

## COMPLETE ABSENCE OF THE SUPRASCAPULAR NOTCH: A RISK FACTOR FOR SUPRASCAPULAR NERVE ENTRAPMENT NEUROPATHY

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**ABSTRACT: BACKGROUND:** The suprascapular notch, a regular feature of superior border of the scapula is absent in some cases. This variation (absent notch) in combination with variations of superior transverse scapular ligament can cause suprascapular nerve entrapment neuropathy with its attendant clinical symptoms of vague pain on the superolateral aspect of shoulder, weakness of abduction and external rotation of ipsilateral arm and atrophy of supraspinatus & infraspinatus muscles. **AIM:** The purpose of this study was to document & compare the incidence of complete absence of suprascapular notch and to know its clinical significance. **MATERIALS & METHODS:** 112 (Right-54, Left-58) dried human scapulae were examined for the absence of the suprascapular notch. **RESULTS:** 19.64% (22 in 112) scapulae presented with absence of suprascapular notch (10-right side, 12- left side). **CONCLUSION:** The regional variations in the incidence of complete absence of suprascapular notch and its involvement in suprascapular nerve entrapment neuropathy should be kept in mind during surgical or arthroscopic shoulder procedures.

**KEY WORDS:** Scapula, Variations, Suprascapular notch, Superior border, Suprascapular nerve entrapment.

**INTRODUCTION:** The scapula is one of the most interesting bones of human body. It presents many variations.<sup>1</sup>The suprascapular notch is situated on the superior border of the scapula, just medial to the base of the coracoid process.<sup>2</sup>This notch is frequently bridged by bone in some animals.<sup>3</sup>In human, it is commonly bridged by superior transverse scapular ligament but by bone (ossified ligament) in some cases.<sup>2,4</sup>The foramen thus completed, transmits the suprascapular nerve to the supraspinatus fossa, the suprascapular vessels passes backward above the ligament.<sup>2</sup>Rangachary et

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al.<sup>5,6</sup> have reported six different types of anatomical variations of suprascapular notch. In type I there is absence of notch. In some cases, the variation in the suprascapular notch is accompanied by a variation of the superior transverse scapular ligament and constitute potential risk factors to suprascapular nerve entrapment.<sup>5,6,7</sup> In Indian scenario paucity of data are available in complete absence of suprascapular notch. So the present study was intended to document and compare the incidence of complete absence of suprascapular notch & to know its clinical significance.

**MATERIALS AND METHODS:** The present study was carried out on 112 (Right-54, Left-58) dried human scapulae of unknown sex obtained from Department of Anatomy, SVS Medical College, Mahabubnagar, Andhra Pradesh and Raichur Institute of Medical Sciences, Raichur, Karnataka. Each scapula was observed for the absence of the suprascapular notch. The scapulae in which there was no lateral confluent on the superior border (straight or concave) at a point where the suprascapular notch should have been, were considered as scapulae with complete absence of the suprascapular notch (scapulae without discrete notch).<sup>8</sup> Representative photograph of absence of suprascapular notch were taken using digital camera (Sony 16 megapixel). The scapulae with bilaterally damaged superior margin were excluded from the study.

**RESULTS:** Macroscopic examination revealed that 22 (10- right side, 12- left side) out of 112 (19.64%) scapulae presented with absence of suprascapular notch. The incidence was more prevalent on left side scapula (10.71%) as compared to right side scapula (8.93%) [Table-1]. Incidence in different population is given in Table no-2.

**DISCUSSION:** The suprascapular notch is usually present in every scapula. Several morphological variations and classifications of suprascapular notch have been reported in various populations. Rangachary et al. (1979)<sup>5,6</sup> conducted a study on 211 American scapulae and classified suprascapular notch into six types (Type I – Type VI) based on the width at superior border of the notch, the widest point within the notch, and the depth of the notch. They reported scapula without discrete notch (Type I) in 8% of studied scapulae. In the present study, we observed 19.64% incidence of complete absence of suprascapular notch (scapula without discrete suprascapular notch) which is higher than Rangachary's report. Sinkeet et al. (2010)<sup>9</sup> analysed 138 human scapulae in Kenyan population and found 3 scapulae without notch and 30 scapulae with concave superior border (wide depression extending from medial superior angle to the base of coracoid process) having no discrete notch. So 33 of 138 (23.91%) had complete absence of notch. This is higher than our finding (19.64%).

The incidence of complete absence of suprascapular notch varies in different population (Table no.-2). The incidence in our study (19.64%) is close to Iqbal K et al.<sup>10</sup> (18%) but higher than Rangachary et al.<sup>4,5</sup> (8%), Natsis et al.<sup>11</sup> (8.3%) & Polguy et al.<sup>12</sup> (6%) and lower than Sinkeet et al.<sup>9</sup> (23.91%). Ofusori et al.<sup>8</sup> reported a case of complete absence of suprascapular notch in Nigerian scapula. Rekha B.S.<sup>13</sup> also found a case of complete absence of suprascapular notch in Indian scapula during a routine dissection.

