STRESZCZENIE W JĘZYKU ANGIELSKIM

Introduction:

Suprascapular notch is an incisura at the upper border of the scapula, situated medially to the base of the coracoid process. It is bridged by the superior transverse scapular ligament to create the osteofibrous tunnel. This space is usually occupied by the suprascapular nerve and vein. On the contrary the suprascapular artery runs above the superior transverse scapular ligament.

Suprascapular notch region is characterised by great diversity of anatomical variations concerning for ex.: shape of the suprascapular notch; presence of additional ligaments; shape of ligament; topography of suprascapular neuro-vascular bundle; and presence of accessory vessels. Due to the fact that the suprascapular notch only recently emerged within the scope of clinical researches, more detailed analysis of the anatomy of this region is required. During dissection of the shoulder region, on the anterior side of the suprascapular notch, I noticed a vain that raised from the confluence of a few nutrient veins of the scapula and passed on the inferior border of the suprascapular notch to the supraspinatus fossa. In available literature, I was not able to find a description of this vein, thus I used a name “the suprascapular notch vein”.

Suprascapular notch is the most common place for the suprascapular nerve injury. Morphological variations in this region are one of the most important risk factors of this pathology. In general, the suprascapular nerve injury is considered to cause up to 2% of shoulder pain syndromes, however its frequency is much higher in professional sportsmen

performing overhead activities. The diagnosis is usually delayed, what results in poor treatment outcome and disability of the upper limb.

It is presently stated that every anatomical variant that constricts the space for the suprascapular nerve passage (e.g. deep and narrow suprascapular notch), might predispose to the suprascapular nerve neuropathy. However most of researches focused on qualitative analysis of a single risk factor. In my opinion aetiology of this pathology is more complex. Furthermore, due to development of orthopaedics and anaesthesiology, some structures that used to be omitted in anatomical descriptions might become clinically relevant.

Aims:

1. To create the objectified parameters enabling complex assessment of the morphological variations of the suprascapular notch region.
2. To characterise the morphology of the suprascapular notch vein.
3. To evaluate functional properties of the anterior coracoscapular ligament.

Material and Methods

100 formalin-fixed cadaveric shoulder were included into the study. 60 of them were fully dissected and in 40 limbs the suprascapular notch region has already been dissected for teaching purposes, thus this region was only cleared to visualise the osteofibrous structures. The study protocol was accepted by bioethics committee of Medical University of Lodz (RNN/580/13/KE).

Dissection and data acquisition were performed in stages according to the protocol enabling to evaluate following structures: the suprascapular neurovascular bundle; ligaments in the suprascapular notch region; shape of the suprascapular notch. After each stage the

photographic documentation was obtained to perform further measurements by means of the professional software for quantitative image analysis (MultiScanBase 18.03 Software; Computer Scanning System II, Warsaw, Poland). The following measurements were obtained: diameter of nerve and vessels of the suprascapular notch region; parameters required to classify the suprascapular notch, superior transverse scapular ligament and anterior coracoscapular ligament to present classifications; lengths of proximal and distal attachments of ligaments to the border of the suprascapular notch; areas of the anterior side of ligaments, the suprascapular notch and the passage for the suprascapular nerve.

Statistical analysis was performed by means of the Statistica 12.0 (StatSoft Polska, Kraków, Polska) considering $p < 0,05$ significant. Nominal variables were compared by means of the Chi^2 test. After evaluation of normality of data distribution (the Shapiro-Wilk test) quantitative variables were compared with the Manny-Whitney test (comparison between 2 groups) or the Kruskal-Willis ANOVA with dedicated post-hoc tests (comparison between more than 2 groups). Correlation was tested with the Spearman's rank correlation coefficient.

Results:

Considering obtained measurements we proposed two new parameters that enable complex assessment of suprascapular notch morphology:

1. The area reduction coefficient (ARC) – parameter describing what percentage of the whole area of the suprascapular notch is occupied by the ligaments.
2. The ambit occupation coefficient (AOC) – parameter describing what percentage of the length of the bony border of the suprascapular notch is occupied by proximal and distal attachments of the ligaments.

The mean value of the ARC was 72,6% (± 12%), and AOC 61,2% (± 10%). Parameters

correlated with each other (R = 0,6855; p < 0,0001). They also correlate with the area of the suprascapular nerve passage, however the correlation was stronger for the ARC (ARC: R = -0,7555; p < 0,0001; AOC: R = -0,5609; p < 0,0001). The ARC was significantly increased in suprascapular notches with the band-shaped type of the superior transverse scapular ligament (70,9%) than in notches with fan-shaped type of the ligament (65,3%; p = 0,0274).

The suprascapular notch vein was present in 35 specimens (58,3%) out of 60 included into the analysis. In 11 cases it was double. In all specimens it ran below the superior transverse scapular ligament and anterior coracoscapular ligament (if present). The area of the suprascapular nerve passage did not differed significantly considering nor presence neither the diameter of the suprascapular notch vein. However the suprascapular notch vein co-occurred significantly more often with the anterior coracoscapular ligament (p = 0,0001), and in these cases had significantly bigger diameter (2 mm ± 0,7 mm vs. 1,5 mm ± 0.6 mm; p = 0,021).

Anterior coracoscapular ligament was present in 52 out to 100 specimens (52%). Band-shaped type was the most common (33 cases; 63,5%), and the vestigial type was the second most common (10 cases; 19.2%). The vestigial type is a fine fibrous structure that align the lower border of the suprascapular notch. Hence, I assumed that on the contrary to other types of the anterior coracoscapular ligament, it does not play a mechanical function. After exclusion of this type from analysis, there was a significant difference between maximal depth of the suprascapular notches between specimens with the anterior coracoscapular ligament (11,3 mm) and without it (9,6 mm; p = 0,0018).

Conclusions:

1. Created parameters allow to quantitatively evaluate the influence of the morphological variation of the suprascapular notch and associated ligaments on the area of the suprascapular nerve passage.
2. The suprascapular notch vein was a common structure that always passed to the supraspinatus fossa through the deepest point of the suprascapular notch. I co-occurred significantly more often with the anterior coracoscapular ligament.
3. Anterior coracoscapular ligament can present in mechanically sufficient form and in these cases it co-occurred significantly more often with deeper suprascapular notches.