



Original Research Article

Incidence of ossification of superior transverse scapular ligament of scapula in Indian population

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ABSTRACT

Keywords

Scapula,
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The superior transverse scapular ligament is present above the suprascapular notch and converts it into foramen through which passes the supraclavicular nerve. This ligament may ossify partially or completely. Ossified superior transverse scapular ligament is one of the risk factor for the suprascapular nerve entrapment neuropathy. Therefore a precise knowledge of this area is essential during suprascapular nerve decompression. Aim of present study was to know the incidence and morphology of the superior transverse scapular ligament in dry Indian population. The study was carried out on 194 (100- right and 94- left) dried scapulae to see the incidence of ossified superior transverse scapular ligament. In 5 scapulae (9.7%), there was a complete ossification of the superior transverse scapular ligament and in 3 scapulae (5.82 %) it was partially ossified. The anatomical knowledge of ossified STSL may be helpful for radiologists, neurosurgeons and orthopaedic surgeon and clinician dealing with suprascapular nerve entrapment neuropathy. Knowledge of underlying mechanism of injury to nerve may be helpful in planning the appropriate treatment plan.

Introduction

The superior transverse scapular ligament (STSL) is present above the suprascapular notch (SSN). It joins the two superior corners of this notch and converts it into suprascapular foramen through which passes the suprascapular nerve (SN), while the suprascapular artery and vein usually pass above the ligament (Tubbs R et al 2007). An anatomy textbook describes ossification of STSL (Standring S et al 2005). Many researchers have reported variations of

STSL. This ligament may be calcified, partially or completely ossified, trifurcation and anomalous bands of it (Ticker J et al 1998).

According to Harris et al. the ossification of the STSL was considered anomalous (Harris R et al 2001). The variations of size and shape of suprascapular notch and STSL have been known to predispose to SN entrapment neuropathy (Dunkelgrun M et al 2003,

Rengachary S et al 1979). The presence of an ossified STSL may produce difficulty during decompression of the suprascapular notch if the condition is not known (Ticker J et al 1998). Many researchers reported variable incidence of complete ossification of STSL which varies in different population. In Indian population there is very little data is available. Considering the paucity of data on incidence of ossification of STSL we studied this topic.

Materials and Methods

The present study was carried out on 194 (Right-100, Left-94) dried human scapulae of unknown sex obtained from our Department and students from 1st year MBBS and BPTH. The scapulae with damaged superior margin were excluded from the study. Each scapula was carefully observed to see the presence of completely or partially ossified STSL.

Representative photograph of STSL were taken using digital camera. The dimensions of STSL were recorded in millimeters with help of digital vernier caliper. Following measurements of STSL were measured. Measurements of STSL were

- a. Superior maximal length,
- b. Inferior maximal length,
- c. Thickness at medial and lateral end

Results and Discussion

Visual observation of 194 scapulae revealed that 5 (9.7%) scapulae had completely ossified STSL (Fig. 1). Out of 5 scapulae 3 were right sided and 2 were left sided. We observed partially ossified STSL (Fig. 2) in 3 scapulae (5.82 %). Out of 3 scapulae 2 were right side and 1 was left sided.

Dimensions measured were tabulated in Table-1.

The suprascapular nerve is predominantly a motor nerve which innervates the supraspinatus and the infraspinatus muscle but does not have cutaneous sensory components (Safran M 2004). SN has long course and it travels under STSL and spinoglenoid ligament. Variations of these ligaments may irritate the SN. Irritation of the SN gives rise to pain which is deep and poorly localized and because of this the cause of the pain and tenderness is difficult to discover in any individual and the muscle atrophy starts (Thompson W and Kopell H 1959). A thorough anatomical knowledge of the course of the nerve and its possible sites of entrapment is essential for an early and correct diagnosis.

In 1959, Kopell and Thompson (1959) described that the main site of entrapment of the SN is at suprascapular notch. Narrowing of the SSN may occur due to calcification, partial or complete ossification of STSL, presence of bony bridge which irritate or compress the suprascapular nerve and give rise to suprascapular nerve entrapment syndrome (Natsis K et al 2008). Also, the shape of the SSN and excessive movement of the shoulder exerts traction on the suprascapular nerve which leads to its compression against the superior transverse scapular ligament (Soni, G et al. 2011). According to Callahan et al. suprascapular nerve entrapment is an acquired neuropathy which is secondary to compression of the nerve in the bony suprascapular notch more than in the spinoglenoid notch (Callahan, J et al 1991).

Many researchers described the variable incidence of complete ossification of STSL and it differs from population to population (Table-2).

Our study reported 9.7% incidence of completely ossified STSL which is slightly higher than Suman et al 2013 (6.1%). Incidence of ossified SSTL reported by Silva et al. was quite high as compared to our study. A case report of complete ossification of STSL was reported by Khan and Das et al. in Indian population (Khan M 2006, Das et al 2007).