Although it has been hypothesized that suprascapular nerve entrapment is more likely to be associated with a narrow V-shaped notch but no direct correlation between notch type and suprascapular nerve entrapment has been found clinically.<sup>14</sup> In contrast many authors have reported that the variations in the morphology of the superior transverse scapular ligament like ossification<sup>3</sup>,

calcification<sup>15</sup>, bifurcation<sup>16</sup>, trifurcation<sup>17</sup> and/or hypertrophy<sup>18</sup> is associated with suprascapular nerve entrapment neuropathy. Among the various factors, including variation in the shape of the suprascapular notch along with morphological variation of the superior transverse suprascapular ligament causing suprascapular nerve entrapment, complete absence of the suprascapular notch may also be one of the predisposing factors for suprascapular nerve entrapment neuropathy.<sup>5,6,8</sup>

Suprascapular nerve originates from the lateral aspect of superior trunk of the brachial plexus with contribution from the 5<sup>th</sup> and 6<sup>th</sup> anterior cervical roots, occasionally from 4<sup>th</sup> root as well and travels downward reach to the upper border of the scapula and enters the supraspinatus fossa through the suprascapular notch below the STSL\* (suprascapular vessels above the STSL\*). The nerve travels obliquely along the floor of the supraspinatus fossa under supraspinatus muscle, supplies it, also provides sensory branches to the glenohumeral & acromioclavicular joints and takes a sharp turn around the lateral margin of the base of the scapular spine (spinoglenoid notch) with the suprascapular vessels passing below a spinoglenoid (or inferior transverse scapular) ligament when present, to enter the infraspinatus fossa. Here it supplies the infraspinatus muscle.<sup>2,19,20</sup>

The suprascapular nerve entrapment may occur at any point along its course but in the case of absence of suprascapular notch, compression of suprascapular nerve by the superior transverse scapular ligament possibly occur on the superior border of the scapula.<sup>5,6,8</sup> This compression may be pronounced when the superior transverse scapular ligament is ossified.<sup>3</sup> Usually cases of Suprascapular nerve entrapment neuropathy complain of deep and diffuse, poorly localized dull or burning pain in the posterolateral aspect of shoulder, which exaggerate on activity. This pain can be elicited by palpation over the region of the scapular notch. In some cases the pain radiates to the ipsilateral extremity, the side of the neck or the front of the chest. The patients also report a feeling of weakness in the affected shoulder, especially when performing overhead activities due to weakness and atrophy of supraspinatus & infraspinatus muscles resulting from denervation of these muscles.<sup>19,20,21</sup>

The investigations like nerve conduction velocity (NCV) and electromyographic (EMG) studies, X-ray, CT, MRI, and arthrography may be helpful in correct diagnosis. The electrophysiological studies and MRI should always be used when clinical findings are suggestive of suprascapular nerve entrapment. MRI also reveals rotator cuff tear, if present.<sup>20,21</sup>

The patient of suprascapular nerve dysfunction without muscle atrophy or evidence of a space-occupying lesion is usually prescribed non-operative treatment consisting of rest, followed by physiotherapy. After three-four months, if the symptoms persist, operative decompression of the nerve is advocated.<sup>20,21</sup>

Since the present study was performed with a limited number of dry scapulae, more clinical, radiological and cadaveric studies need to be done.

**CONCLUSION:** The present study explores that incidence of complete absence of suprascapular notch varies in different populations and it can be one of the risk factors for suprascapular nerve entrapment neuropathy. This anatomical information should be taken into consideration during surgical or arthroscopic shoulder procedures. It may be helpful in avoiding iatrogenic suprascapular nerve injury in these procedures.

\* Superior transverse scapular ligament.

