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Anatomy of Suprascapular Notch and its Association with Suprascapular Nerve Entrapment Syndrome

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Abstract: This study deals with the morphological variations of suprascapular notch of dry scapula. A total of 200 human dry scapulae which were obtained from the Department of Anatomy of various medical colleges were analyzed. The variation of suprascapular notch was recorded and classified into different types. The most common type of suprascapular notch in the study was U shaped. The other shaped were V and J shaped. We also encountered ossified suprascapular ligament and complete absence of suprascapular notch. Such conditions can cause suprascapular nerve entrapment syndrome.

Keywords: Scapula, Suprascapular notch, Suprascapular nerve entrapment syndrome.

INTRODUCTION

Suprascapular notch is a depression on the superior border of scapula close to the coracoid process. The suprascapular notch is bridged by the suprascapular ligament thus, converting suprascapular notch into suprascapular foramen [1]. The suprascapular nerve passes through the foramen whereas suprascapular vessels pass above the suprascapular ligament [2]. The suprascapular nerve is a branch of upper trunk of brachial plexus which has a root value of C5 and C6. It is a mixed nerve containing both sensory and motor fibers. The sensory fibers supplies to rotator cuff, ligaments of shoulder joint and acromioclavicular joint. The motor fibers supply supraspinatus and infraspinatus muscles [2].

The ossification of suprascapular ligament causes the compression of the suprascapular nerve leading to suprascapular nerve entrapment syndrome [3]. The result of this syndrome causes weakness of the upper arm, difficulty in abduction and external rotation of the shoulder joint and then atrophy of the supraspinatus and infraspinatus muscles [4]. Approximately 1–2% of shoulder pain is caused by the suprascapular nerve entrapment syndrome [5]. This entrapment syndrome is frequently found in volleyball players, tennis players, badminton players and individuals with occupations which require a lot of overhead work who perform extreme abduction and external rotation of shoulder joint [6-10]. The size of suprascapular notch is an important factor to cause suprascapular nerve entrapment syndrome because narrow suprascapular notch was encountered in those patients with this syndrome [11-16]. Thus, morphological variation of the suprascapular notch is predisposing factors for suprascapular nerve entrapment syndrome.

MATERIALS AND METHODS

A total of 200 human scapulae irrespective of sex were studied from the Department of Anatomy of various medical colleges. They were analyzed after getting permission from the Head of the institutions and Anatomy Departments for the study. The scapulae which were broken were excluded from the study. The study was conducted between June 2016 to October 2017. The variation of suprascapular notch was recorded and classified into different types U shaped, V shaped, J shaped, absence of suprascapular notch and presence of suprascapular foramen. The data were obtained, tabulated and statistically analyzed.

RESULTS

In this study three differents shape of suprascapular notch were observed. Out of 200 scapulae analyzed, we found U shaped notch in 42%, J shaped notch in 27.4% and V shaped notch in 6.3%. Complete absence of suprascapular notch was found in 18.6%. Suprascapular foramen was found in 5.7%, due to complete ossification of suprascapular ligament.

Fig-1: Scapulae

Fig-2: U shaped notch

Fig-3: V shaped notch

Fig-4: J shaped notch

Fig-3: Absent notch

Fig-4: Suprascapular foramen

DISCUSSION

Several studies have been reported on the variation of supra scapular notch in different population by various authors [17-19]. Natsis *et al*., studied on 423 scapulae in Germany [20]. They reported that U shaped supra scapular notch was found in 48 % [20]. The other studies in which U shaped supra scapular notch were reported by Sinkeet *et al.*, in 29% [18], Sangam *et al.*, reported 59.61% [21] and Pushpa *et al*., reported 15.34% [22]. In our study we found U shaped SSN in 42% and V shaped SSN in 6.3%. The V shaped supra scapular notch was also reported by Sinkeet *et al.*, in 5% [18] and Pushpa *et al.*, in 7.95% [22] which were similar to our result. The J shaped SSN was reported in 31% by Natis *et al.*, [20] by Muralidhar *et al*., in 8.65%, and by Pushpa *et al.*, in 34.65% [20-22]. In our study we found J shaped SSN in 27.4%.

