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A Study on Complete Absence of the Suprascapular Notch

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Abstract: ***Background:*** ***The suprascapular notch is a common feature of superior border of the scapula, near the coracoid process. Superior transverse scapular ligament is a band like fibrous structure that converts the suprascapular notch into a foramen through which the suprascapular nerve passes, whereas the suprascapular vessels goes above the ligament. Some times this suprascapular notch is absent. Its absence along with different variations of superior transverse scapular ligament may results in suprascapular nerve entrapment neuropathy. This syndrome is characterized by vague pain on the posterolateral aspect of shoulder and atrophy of supraspinatus & infraspinatus muscles. The patients also complain about weakness of external rotation and abduction of arm. The knowledge about the variations along the course of the nerve is important in understanding the source of the entrapment syndrome.*** ***Aims & Objectives****: To study the incidence of complete absence of suprascapular notch in Indian population & compare it with incidences in various races of world.* ***Materials & Methods:*** *The present study carried out on 220 (Right-108, Left-112) dried human scapulae of unknown sex and age for presence or absence of the suprascapular notch on superior border of scapula. RESULTS: Scapulae without suprascapular notch are found in 34 among 220 scapulae (15.46%), in which 15 (6.82%) belongs to right side & 19 (8.64%) to left side.* ***Conclusion:*** *The incidence of complete absence of suprascapular notch in our study suggest that it is not a rare finding. So, every practicing physician & surgeon should always consider its role in suprascapular nerve entrapment neuropathy.*

Keywords: Scapula, Suprascapular notch, Superior border, Suprascapular ligament, Suprascapular nerve entrapment.

1. Introduction

The scapula is a flattened, triangular bone that lies on the posterolateral aspect of the chest wall, over the second to the seventh rib. Its superior border extends between superior angle to lateral angle. The superior border is thinnest and shortest among all borders[1]. The suprascapular notch is located on superior border near the root of coracoid process. This notch is converted into a foramen known as suprascapular foramen by transverse scapular ligament (suprascapular ligament). There are so many variations seen in superior transverse scapular ligament like multiple bands, calcification & partial or complete ossification. In some animals, this suprascapular notch is bridged by bone[2]. The suprascapular nerve passes through this foramen while the suprascapular vessels goes backward above the ligament[3]. Overhead abduction of shoulder joint exert traction on the suprascapular nerve, which leads to its compression against superior border of scapula. Narrow or absent suprascapular notch have been reported in patients of nerve entrapment. Suprascapular nerve arises at the Erb's point, which is present on superior trunk of brachial plexus. It goes towards the suprascapular notch through the posterior cervical triangle[4] , under cover of trapezius and omohyoid and finally passes through the suprascapular foramen and enters the supraspinous fossa[3,4]. There are six different types of suprascapular notch according to Rangachary et al.[5,6] , in which type I is described as scapula with absence of notch. The risk of suprascapular nerve entrapment increases when this type of variation of suprascapular notch occurs along with ossification of the superior transverse scapular ligament[3,5,6,7]. In Indian population, very few data are available regarding complete absence of suprascapular notch. Hence, we aimed to verify that data & study the incidence of complete absence of suprascapular notch in Indian population & compare it with incidences in various races of world.

2. Materials And Methods

The present study has been carried out on 220 (Right-108, Left-112) dried human scapulae of unknown sex & age, which were obtained from Department of Anatomy & Department of Forensic Medicine & Toxicology of Indira Gandhi Institute of Medical Sciences (Patna, Bihar, India), Lord Buddha Koshi Medical College (Saharsa, Bihar, India), Patna Medical College (Patna, Bihar, India), Nalanda Medical College (Patna, Bihar, India), after obtaining consents and permission for the study from heads of the institutes and anatomy department. Each scapula is observed carefully for the absence of the suprascapular notch on superior border. Scapula having marked deformities and damaged superior border are excluded from the study. Representative photographs of absence of suprascapular notch are taken using a digital camera (Nikon 8.0 Megapixels).

3. Results

Scapulae without suprascapular notch are found in 34 among 220 scapulae (15.46%), in which 15 belongs to right side & 19 to left side. The absence of suprascapular notch is more common in left side (8.64%) as compared to right side (6.82%) [Table-1 & Figure 1, 3 & 4].

