

## Morphological variations in anatomy of suprascapular notch and its clinical significance

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### Abstract

**Introduction:** Scapula is a flat triangular bone that lies on the posterior chest wall between the second and seventh ribs. The aim of this study was to determine the variations in suprascapular notch morphology and correlate it clinically.

**Material & Methods:** The study included 150 dried adult scapulae (75 right and 75 left) irrespective of age and sex from Department of Anatomy, King George's Medical University, Lucknow, Uttar Pradesh, India. The study was done by naked eye examination carefully. With the help of a digital Vernier calipers various parameters were measured i.e. superior length of suprascapular notch, inferior length of suprascapular notch, depth of the suprascapular notch. Based on shape and size of suprascapular notch it was classified as U-shaped, V-shaped, J-shaped, suprascapular notch converted into foramen.

**Results:** Out of 150 scapulae, 59% of suprascapular notch were 'U' shaped, 11% were J shaped, 8% were V shaped, 2% were completely ossified to form suprascapular foramina. In 20% cases, no suprascapular notch was observed.

**Conclusion:** In the present study, U shaped suprascapular notch was found to be maximum. A narrow suprascapular notch in combination with an anomalous superior transverse scapular ligament causes constriction to be considered as a risk factor for suprascapular nerve entrapment.

**Keywords:** suprascapular notch, scapulae, foramen, superior transverse scapular ligament.

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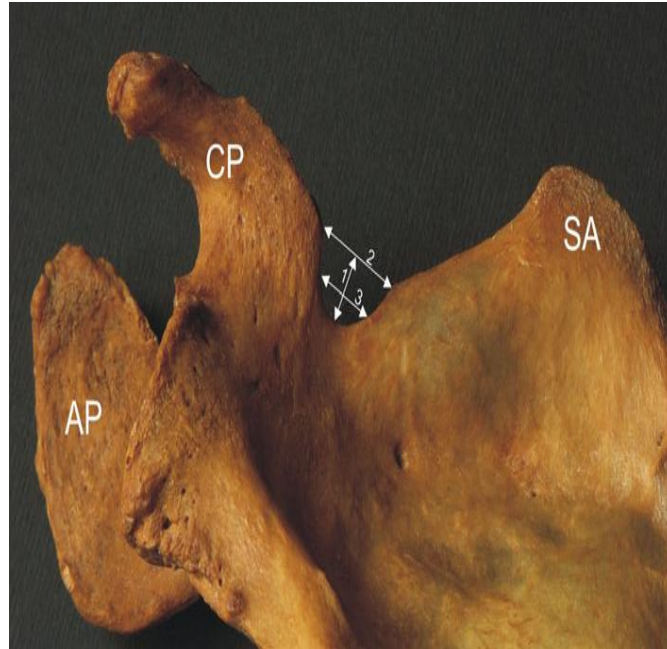
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### I. Introduction

The scapula is a flat triangular bone that lies on the posterior chest wall against the second and seventh ribs. Word scapula is derived from a Greek word Skaptein which means "todig". The coracoid process of scapula projects upward and medial to the base of the coracoid process lies the suprascapular notch. Scapulae plays a vital role in forming the articular surfaces of shoulder as well as acromioclavicular joint [1]. This notch is converted into a foramen by superior transverse scapular ligament and serves as a passage for the suprascapular nerve. The morphology of suprascapular notch is considered to be risk factor for suprascapular nerve entrapment either in combination with an anomalous superior transverse scapular ligament or as a narrow notch [2].

### II. Material And Method

The study was conducted in the Department of Anatomy, King Georges Medical University, Lucknow-U.P. 150 dried adult scapulae were obtained from the bone bank of the Department. Damaged bones were separated and side determination was done. 150 bones (75 R, 75 L) were observed irrespective of age, sex, gender, race. Using Vernier caliper following parameters were measured- the maximum superior, inferior length and depth. Each scapula was placed on table with its anterior surface up. The two tips of Vernier caliper were placed on the two superior corners of the suprascapular notch. Superior transverse diameter was measured from an imaginary line joining the two superior corners of the notch. Inferior transverse diameter was taken from imaginary line joining the two inferior corners of the notch. Maximum depth was taken from imaginary vertical line joining the midpoint of superior line and deepest point on suprascapular notch. (Fig. 1). Based on shape, suprascapular notch was classified as U-shaped, V-shaped, J- shaped, no notch, and suprascapular foramen.



**Fig. 1:** Arrows showing different measurements of the suprascapular notch-Arrow 1: Maximum depth, Arrow 2: Superior transverse diameter, Arrow 3: Inferior transverse diameter (AP: acromial process, CP: coracoid process, SA: superior angle)

### III. Observations And Results

U-shaped notch was defined when superior and inferior length of notch were almost equal and the limbs were parallel with rounded base. V-shaped was defined when superior length of notch was more than inferior length and the two limbs converge towards the narrow base. In J-shaped notch, one limb was longer with a curved base. Out of 150 dried scapulae 59% of suprascapular notch were U-shaped, 8% were V-shaped, 11% were J-shaped, 20% bones showed absence of notch while 2% were completely ossified to form suprascapular foramen (Table 1, Fig. 2).

**Table 1: Different shapes of suprascapular notch**

Types	Percentage (%)	Description of Type of Suprascapular Notch
U-shaped	59	Parallel limbs with rounded base
V-shaped	8	Medial and lateral limbs converge towards narrow base
J-shaped	11	One limb is longer with curved base
No Notch	20	Absence of suprascapular notch
Suprascapular foramen	2	Complete ossification of suprascapular notch



**Fig. 2:** Different types of suprascapular notch (a) U-shaped (b) V-shaped (c) J-shaped (d) No notch (e) Suprascapular foramen

#### **IV. Discussion**

Variation in shape of suprascapular notch holds an important clinical significance. A narrow suprascapular notch in combination with an anomalous superior transverse scapular ligament causes sufficient constriction to be considered as a risk factor for suprascapular nerve entrapment. For understanding of location and source of entrapment syndrome, several morphological variations and classifications of the suprascapular notch were reported. These features are of importance in suprascapular nerve entrapment which causes the supraspinatus and infraspinatus muscles to waste. Two oldest classifications of the type of suprascapular notch were introduced by Hrdlicka (1942) and Olivier (1960) [3,4]. Hrdlicka (1942) was first to separate the suprascapular notches into five types based on visual observations. Olivier (1960) also described five types of suprascapular notches. Rengachary et al., (1979) classified suprascapular notches into six types [5]. Ticker et al., (1998) mentioned only about U and V shaped notches and results of their study were higher than the present study [6]. Natsis et al., (2007) proposed a new method of classification based on specific geometric parameters. Results of Natsis et al., (2007) are higher in case of values of foramen but less in case of values of without notch in scapulae [7]. In a study conducted by Iqbal et al (2010) results were higher in case of V- shaped notch and foramen while less in case of U-shaped notch and J- shaped notch [8]. Mahdy et al (2013) also conducted a study on suprascapular notch [9]. Mahato et al., (2013) studied only complete absence of notch and results of their study were slightly higher [10]. In the present study, 59% of notches were U-shaped, in 20% cases notch was found to be absent, 11% J-shaped, 8% V-shaped whereas in 2% cases complete ossification of the notch was observed.

#### **V. Conclusion**

The shape of suprascapular notch may alter the distance between it and the supraglenoid tubercle, which is important for the determination of a potential safe zone to minimize the risk of iatrogenic injury of the suprascapular nerve during arthroscopic procedures and other open procedures requiring dissection of the posterior glenoid neck.

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