The incidence of complete ossification of the supra scapular ligament leads to the formation of supra scapular foramen. Such type of supra scapular foramen was found in 5.7% in our study. Such findings were also reported in the literature which varies from 3.7% to 12.5% [23-26]. In our study absence of supra scapular notch was found in 18.6%, which was higher than 8% reported by Natis *et al.*, [20] But there are other reports which match with our result. Sinkeet *et al*., Muralidhar *et al*., Pushpa *et al*., Iqbal *et al*., reported absence of SSN in 22%, 21.5%, 17.61% and 18% respectively [18, 21, 22, 27]. The difference in the results in the relevant studies may be influenced by population, race, age, sex and number of sample.

According to the Dunkelgrun V shaped notch would be more likely connected with nerve entrapment syndrome because V shaped notch had less area when compared to U and J shaped SSN.[28] They are different reports in which modification of supra scapular ligaments like ossification [29, 30], bifurcation, [31] trifurcation [32] and hypertrophy [33] is correlated with supra scapular nerve entrapment syndrome. Complete absence of SSN is also one of the predisposing factors for supra scapular nerve entrapment syndrome [34].

The patient suffering from supra scapular nerve entrapment syndrome complain deep and diffuse, poorly localized burning pain on the posterior aspect of shoulder joint which exaggerate on activity. In few cases, the pain may radiate to the ipsilateral side of neck, chest and extrimity.

The patient also complain feeling of weakness in the affected shoulder, especially when performing overhead activities due to weakness and atrophy of supraspinatus and infraspinatus muscles caused by denervation of these muscles [35]. Supra scapular nerve entrapment syndrome is treated usually by surgical decompression of the nerve at the site of entrapped. An arthroscopic approach is a more convenient way of treating the conditions. A due attention should be given in case of complete ossification of supra scapular ligament, as in this condition, a complete excised of bony bridge should be done for better management of post operative outcome.

CONCLUSION

There is no uniformity in the shape of suprascapular notch. The suprascapular notch usually showed U shaped and J shaped. In few cases, due to complete ossification of suprascapular ligament, there is

suprascapular foramen and in some cases, the suprascapular notch may be absent. These finding of such anatomical variations of suprascapular notch may be helpful for clinicians, for making a proper diagnosis and planning the most suitable surgical interventions in suprascapular nerve entrapment syndrome.

