 'V' shaped (Fig.6)	**76**	**19.38**
Type V: 'C' shaped (Fig.7)	**30**	**07.65**
Type VI : Partially ossified superior teraservers scapular ligament (Fig.8)	**19**	**04.84**

Fig.1 Type I: without a discrete suprascapular notch

Fig.2 Type II a: U shaped SSN- with narrow base

Fig.3 Type II b: U shaped SSN- with wider base

Fig.4 Type III a: J shaped SSN- with narrow base

Fig.5 Type III b: J shaped SSN- with wider base

Fig.6 Type IV- V shaped SSN

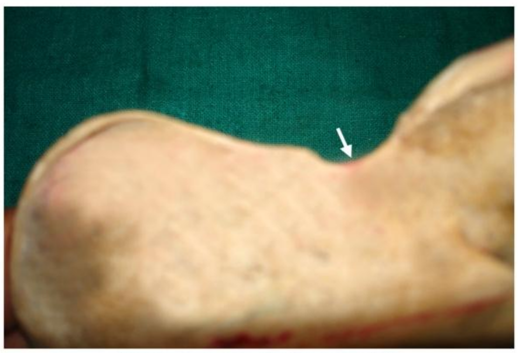

Fig.7 Type V- C shaped SSN

Fig.8 Type VI- Partial ossification of the STSL

DISCUSSION

Several morphological variations and classification of SSN have been reported by many researchers in different populations [16]. Rengachary et al. (1979) [14] did extensive anatomical and clinical study of SSN and classified it into six types based on the inferior shape of the notch as well as the degree of ossification of STSL [14]. They developed mathematical formula which makes confusion when transition between these types is being found. Also, it is difficult and time consuming to calculate that formula [14]. Ticker et al. (1998) classified SSNs into two types and evaluated the degree of ossification of the STSL separately [16]. Natsis et al. used two geometrical criteria for classification of SSNs and it seems to be simple [10].

Iqbal et al. provided an easiest method for classification of SSNs which is based on its shape by gross examination and reported three types (U, V, J) in Pakistani population [6]. We carried out our work in the same way as it done by Iquabal et al. [6] but we noted six different types (Table I) which may be because of difference in population groups and sample size. The results of the present study reported the ‘U’ shaped (39.79%) notch as most common (Fig.2, 3), Sinkeet et al. [15] in Kenyan population (29%) also reported same but there is difference in percentage. Iqubal et al. in Pakistani population reported the ‘J’ shaped notch the commonest (22%), ‘V’ shaped in 20% and ‘U’ shaped in 13.2 % [6]. We observed absence of notch (Fig 1) in 7.65% scapula which has been suggested to be one of the predisposing factors for SNES [12]. However, Iqubal et al. [6] reported higher values i.e. 22.5 %.

SNES is becoming more commonly recognized as a cause of the painful shoulder in certain sport activities especially volleyball, baseball and badminton [3, 5, 18]. Several theories have been postulated to explain the mechanism of SNES but excessive traction or stretching of the nerve is the possible cause. According to Rengachary et al. the size of the SSN played a role in the predisposition of SNES [14]. A reduction in the height of suprascapular foramen may predispose suprascapular nerve entrapment syndrome is more likely to be associated with 'V' shaped notch but no direct correlation between notch type and SNES has been shown clinically [3, 1].

In the present study, we observed' 'C' and 'J' shaped with narrow base SSNs (Fig 7,5,4). These types of notches may be responsible for SNES due to reduction in height and size of suprascapular foramen. So the anatomical variants of the SSN type may have some clinical significance. Though, exact cause of various shapes of SSN is not clear but Odita et al. [11] suggested that, the ossifications of the coracoid process and epiphysis influence the shape of the SSN and it could be the cause of the population difference. Variations in SSNs have been reported in the present work will be helpful for clinicians and surgeons to recognize the anatomical variants to ensure adequate access and complete decompression of the SN.

CONCLUSION

Clinically, variations of SSN are very important for possible predisposing factor because compression of SN may occur in this area [11]. Knowing the anatomical variations in details might be important for better understanding of location and source of SNES, especially for individuals who are involved in violent overhead activities [13]. The frequency of occurrence of variations of SCN is uncertain and varies in different population groups. Therefore, for better understanding about the different types of SSN and their role in SNES, population specific studies should be carried out on dry as well as cadavers and living subjects with the help of USG and MRI.

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