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## REFERENCES

1. Hrdlicka A. The scapula: visual observations. *Am J Phys Anthropol.* 1942; 29:73-94.
2. Standring S, ed. *Gray's Anatomy.* 40th Ed., New York, Churchill Livingstone. 2008; 794-821.
3. Khan, M. A. Complete ossification of the superior transverse scapular ligament in an Indian male adult. *Int. J. Morphol.*, 2006;24(2):195-6.
4. Edelson JG. Bony bridges and other variations of the suprascapular notch. *J Bone Joint Surg Br.* 1995; 77:505-6.
5. Rengachary, S. S.; Burr, D.; Lucas, S.; Hassanein, K.M.; Mohn, M.P. & Matzke, H. Suprascapular entrapment neuropathy: a clinical, anatomical, and comparative study. Part 1-Clinical study. *Neurosurg.*, 1979;5:441-46.
6. Rengachary, S. S.; Burr, D.; Lucas, S.; Hassanein, K.M.; Mohn, M.P. & Matzke, H. Suprascapular entrapment neuropathy: a clinical, anatomical, and comparative study. Part 2. Anatomical study. *Neurosurg.*, 1979;5:447-51.
7. Callahan, J. D.; Scully, T. B.; Shapiro, S. A. & Worth, R.M. Suprascapular nerve entrapment. A series of 27 cases. *J. Neurosurg.*, 74:893-6, 1991.
8. David A. Ofusori, Raymond A. Ude, Christina U. Okwuonu, and Olamide A. Adesanya. Complete absence of the suprascapular notch in a Nigerian scapula: A possible cause of suprascapular nerve entrapment. *Int J Shoulder Surg.* 2008 Oct-Dec; 2(4): 85-86.
9. Sinkeet SR, Awori KO, Odula PO, Ogeng'o JA, Mwachaka PM. The suprascapular notch: its morphology and distance from the glenoid cavity in a Kenyan population. *Folia Morphol (Warsz).* 2010; 69:241-5.
10. Khadija Iqbal and RameezIqbal. Classification of Suprascapular Notch According to Anatomical Measurements in Human Scapulae. *Journal of the College of Physicians and Surgeons Pakistan* 2011, Vol. 21 (3): 169-170.
11. Natsis K, Totlis T, Tsikaras P, Appell HJ, Skandalakis P, Koebke J. Proposal for classification of the suprascapular notch: a study on 423 dried scapulas. *Clin Anat.* 2007; 20:135-9.
12. MichałPolguy, Kazimierz S. Jędrzejewski, MirosławTopol. Special paper – Anatomical pathology Sexual dimorphism of the suprascapular notch – morphometric study. *Arch Med Sci* 2013; 9, 1: 177-183.
13. Rekha. B. S. Complete absence of suprascapular notch- a case report. *Journal of Evolution of Medical and Dental Sciences*, January 7, 2013; Volume 2: Issue1, 19-22.
14. Cummins CA, Anderson K, Bown M, Nuber G, Roth SI. Anatomy and histological characteristics of the spinoglenoid ligament. *J Bone Joint Surg Am.* 1998; 80:1622-1625.
15. Cohen, S. B.; Dnes,D.M.& Moorman, C.T. Familial calcification of the superior transverse scapula ligament causing neuropathy. *Clin. Orthop. Rel. Res.*, 1997; 334:131-5.
16. Alon M, Weiss S, Fishel B, Dekel S. Bilateral Suprascapular nerve entrapment syndrome due to an anomalous transverse scapular ligament. *ClinOrthop.* 1988; 234:31-33.
17. Ticker, J. B.; Djurasovic, M.; Strauch, R. J.; April, E.W.; Pollock, R. G.; Flatow, E. L. &Bigliani, L.U. The incidence of ganglion cysts and variations in anatomy along the course of the suprascapular nerve. *J. Shoulder Elbow Surg.*, 1998; 7(5):472-8.

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18. Garcia G, McQueen D. Bilateral suprascapular nerve entrapment syndrome: case report and review of the literature. *J Bone Joint Surg Am.* 1981; 63:491-492.
19. Holzgraefe M, Kukowski B, Eggert S. Prevalence of latent and manifest suprascapular neuropathy in high level volleyball players. *Br J Sports Med.* 1994; 28:177-179.
20. Martin SD, Warren RF, Martin TL, Kennedy K, O'Brien SJ, Wickiewicz TL. Suprascapular neuropathy: results of non-operative treatment. *J Bone Joint Surg Am.* 1997; 79:1159-1165.
21. Th. Fabre, C. Piton, G. Leclouerec, F. Gervais-Delion, A. Durandeau Entrapment of the suprascapular nerve *J Bone Joint Surg Br.*, May 1999;Vol. 81-B, No. 3, 414-419.

**TABLE-1:** Sidewise allocation of scapulae

Side	No. of scapula with notch (%)	No. of Scapula without notch (%)	Total No. of scapula (%)
Right	44 (39.29%)	10 (8.93%)	54 (48.22%)
Left	46 (41.07%)	12 (10.71%)	58 (51.78%)
Total	90 (80.36%)	22 (19.64%)	112 (100%)

**Table-2:** Incidence of absence of suprascapular notch.

Sl. No	Author	Population	No. of specimen studied	Incidence (%)
1.	Rangachary et al.(1979) <sup>5,6</sup>	American	211	8
2.	Natsis et al.(2007) <sup>11</sup>	Greek	423	8.3
3.	Sinkeet et al(2010) <sup>9</sup>	Kenyan	138	23.91
4.	Iqbal K.et al(2010) <sup>10</sup>	Pakistani	250	18
5.	Polguy et al(2013) <sup>12</sup>	Poland	81	6
6.	Present study(2013)	Indian	112	19.64



**FIG-1:** Left side dry scapula  
With suprascapular notch  
a. superior border, b- suprascapular notch



**FIG-2:** Left side dry scapula with absence  
suprascapular notch (arrow)



**Fig-3:** Right side dry scapula with absence of suprascapular notch (arrow)