REFERENCES

1. Ajmani, M. L. (1994). The cutaneous branch of the human suprascapular nerve. *Journal of anatomy*, *185*(Pt 2), 439.
2. Standring, S., Ellis, H., Healy, J., Johnson, D., & Williams, A. (2008). Pectoral girdle, shoulder region and axilla. *Gray's Anatomy. 40th Ed. Edinburgh: Churchill Livingston Elsevier. p*, 791-822.
3. Heck Jr, R. K. (2008). Malignant tumors of bone. *Osteosarcoma, Canal ST, Campbell's operative orthopedics, 11th ed, New York: Mosby*, 907-10.
4. Bayramoğlu, A., Demiryürek, D., Tüccar, E., Erbil, M., Aldur, M. M., Tetik, O., & Doral, M. N. (2003). Variations in anatomy at the suprascapular notch possibly causing suprascapular nerve entrapment: an anatomical study. *Knee Surgery, Sports Traumatology, Arthroscopy*, *11*(6), 393-398.
5. Polguj, M., Jędrzejewski, K. S., Podgórski, M., & Topol, M. (2011). Correlation between morphometry of the suprascapular notch and anthropometric measurements of the scapula. *Folia morphologica*, *70*(2), 109-115.
6. Antoniou, J., Tae, S. K., Williams, G. R., Bird, S., Ramsey, M. L., & Iannotti, J. P. (2001). Suprascapular Neuropathy: Variability in the Diagnosis, Treatment, and Outcome. *Clinical Orthopaedics and Related Research (1976-2007)*, *386*, 131-138.
7. Cummins, C. A., Messer, T. M., & Nuber, G. W. (2000). Suprascapular nerve entrapment. *JBJS*, *82*(3), 415-424.
8. Edeland, H. G., & Zachrisson, B. E. (1975). Fracture of the scapular notch associated with lesion of the suprascapular nerve. *Acta Orthopaedica Scandinavica*, *46*(5), 758-763.
9. Ferretti, A. N. D. R. E. A., Cerullo, G. U. G. L. I. E. L. M. O., & RUsso, G. I. O. V. A. N. N. (1987). Suprascapular neuropathy in volleyball players. *JBJS*, *69*(2), 260-263.
10. VastamÄki, M., & Göransson, H. A. R. R. Y. (1993). Suprascapular nerve entrapment. *Clinical orthopaedics and related research*, (297), 135-143.
11. Polguj, M., Jędrzejewski, K. S., Podgórski, M., & Topol, M. (2011). Correlation between morphometry of the suprascapular notch and anthropometric measurements of the scapula. *Folia morphologica*, *70*(2), 109-115.
12. Ofusori, D. A., Ude, R. A., Okwuonu, C. U., & Adesanya, O. A. (2008). Complete absence of the suprascapular notch in a Nigerian scapula: a possible cause of suprascapular nerve entrapment. *International journal of shoulder surgery*, *2*(4), 85.
13. Yücesoy, C., Akkaya, T., Özel, Ö., Cömert, A., Tüccar, E., Bedirli, N., ... & Gümüş, H. (2009). Ultrasonographic evaluation and morphometric measurements of the suprascapular notch. *Surgical and radiologic anatomy*, *31*(6), 409.
14. Jadhav, S. D., Patil, R. J., Roy, P. P., Ambali, M. P., Doshi, M. A., & Desai, R. R. (2012). Supra-scapular foramen in Indian dry scapulae. *National Journal of Clinical Anatomy*, *1*(3), 133-135.
15. Tubbs, R. S., Nechtman, C., D'Antoni, A. V., Shoja, M. M., Mortazavi, M. M., Loukas, M., ... & Spinner, R. J. (2013). Ossification of the suprascapular ligament: a risk factor for suprascapular nerve compression?. *International journal of shoulder surgery*, *7*(1), 19.
16. Albino, P., Carbone, S., Candela, V., Arceri, V., Vestri, A. R., & Gumina, S. (2013). Morphometry of the suprascapular notch: correlation with scapular dimensions and clinical relevance. *BMC musculoskeletal disorders*, *14*(1), 172.
17. Polguj, M., Jędrzejewski, K. S., Podgórski, M., & Topol, M. (2011). Correlation between morphometry of the suprascapular notch and anthropometric measurements of the scapula. *Folia morphologica*, *70*(2), 109-115.
18. Sinkeet, S. R., Awori, K. O., Odula, P. O., Ogeng'o, J. A., & Mwachaka, P. M. (2010). The suprascapular notch: its morphology and distance from the glenoid cavity in a Kenyan population. *Folia morphologica*, *69*(4), 241-245.
19. Wang, H. J., Chen, C., Wu, L. P., Pan, C. Q., Zhang, W. J., & Li, Y. K. (2011). Variable morphology of the suprascapular notch: an investigation and quantitative measurements in Chinese population. *Clinical Anatomy*, *24*(1), 47-55.
20. Natsis, K., Totlis, T., Tsikaras, P., Appell, H. J., Skandalakis, P., & Koebke, J. (2007). Proposal for classification of the suprascapular notch: a study on 423 dried scapulas. *Clinical Anatomy: The Official Journal of the American Association of Clinical Anatomists and the British Association of Clinical Anatomists*, *20*(2), 135-139.
21. Sangam, M. R., Devi, S. S. S., Krupadanam, K., & Anasuya, K. (2013). A study on the morphology of the suprascapular notch and its distance from the glenoid cavity. *Journal of clinical and diagnostic research: JCDR*, *7*(2), 189.
22. Pushpa, N. B., & Bajpe, R. (2015). Morphology of suprascapular notch: a study on 176 dry scapulae. *Int J Anat Res*, *3*(4), 1642-45.
23. Hrdlička, A. (1942). The scapula: visual observations. *American Journal of Physical Anthropology*, *29*(1), 73-94.

