

OSSIFIED SUPERIOR TRANSVERSE SCAPULAR LIGAMENT: A MORPHOLOGICAL STUDY ON DRIED PAKISTANI SCAPULAE

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ABSTRACT

Background: The suprascapular notch of scapula is converted into a foramen by superior transverse scapular ligament (STSL) with the suprascapular nerve passing through the foramen and the suprascapular vessels passing above it. The suprascapular notch is the most common site of suprascapular nerve entrapment, which can manifest in disability and pain of the upper limb. The anatomical variations of suprascapular notch are considered to be a risk factor for suprascapular neuropathy entrapment. Complete ossification of STSL with formation of bony foramina is the most recognized predisposing factor for the compression of suprascapular nerve at the suprascapular notch.

Aims and Objectives: The aim of this study was to see the incidence of the ossified superior transverse scapular ligament (STSL) on dried Pakistani scapulae,

Materials and Methods: Two hundred and four dried scapulae from the Anatomy Departments of Allama Iqbal Medical College, Lahore and Khawaja Muhammad Safdar Medical College, Sialkot were examined. The scapulae included in this study were 97 of right side and 107 of left side. The scapulae were closely observed for the presence of ossified STSL.

Results: It was found that complete ossification of superior transverse scapular ligament was found in 4 out of 204 scapulae. The incidence was 1.96% in Pakistani population.

Conclusion: The role of STSL in causing suprascapular nerve entrapment is a known fact and proper understanding of the topographical anatomy may be helpful for clinicians and surgeons in routine practice. Present study showed 1.96% incidence of ossified STSL in Pakistani population.

Key Words: Scapulae, Superior transverse scapular ligament (STSL) ossification, suprascapular foramen.

INTRODUCTION

The suprascapular notch is a depression on the lateral part of superior border of scapula running medial to the coracoid process. The suprascapular nerve passes through the suprascapular notch which is converted into foramen by superior transverse scapular ligament.¹ The suprascapular nerve provides motor innervation to the supraspinatus and infraspinatus muscles, in addition to branches to the coracohumeral and coracoacromial ligaments, subacromial bursa, and the acromioclavicular joint. Often the STSL is ossified to produce compression of the suprascapular nerves which results in symptoms like pain in the shoulder region, wasting and weakness of the supraspinatus and infraspinatus muscles.² An early and correct diagnosis requires a thorough anatomical knowledge of its possible sites of entrapment. The suprascapular nerve is commonly susceptible to compression mainly at two major sites i.e. at the level of the suprascapular notch and at the base of the spine of scapula.³

Superior transverse scapular ligament connects two regions of the same bone and does not cross any joint, and no mechanical function has yet been attributed to it. Nevertheless, variations in its thickness and length, and its tendency to ossify, suggest that the ligament responds to changes in mechanical load. The frequency with which the SSL ossifies, relates to the fibrocartilaginous character of the ligament.⁴ The anatomical knowledge of suprascapular foramen is of extreme importance for clinicians; it can be a risk factor during surgical explorations involving a suprascapular nerve decompression.⁵ The coexistence of the suprascapular notch and the suprascapular foramen is another anatomical variation in the suprascapular region.⁶

The presence of an ossified STSL may also pose a challenge during decompression of the suprascapular notch if the condition is not fully appreciated.⁷ The ossification of the STSL may also alter the attachment of the omohyoid muscle, which has its attachment close to it. The lateral border of the scapula has a pro-

jection and it may have distorted the attachment of the omohyoid muscle, thereby altering its action.⁸ The documented variations of the superior transverse scapular ligament include calcification, partial or complete ossification and multiple bands.⁹

To study the pathology of suprascapular nerve compression, multiple studies have been carried out with particular reference to suprascapular notch, partial or complete ossification of superior transverse scapular ligament. The ossified STSL is a potential risk factor in the formation of suprascapular nerve entrapment.¹⁰ The frequency of completely ossified superior transverse scapular ligament varies throughout the world. Since no such data is available about incidence of ossified STSL in dried Pakistani scapulae, present study was carried out to find out the incidence of ossification of superior transverse scapular ligament in dried Pakistani scapulae.

MATERIALS AND METHODS

In present study, dried 204 scapulae were analysed, irrespective of age and sex to see the presence of ossified STSL from the Anatomy Departments of Allama Iqbal Medical College, Lahore and Khawaja Muhammad Safdar Medical College, Sialkot. The scapulae included in this study were 97 of right side and 107 of left side. Each bone was closely observed for the presence of suprascapular foramen. The bones showing suprascapular foramen (ossified STSL) were photographed.

