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Research Paper

Complete ossification of Superior transverse scapular ligament (STSL) in dried human scapulae in Gujarat region: A risk Factor for Suprascapular nerve compression

Medical Science

KEYWORDS : Scapula, suprascapular notch, superior transverse scapular ligament, suprascapular nerve

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ABSTRACT

The superior transverse scapular ligament (STSL) bridges the suprascapular notch of scapula, converting it into a suprascapular foramen. The suprascapular nerve traverses through the suprascapular foramen and suprascapular vessels pass above the ligament. Often the STSL gets ossified leading to entrapment of the suprascapular nerve producing relevant symptoms. The entrapment of the suprascapular nerve by the ossified STSL may result in symptoms like pain in the shoulder region and also result in wasting and weakness of the supraspinatus and infraspinatus muscles. Such a condition has to be differentiated from other conditions like rotator cuff tears. The purpose of present study was to find incidence of complete ossification of STSL in Gujarat region. 200 (Right-98, Left-102) dried human scapulae were examined for the complete ossification of STSL. 3.5% (7 in 200) scapulae presented with completely ossified STSL (Right-4, Left-3). It can be one of the leading causes of suprascapular neuropathies.

INTRODUCTION:

The scapula is a triangular, flattened bone. It extends from the second to the seventh rib in the posterolateral aspect of thorax. Its superior border extends between superior and lateral angles. The suprascapular notch is located in this border near the root of coracoid process. This notch is converted into a foramen called suprascapular foramen by superior transverse scapular ligament (STSL/suprascapular ligament). This ligament is a flat fasciculus which narrows its attachments to the base of the coracoid process and medial side of the suprascapular notch. This ligament is sometimes ossified. (Standring et al., 2008) The suprascapular nerve passes through the foramen and the suprascapular vessels cross above the ligament. The anatomical knowledge of this foramen is of extreme importance for clinicians as it can be a risk factor during surgical explorations of this region. (Ticker et al., 1998; Jadhav et al., 2012)

MATERIALS AND METHODS:

The present study was carried out on 200 (Right-98, Left-102) intact dried human scapulae of unknown sex obtained from Department of Anatomy, Government Medical College, Surat; Pramukhswami medical college, Karamsad and B J Medical College, Ahmedabad, Gujarat. Each intact scapula was observed for complete ossification of STSL. As criteria of inclusion, none of the scapulae presented fractures, malformations, damage due to conservation or pathology that could influence the development. The results were tabulated and analyzed statistically.

RESULTS:

completely ossified STSL (as shown in fig.) was observed in 7 (3.5%) scapulae (Right-4 and left-3) showing the presence of suprascapular foramen in dry scapulae. According to this study, the incidence of ossification of STSL is 3.5%. Scapulae of right side are having higher incidence (4.08%) than those of left side (2.94%).

DISCUSSION:

Entrapment of suprascapular nerve in the suprascapular foramen produces a constellation of symptoms and signs that defines a clinically recognizable syndrome. This is commonly recognized as suprascapular nerve entrapment syndrome. The role of suprascapular nerve entrapment in chronic shoulder pain and dysfunction is well appreciated by orthopedicians. The morphology of the bony notch altered due to ossification of STSL has been one of the significant causes for entrapment (Rengachary et al., 1979, Natsis et al., 2007; Wang et al., 2011).

The incidence of ossified STSL has been reported as 1.5% in Finnish population (Kajava et al., 1924), 6.5% in Italian population (Vallois, 1925), 30.76% in Brazilian population (Silva et al., 2007) and as 3% In North Indian population (Soni et al., 2012). The present study results performed in Western region closely correlate with other Indian study that was performed in North Indian region.

Table - Comparison of incidence of Ossified superior transverse scapular ligament with other studies

Sr .No	Author	Incidence of Ossified superior transverse scapular ligament
1	Kajava et al.	1.5%
2	Vallois et al.	6.5 %
3	Silva et al.	30.76%
4	Soni et al.	3%
5	Present study	3.5%

The STSL experiences both compressive and tensile forces. This is indicated by the presence of fibro cartilage enthuses (Morrigl et al., 2001) in the ligament. The incidence of ossification has been noted to increase with age (Hrdlicka, 1942). This finding indicates that the compressive and tensile forces play an important role in the ossification. Previous studies also confirm that the STSL may be ossified partially or completely (Ticker et al., 1998). Silva et al. (2007) has proposed that the pull of muscles and certain habits during utilization of the upper limbs are the probable causes of high incidence of ossification in the studied population. Familial cause for calcification has also been described (Cohen et al., 1997).

The nerve conduction velocity and electromyographic studies may help in proper diagnosis. (Cummins et al., 2000) Investigations like CT and MRI scans may help at arriving at a correct diagnosis. Also the atrophy of muscles has been found in MRI scans; therefore MRI scans may be beneficial for correct diagnosis. (Kullmer et al., 1998)

Non-operative treatment has been advised for majority of the cases. (Cummins et al., 2000) A rehabilitation programme with gradual strengthening of the involved muscles is always advised. In extreme cases, surgical decompression of the nerve is advised. The approach is anterior, superior or posterior. The idea is to identify the suprascapular nerve by retracting the suprascapular vessels laterally and then the STSL may be resected to decompress the impinged nerve. (Cohen et al., 1997)

Patients presenting with chronic shoulder pain, dysfunction and wasting of the muscles innervated by suprascapular nerve require surgical decompression of the same. The surgical technique includes direct exploration or arthroscopic release. Arthroscopic release of the STSL is the current trend in the surgical treatment of the suprascapular nerve entrapment neuropathy. The technique of arthroscopic release has been found better when compared to the routine or traditional open release

technique (Lafosse et al., 2007). In arthroscopic release the neurovascular structures and STSL are better visualized and also the procedure is simple and less invasive when compared to direct exploration (Lafosse et al., 2007). Variation in the STSL as in case of its ossification, the surgical procedure becomes more difficult and risky. Injury to the suprascapular vessels and nerve are the potential risk factors in case of ossified STSL. The choice of instruments (arthroscopic burr VS Kerrison punch) is also to be decided pre- operatively in decompressing the suprascapular nerve entrapped due to ossified STSL (Bhatia et al., 2006; Lafosse et al., 2007; Agrawal, 2009).

More recent publications on this topic illustrate the continued interest in this variation from various ethnic groups and the potential associated pathology. (Bayramoglu et al., 2003; Sinkeet et al., 2010; Duparc et al., 2010) Additional contributing factors may also be at play such as the fascia of the supraspinatus. (Duparc et al., 2010)

The present study indicates 3.5% incidence of completely ossified STSL in dried scapula forming a complete bony suprascapular foramen in Gujarat region. This adds to the further knowledge regarding the suprascapular notch in Indian population which can be helpful to the clinicians while performing surgeries over this area.

CONCLUSION

Present study showed 3.5% incidence of ossified STSL which can be a potential risk factor for the suprascapular nerve entrapment syndrome. The anatomical and radiological knowledge of the ossification of the STSL are of extreme importance for clinicians, radiologists and surgeons dealing with suprascapular nerve entrapment conditions. It also can be inferred that the compressive and tensile forces play an important role in either partial or complete ossification of STSL. Considering the variations in the incidences of ossified STSL, further detailed study using the cadaveric dissection, dry bones and radiology are suggested which may add to the current knowledge about the ossification of STSL.

Figure: Complete ossification of STSL in left scapula

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