Table 1: Sidewise allocation of scapulae

Side	*No. of scapula with notch (%)*	*No. of Scapula without notch (%)*	*Total No. of scapula (%)*
Right	93 (42.27%)	15 (6.82%)	108 (49.09%)
Left	93 (42.27%)	19 (8.64%)	112 (50.91%)
Total	186 (84.54%)	34 (15.46%)	220 (100%)

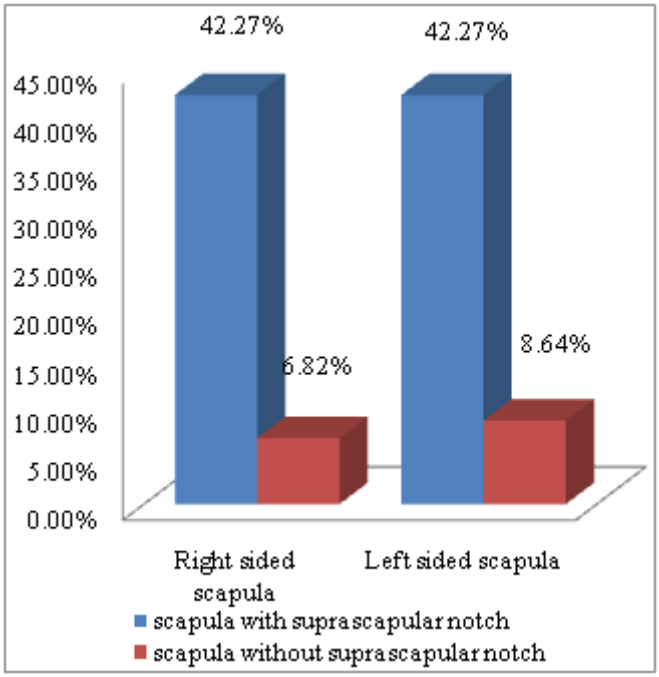

Figure 1: Sidewise allocation of scapula (in percentage)

4. Discussion

The incidence of complete absence of suprascapular notch in our study is 15.46%, which is lesser than incidence of Wang et al.[8] (28%), followed by incidence of Sinkeet at el.[9] (23.91%), Muralidhar Reddy Sangam et al.[10] (21.15%) and Usha Kannan et al[11] (20%) but higher than Vandana and Sudha[12] (4.5%), Vasudha T K et al[13] (6%), Pragna et al[14] (6.25%) and Rangachary et al[5,6] (8%). [Table No. 2 & 3]. In Nigerian population, Ofusori et al[15] found a single case of complete absence of suprascapular notch. During routine dissection classes, Rekha BS[16] also found a similar single scapula. The literature revealed that the incidence of absence of suprascapular notch are different in different populations. Table 2 & figure 2 shows comparative distribution of absence of suprascapular notch in different population. Suprascapular notch was classified into six different types (Type I – Type VI) after study on 211 American scapulae by Rangachary et al[5,6] . This classification was done on the basis of following criteria's:-- (a) Depth of notch, (b) Width at superior border of notch & (c) Widest point within the notch. According to this classification, Type I includes scapula without discrete notch, which was 8% in their study. The V shaped suprascapular notch is commonly associated with suprascapular nerve entrapment syndrome, but no direct correlation found between them clinically [17]. Dunkelgrun et al[18] found in his study that V shaped notches have lesser area than U shaped notches, so this is a causative factor for suprascapular nerve entrapment syndrome. There are so many variation found in the superior transverse scapular ligament i.e. ossification[2], calcification[19], bifurcation[20], trifurcation[21] and/or hypertrophy[22], which are may be a cause of suprascapular nerve entrapment syndrome. There is direct correlation in between length of scapula and depth of suprascapular notch & inverse correlation in between length ratio/width of body of scapula and depth of suprascapular notch[23]. The motor supply of supra & infraspinatus muscles comes from suprascapular nerve, but this nerve does not supply the adjoining skin. So, any irritations in the nerve fibers causes deep pain, which is not well localized. When the patient comes to a clinician with his complains, the muscles atropy get started[24]. For early & correct diagnosis, every clinician must have detail anatomical knowledge about the course of suprascapular nerve & all possible sites of its compression. It is mainly compressed at two sites: (a) At the suprascapular notch & (b) At the base of scapular spine. Kopell & Thompson et al[24] first of all described its compression at suprascapular notch. He explained that its compression against superior transeverse scapular ligament occurs mainly during horizontal adduction & abduction of shoulder joint. This compression may be more when superior transeverse scapular ligament becomes ossified[2]. Black KP & Lombardo JA[25] found in their study that suprascapular nerve entrapment syndrome presents with initial symptoms of burning sensations, numbness & weakness in the hand, which later on present only weakness of abduction and external rotation of shoulder joint. The X-ray, CT scan, nerve conduction velocity test (NCV), electromyographic studies (EMG), MRI & arthroghaphy are some recent investigation techniques which helps in correct diagnosis of nerve entrapment.