24. Rengachary, S. S., Burr, D., Lucas, S., Hassanein, K. M., Mohn, M. P., & Matzke, H. (1979). Suprascapular entrapment neuropathy: A clinical, anatomical, and comparative study: Part 2: Anatomical study. *Neurosurgery*, *5*(4), 447-451.
25. Ticker, J. B., Djurasovic, M., Strauch, R. J., April, E. W., Pollock, R. G., Flatow, E. L., & Bigliani, L. U. (1998). The incidence of ganglion cysts and other variations in anatomy along the course of the suprascapular nerve. *Journal of Shoulder and Elbow Surgery*, *7*(5), 472-478.
26. Bayramoğlu, A., Demiryürek, D., Tüccar, E., Erbil, M., Aldur, M. M., Tetik, O., & Doral, M. N. (2003). Variations in anatomy at the suprascapular notch possibly causing suprascapular nerve entrapment: an anatomical study. *Knee Surgery, Sports Traumatology, Arthroscopy*, *11*(6), 393-398.
27. Iqbal, K., & Iqbal, R. (2011). Classification of suprascapular notch according to anatomical measurements in human scapulae. *J Coll Physicians Surg Pak*, *21*(3), 169-70.
28. Dunkelgrun, M., Iesaka, K., Park, S. S., Kummer, F. J., & Zuckerman, J. D. (2003). Interobserver reliability and intraobserver reproducibility in suprascapular notch typing. *Bulletin-hospital for joint diseases new york*, *61*(3/4), 118-122.
29. Cohen, S. B., Dines, D. M., & Moorman, C. T. (1997). Familial calcification of the superior transverse scapular ligament causing neuropathy. *Clinical orthopaedics and related research*, (334), 131-135.
30. Khan, M. A. (2006). Complete ossification of the superior transverse scapular ligament in an indian male adult/Osificacion competa del ligamento escapular superior en un hombre adulto de la India. *International Journal of Morphology*, *24*(2), 195-197.
31. Alon, M., Weiss, S., Fishel, B., & Dekel, S. H. M. U. E. L. (1988). Bilateral suprascapular nerve entrapment syndrome due to an anomalous transverse scapular ligament. *Clinical orthopaedics and related research*, (234), 31-33.
32. Ticker, J. B., Djurasovic, M., Strauch, R. J., April, E. W., Pollock, R. G., Flatow, E. L., & Bigliani, L. U. (1998). The incidence of ganglion cysts and other variations in anatomy along the course of the suprascapular nerve. *Journal of Shoulder and Elbow Surgery*, *7*(5), 472-478.
33. Garcia, G., & McQueen, D. A. V. I. D. (1981). Bilateral suprascapular-nerve entrapment syndrome. Case report and review of the literature. *JBJS*, *63*(3), 491-492.
34. Ofusori, D. A., Ude, R. A., Okwuonu, C. U., & Adesanya, O. A. (2008). Complete absence of the suprascapular notch in a Nigerian scapula: a possible cause of suprascapular nerve entrapment. *International journal of shoulder surgery*, *2*(4), 85.
35. Holzgraefe, M., Kukowski, B., & Eggert, S. (1994). Prevalence of latent and manifest suprascapular neuropathy in high-performance volleyball players. *British journal of sports medicine*, *28*(3), 177-179.