



Ossification of Transverse Scapular Ligament in Population of Bihar & Its Clinical Implications

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Abstract

Background: The common site of compression of suprascapular nerve which arise from the upper trunk of brachial plexus, is either at the spinoglenoid notch or at the suprascapular notch. This notch is converted into a foramen by a ligament named superior transverse scapular ligament through which suprascapular nerve passes. Sometimes this ligament get ossified & converts this notch into a bony foramen. When overhead abduction occurs around the shoulder joint, it produces traction force on suprascapular nerve & it may leads to entrapment neuropathy.

This risk of entrapment increases when this ligament get completely ossified & form a bony foramen.

Aim & Objective: To study the incidence of ossification of this ligament in population of Bihar & compare it with findings among different regions of world.

Materials and Methods: We conducted this study on 120 (Right-56, Left-64) scapula of unknown sex & age, which neither have any bony deformities nor damaged superior border.

Results: We found 16 scapulae among 120 (13.33%) in which superior transverse scapular ligament is fully ossified. Among them 11 (9.17%) belongs to right & 4 (4.16%) belongs to left side. This ossification is more common in right side.

Conclusion: These findings itself suggestive of ossification of this ligament is not so rare in Bihar. So, the physicians & surgeons must have knowledge about this ossification which helps in early diagnosis of nerve entrapment.

Keywords: Scapula, Nerve entrapment syndrome, Suprascapular notch, Transverse scapular ligament, Suprascapular nerve.

Introduction

The scapula which is commonly known as shoulder blade, is a flat triangular bone that

present on posterolateral thoracic wall, against the second to seventh ribs. It has two surfaces ventral

& dorsal. The concave dorsal surface divided into a smaller supraspinous fossa and larger infrascapular fossa. The convex ventral surface has also a fossa named subscapular fossa. It has three borders namely medial, lateral and superior which also forms three angles i.e. lateral, superior and inferior. Among all these three borders, superior border is thinnest and shortest. The superior border has a deficient portion near the base of coracoid process which is known as suprascapular notch. This notch is bridged by a strong fibrous band known as suprascapular ligament which convert it into a foramen. The suprascapular nerve passes through this foramen and supplies the supraspinatus & infraspinatus muscles and the suprascapular vessels goes backward above this ligament. Sometimes this ligament is ossified.^[1] There are also so many variations seen in superior transverse scapular ligament like multiple bands and calcification^[2], bifurcation^[3], trifurcation^[4] and hypertrophy.^[5] In some animals, this suprascapular notch is always bridges by bone in place of ligament.^[6] When overhead abduction occurs around the shoulder joint, it produces traction force on suprascapular nerve & it may leads to entrapment neuropathy. This risk of entrapment increases when this ligament get completely ossified & form a bony foramen. The compression of suprascapular nerve may occurs either at the suprascapular notch or at the spinoglenoid notch. This entrapment 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. This compression becomes more pronounced when suprascapular ligament is completely or partial ossified. Hence, the clinician always kept in mind about possibility of different variations in course of the nerve in patients of suprascapular nerve entrapment syndrome. In 1959, Kopell and Thompson described this syndrome. Therefore, we study about the incidence of ossification of suprascapular ligament in population of Bihar & compare it with findings of different studies.

Materials and Methods

The present study has been carried out on 120 (Right-56, Left-64) dried human scapulae of unknown sex & age, which are obtained from Department of Anatomy and Forensic Medicine & Toxicology of different medical colleges of Bihar. Each scapula is observed carefully for ossification of suprascapular ligament on superior border of scapula. Scapula having marked deformities and damaged superior border are excluded from the study. Representative photographs are taken using a digital camera.

Results

Scapulae with ossified superior transverse scapular ligament are found in 16 among 120 scapulae (13.33%), in which 11 (9.17%) belongs to right side & 4 (4.16%) to left side. This ossification is more commonly reported in right side. [Table-1 & Figure- 1, 2]

Table-1: Sidewise allocation of ossified superior transverse scapular ligament

Sr. No.	Right side	Left side	Total
1. No. of scapula with ossified STSL	11 (9.17%)	4 (4.16%)	16 (13.33%)
2. No. of scapula without ossified STSL	45 (37.50%)	59 (49.17%)	104 (86.67%)
Total	56 (46.67%)	64 (53.33%)	120 (100%)