Table 2: Comparative statement of Incidence of absence of suprascapular notch in different population studied by different authors

Sl. No.	*Population*	*Author (year of study)*	*No. of specimen studied*	*Incidence (%)*
1.	American	Rangachary et al.[5,6] (1979)	211	8
2.	Greek	Natsis et al.[26] (2007)	423	8.3
3.	Nigerian	Ofusori et al[15] (2008)		Single case report
4.	Kenyan	Sinkeet et al[9] (2010)	138	23.91
5.	Pakistani	Khadija Iqbal et al[27] (2011)	250	10
6.	Chinese	Wang et al[8] (2011)	295	28
7.	Poland	M. Polguj et al[28] (2013)	81	6
8.	Italian	Paolo Albino et al[29] (2013)	500	12.4
9.	Indian	Present study (2014)	220	15.46

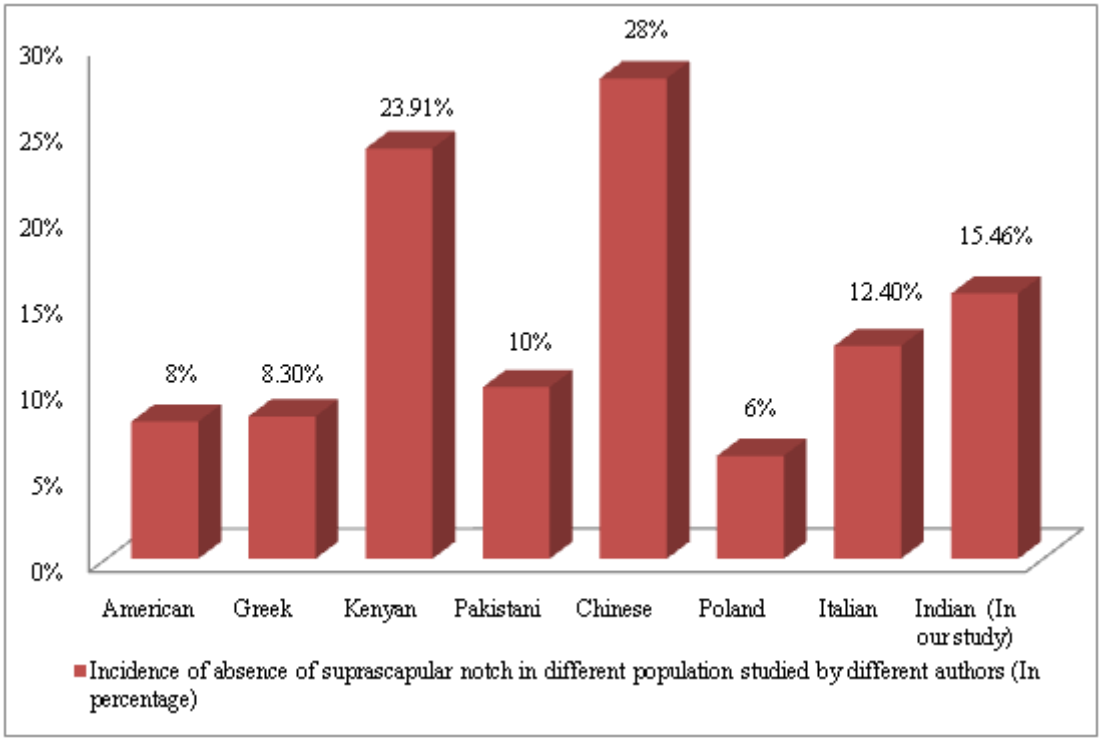

Figure 2: Incidence of absence of suprascapular notch in different population

Table 3: Comparative statement of Incidence of absence of suprascapular notch in Indian population by different authors