RESULTS

It was found that four out of two hundred and four scapulae showed presence of suprascapular foramen (ossified superior transverse scapular ligament). Two scapulae of right side and two scapulae of left side showed evidence of ossification of STSL. This shows that incidence of ossified STSL is 1.96% in Pakistani population.



Fig. 1: *Ossified Superior Transverse Scapular Ligament converting suprascapular notch into a foramen.*



Fig. 2: *Ossified Superior transverse scapular ligament (Suprascapular Foramen) in a scapula.*

DISCUSSION

Multiple studies have been carried out with particular reference to suprascapular notch, partial or complete ossification of superior transverse scapular ligament to avoid this risk during operative procedures and to study the pathology of suprascapular nerve compression.¹¹ In present study, complete ossification of transverse scapular ligament (bony foramen) is found in 1.96% (4 out of 204) scapulae. Silva et al¹² found the ossified STSL in 68 out of 221 (30.76%) dry scapula in Brazilians. Many researchers from the world recorded presence of ossification of STSL such as 3.7% by Edelson¹³ and 3% by Garg.¹⁴ In a study, four cases out of 300 scapulae were found with bony canals formed by complete ossification STSL. Two were on the right side and two on the left, a finding similar to the present study.¹⁵ Natsiset al¹⁶ in a study on scapulae detected ossified STSL in 7.3% scapulae.

In another study, an ossified superior transverse scapular ligament was observed more often in the right scapula. This study suggested that the occurrence of the bony bridge formed by ossified STSL could have a genetic basis.¹⁷ It is supported by a study by Cohen et al¹⁸ who describe a familial case of calcification of the STSL affecting a 58-year-old man and his son; both incidences are being associated with suprascapular nerve entrapment and clinical symptoms of pain, weakness, and atrophy of the supraspinatus muscle. Rengachary et al¹⁹ mentioned six different types of anatomical variations in the suprascapular notch area. The-

se variations of the suprascapular notch and the STSL constitute potential predisposing factors to suprascapular nerve entrapment. In a study on cadavers, all specimens with ossified STSL displayed signs of neural degeneration in the suprascapular nerve.² In another study on cadavers, it was detected that superior transverse scapular ligament was calcified in four of the 32 shoulders.²⁰

A study was conducted to classify the suprascapular notch in Pakistani population in 2010,²¹ but no such study about incidence of ossification of STSL is conducted previously in Pakistan. Present study shows that the incidence of STSL ossification is lower than most of the populations of the world (Table 1).

In **Conclusion** present study showed 1.96% incidence of ossified STSL in Pakistani population. It may pose a potential risk factor for the suprascapular nerve entrapment syndrome. Knowledge of anatomical variations is a crucial factor for the safety of operative decompression of the suprascapular nerve in entrapment neuropathy. The morphological and radiological knowledge of the suprascapular foramen (ossified STSL) is of extreme importance for clinicians, radiologists and neurosurgeons who manipulate this anatomical area. Advanced study on a larger group using the dissection of cadavers, radiology, MRI and dry bones for further research on the ossification of STSL is recommended.

AUTHOR’S CONTRIBUTIONS

Z A Created and managed the development of each phase of the study, drafted and prepared the manuscript for submission. K W provided assistance in collecting the sample and examined the data related to the anatomy of the scapulae. K B Provided assistance in collecting the sample and photography of bones. All authors reviewed and critically revised the manuscript drafts, and read and approved the final manuscript.

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Table 1: Incidence of ossification of superior transverse scapular ligament in different populations.

Serial No.	Author	Population	Year	Incidence of Ossification of STSL
1.	Ticker et al ⁸	American	1998	5%
2.	Tubbs et al ²	American	2003	3.7%
3.	Urgudin et al ²²	Turkish	2004	6%
4.	Silva et al ¹²	Brazilian	2007	30.6%
5.	Sinkeet et al ²³	Kenyan	2010	3%
6.	Wang et al ²⁴	Chinese	2011	4.08%
7.	Polugj et al ²⁵	Polish	2011	7%
8.	Jadhav et al ⁵	Indian	2012	10.57%
9.	Polugj et al ¹⁷	Polish	2013	4.72%
10.	Present Study	Pakistani	2014	1.96%

- ascapular nerve compression? *Int J Shoulder Surg.* 2013; 7 (1): 19-22.
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