Complete ossification of STSL was very rare in some population such as in American native – 2.1- 2.9 %, Eskimos-0.3% (Osuagwu, F 2005). A familial case of calcification of STSL was described by Cohen et al. in father and son and both were suffering from entrapment neuropathy of

suprascapular nerve (Cohen S 1997). In the literature the incidence of partial ossification of superior transverse scapular ligament varied from 3.7% - 4% but our study observed it in 5.82 % scapulae which is slightly higher which may be because of difference of region and population used for these studies (Rengachary S 1979, Hrdlicka A 1942). Present study was done on dry bone so without clinical history therefore it is difficult to say that person suffered from suprascapular nerve entrapment neuropathy or not. We feel that further detail study should be done on large number of scapulae from different region and population along with cadaveric study.

Fig 1: Arrow showing complete ossification of superior transverse scapular ligament.

Fig 2: Arrow showing partial ossification of superior transverse scapular ligament.



References

- Callahan JD, Scully TB, Shapiro SA, et al., 1991. Suprascapular nerve entrapment. A series of 27 cases. *Journal of Neurosurgery*. 74(6): 893-6.
- Cohen SB, Dnes DM, Moorman CT. 1997. Familial calcification of the superior transverse scapula ligament causing neuropathy. *Clin. Orthop. Rel. Res.* 334:131-5.
- Das S, Suri R, Kapur V. 2007. Ossification of Superior Transverse Scapular Ligament and its Clinical Implications. *Sultan Qaboos University Medical Journal*. 7 (2): 157-160.
- Dunkelgrun M, Iesaka K, Park SS, Kummer FJ, Zuckerman JD. 2003. Interobserver reliability and intraobserver reproducibility in suprascapular notch typing. *Bull Hosp Joint Dis.* 61:118-22.

- Harris RI, Vu DH, Sonnabend DH, Goldberg J A, Walsh WR. 2001. Anatomic variance of the coracoclavicular ligaments. *J. Shoulder Elbow Surg.* 10:585-8.
- Hrdlicka A. 1942. The scapula: Visual observations. *Am J Phys Anthropol.* 2:73-94.
- Kalpana T, Renuka Karam N, Saratchandra Singh. 2013. Ossification of transverse scapular ligament. *Journal of Evolution of Medical & Dental Sciences.* 2(12):1790-91.
- Khan M A. 2006. Complete ossification of the superior transverse scapular ligament in an Indian male adult. *Int. J. Morphol.* 24(2):195-6.
- Kopell HP, Thompson WA. 1959. Pain and the frozen shoulder. *Surg Gynecol Obstet* 109: 92-96.
- Natsis K, Trifon T, Ioannis G, Konstantinos V, Efthymia P, Prokopios T. 2008. A bony bridge within the suprascapular notch. Anatomic study and clinical relevance. *Aristotle University Medical Journal.* 35 (1): 204-211.
- Osuagwu FC, Inocemi IO, Shokunbi MT. 2005. Complete ossification of the superior transverse scapular ligament in a Nigerian male adult. *Int. J. Morphol.* 23(2):121-2.
- Polguy M, Jedrzejewski K, Agata M, Topol M. 2012. Variations in bifid superior transverse scapular ligament as a possible factor of suprascapular entrapment: an anatomical study. *Int. Ortho. (SICOT).* 36:2095-2100.
- Rengachary SS, Burr D, Lucas S, Hassanein KM, Mohn MP, Matzke H. 1979. Suprascapular entrapment neuropathy: a clinical, anatomical, and comparative study. Part 2. Anatomical study. *Neurosurg.* 5:447-51.
- Safran M R. 2004. Nerve injury about the shoulder athlete. *The American Journal of Sport Medicine.* 32: 803-819.
- Sinkeet SR, Awori KO, Odula PO, Ogeng'o JA, Mwachaka PM. 2010. The suprascapular notch: its morphology and distance from the glenoid cavity in a Kenyan population. *Folia Morphol (Warsz).* 69:241-5.
- Silva SF, Babinski MA. 2007. High Incidence of Complete Ossification of the Superior Transverse Scapular Ligament in Brazilians and its Clinical Implications *Int. J. Morphol.* 25(4):855-859.
- Soni, G, Malik, VS, Shulka L, et al, 2012. Morphometric analysis of the suprascapular notch. *The Internet Journal of Biological Anthropology.* 5(1):20-7.
- Standring S, Ellis H, Healy J, Johnson D, Williams A. 2005. Pectoral girdle, shoulder region and axilla. In: Standring S, ed. *Gray's Anatomy - The Anatomical Basis of Clinical Practice.* Elsevier Churchill Livingstone: New York; P p. 796.
- Suman P, Mahato R, Sabita Singh, ArunKumar, Bilodi S. 2013. Complete ossification of superior transverse scapular ligament: incidence and its clinical implications. *Int J Cur Res Rev.* 5 (13): 80-87.
- Thompson WAL, Kopell HP. 1959. Peripheral entrapment neuropathies of the upper extremities. *N Engl J Med.* 260:1261-1265.
- Ticker JB, Djurasovic M, Strauch RJ, April EW, Pollock RG, Flatow EL, Bigliani LU. 1998. The incidence of ganglion cysts and other variations in anatomy along the course of the suprascapular nerve. *J Shoulder Elbow Surg.* 7:472-478.
- Tubbs RS, Shoja MM, Shokouhi G, Loukas M, Oakes WJ. 2007. Retrosplenic course of the transverse cervical artery with the suprascapular artery travelling through the suprascapular notch. *Folia Morphol.* 66: 80-82.