Sl. No.	*Author (year of study)*	*No. of specimen studied*	*Incidence (%)*
1.	Rekha B. S.[16] (2013)		Single case report
2.	Vasudha T K et al[13] (2013)	115	6
3.	Muralidhar Reddy Sangam et al [10] (2013)	104	21.15
4.	Vandana and Sudha[12] (2013)	134	4.5
5.	Pragna et al[14] (2013)	80	6.25
6.	Usha Kannan et al[11] (2014)	400	20
7.	Present study (2014)	220	15.46

5. Conclusion

In this study, we report the incidence of absence of suprascapular notch in Indian population, which is one of the risk factors for suprascapular nerve entrapment neuropathy. This anatomical information is very helpful in better understanding of clinical and surgical practice in this region. It may be helpful in avoiding iatrogenic suprascapular nerve injury in different arthroscopic procedures. Since the present study is performed with a limited number of dry scapulae, so there is need of further more clinical, radiological and cadaveric studies.

6. Acknowledgement

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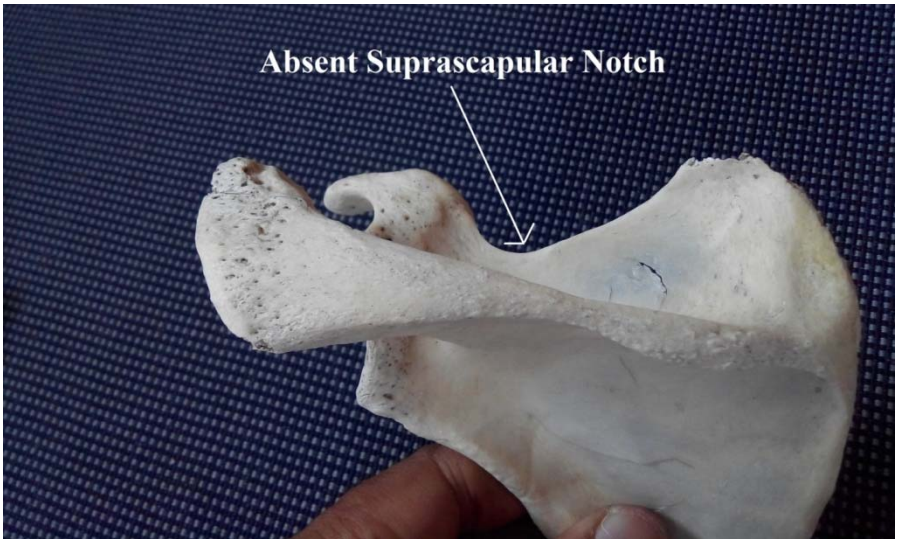

Figure 3: Left side dry scapula with absence suprascapular notch (arrow)

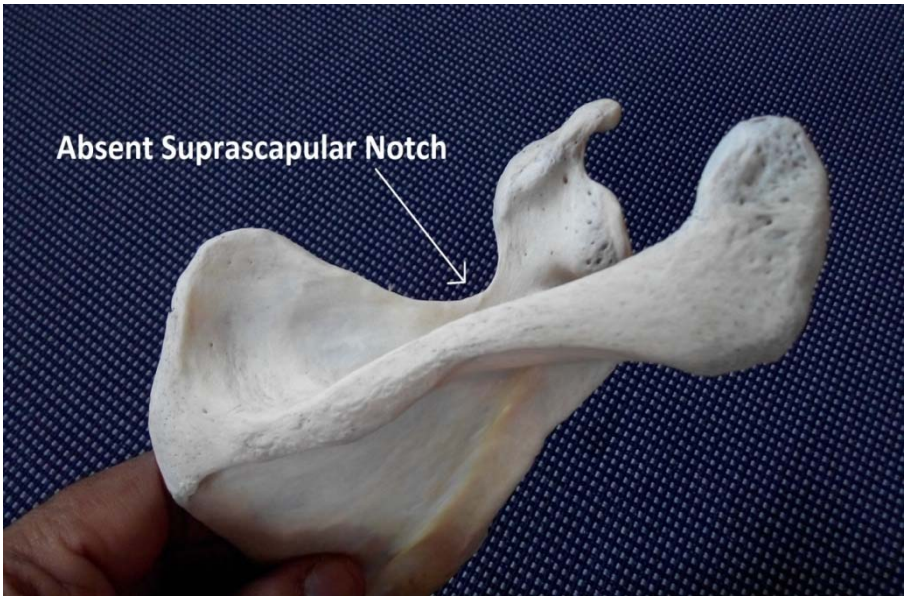

Figure 4: Right side dry scapula with absence suprascapular notch (arrow)

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