Figure 1:- Ossified STSL in right sided scapula



Figure 2: Ossified STSL in left sided scapula

Discussion

The ossification of suprascapular ligament is multifactorial and from the literatures we found that its incidence varies from 1.36% to 30.76% in different populations of world. In present study, we found 13.33% incidence of ossified superior transverse scapular ligament which is nearer to findings of Jadhav et al^[7] (10.57%). Silva et al^[8] reported the incidence of completely ossified superior transverse scapular ligament 30.76% in Brazilian population which is very high as compared to our study. In some parts of world it's ossification is very rare e.g. in Alaskan Eskimos - 0.3%, Native American - 2.1% to 2.9%.^[5] In Nigeria, Osuagwu et al^[9] reported a single case of completely ossified superior transverse scapular ligament and Khan^[6]. In literature, we found that the incidence of ossified superior transverse

scapular ligament varies from 1.93% to 19.44% in Indian population. This bony bridges are more commonly reported in Caucasian male.^[5] A familial case of calcification of superior transverse scapular ligament in both father and son found during study of Cohen et al^[3], causing entrapment syndrome of suprascapular nerve indicates the genetic basis of ossification. The thickness of ossified superior transverse scapular ligament in Indian population is 2.8 ± 0.96 mm as reported by Mistry et al^[10]. Sandow & Ilic^[11] explained that suprascapular nerve compression is more common in volleyball players due to some specific type of movements like abduction associated with lateral (external) rotation. There are six different types of suprascapular notch according to Rangachary et al.^[12,13], in which type VI is described as scapula with completely ossified superior transverse scapular ligament forming the foramen. While, Natsis et al^[14] classified the suprascapular notch into only five types, in which type IV is described as scapula with bony foramen. Polguy M^[15] reported bifid & Ticker JB et al^[4] reported trifid superior transverse scapular ligament in 3.1% & 3% of population respectively. There are five types of superior transverse scapular ligament as explained by Bayramoglu et al^[16]. The first is fan shaped, which is the most common type, the second type has an additional anterior coracoscapular ligament. The third type has two parts i.e. anterior & posterior and in fourth type the ligament is calcified, which is least common type. Wang HJ^[17] explained a scapula with double suprascapular foramen in Chinese population. The motor nerve supply of supra & infraspinatus muscles derived from suprascapular nerve, but this nerve does not supply the adjoining skin. This causes deep pain when any irritations occurs in nerve fibres, is not properly well localized. This leads to start of atrophy of muscles prior to when it comes under notice by any physician^[18]. For diagnosing the entrapment, every clinician must have idea about the course of suprascapular nerve & sites at which its compression may occurs, either at the base of scapular spine or at the notch

present at superior border. According to Thompson et al^[18] the compression of the nerve occurs mainly during abduction as well as horizontal adduction of shoulder joint. This compression becomes more severe when this ligament get ossified^[6]. The 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 as explained by Black KP & Lombardo JA^[19].

Table 2 : Comparison of Incidences of ossified STSL in different population of world

Sr. No.	Population	Author (year of study)	No. of scapula studied	Incidence (%)
1.	American	Edelson et al ^[20] (1995)	1000	3.7%
2.	American	Ticker et al ^[4] (1998)	79	5%
3.	American	Dunkengrun et al ^[2] (2003)	623	5%
4.	Nigerian	Osuagwu et al ^[9] (2005)	A case report	
5.	German	Nastis et al ^[14] (2007)	423	7.3%
6.	Brazilian	Silva et al ^[8] (2007)	221	30.76%
7.	Kenyan	Sinkeet et al ^[21] (2010)	138	2.9%
8.	Poland	Polguy et al ^[22] (2011)	86	7%
9.	Chinese	Wang et al ^[17] (2011)	295	1.36%
10.	Indian	Jadhav et al ^[7] (2012)	350	10.57%
11.	Indian	Muralidhar et al ^[23] (2013)	104	1.93%
12.	Indian	Kalpana T et al ^[24] (2013)	100	2%
13.	Indian	Mistry P et al ^[10] (2013)	180	19.44%
14.	Indian	Vashudha T K ^[25] (2013)	115	4.34%
15.	Indian	Mahto R K et al ^[26] (2013)	122	4.92%
16.	Indian	Pragna P et al ^[27] (2013)	80	3.75%
17.	Indian	Udatree et al ^[28] (2014)	42	9.5%
18.	Indian	Present study (2018)	120	13.33%

Conclusion

We report 13.33% incidence of complete ossification of superior transverse scapular ligament in population of Bihar, which indicates it is not a rare entity. So, this anatomical changes should always be taken into consideration during surgical or arthroscopic shoulder procedures & also in case of treatment of painful shoulder. Its knowledge helps the practicing surgeons in avoiding iatrogenic suprascapular nerve injury in surgical procedures around this region.

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