Scapular region topography concerning peripheral nerves and anatomical implication of nerve entrapment

ABSTRACT

The objectives were to identify and detail the suprascapular notch (SSN), a narrow topographical space where the suprascapular nerve (SN) passes through. The goals were to identify the anatomical sites and causes of the suprascapular nerve entrapment (SNE) and to enhance its diagnostic imaging methods and surgical approaches. The morphology of the SSN was observed in 333 unpaired and 180 paired dry scapulae, and classified into five types based on depth versus superior width measurements where the morphometry of each SSN type was analyzed to assess the pattern of SSN stenosis. The topography of the suprascapular canal (SSC) was dissected and observed in 30 cadaveric specimens. The topography of the SSN was dissected and its contents were observed in 159 cadaveric specimens to profile its variations, followed by analyzing the relationships of the SSN surrounding muscles in 115 cadaveric specimens. Systematic and narrative reviews were conducted in order to established the list of SNE anatomical etiologies and their surgical managements. The relevant anatomical terms were discussed through the consensus method of Delphi. Basic imaging modalities (plain film X-rays, 3D-CT reconstructions, MRI and ultrasound) were evaluated for their efficacy in detecting the SSN. The SSC was identified as an osteofibrous canal with a peer-consensus level of 76.4% concerning the new designated term. The SSN has been classified into five types: Type-I (8.3%), Type-II (12.3%), Type-III (51.2%), Type-IV (6.4%), and Type-V (21.8%). The overall incidence of SSN stenosis was 15% and by each SSN type was as follows: Type-I (1.6%), Type-II (2.8%), Type-III (16.3%), Type-IV (1.6%), and Type-V (15.1%). The SN passes under the suprascapular ligament (SSL) in all cases, while the vessels passes above the SSL only in 51%. An internal vessel(s) pass(es) within the SSN in 49% of cases. More than one suprascapular vein was found in 33.3% with a diameter ranging from 0.5 to 5 mm, and more than one suprascapular artery (SA) was found in 3.3% with a diameter ranging from 1 to 5 mm. The subscapularis muscle (SUBM) was covering the anterior surface of the SSN completely in 3.5% and partially in 38.3% of cases. The SN can be compressed dynamically within the SSN by an accompanying pulsating SA, or by SUBM impingement. The SSL was covered by the inserting omohyoid muscle partially in 29.6% of cases. Ultrasound algorithm to detect a suspected SSN stenosis is proposed by measuring the

SSN depth and width. Conservative treatment of the SSN does not assure motor recovery with a reported motor impairment in 60% of cases. A surgical ligamentectomy would release the entrapped SN only if it was compressed by the SSL. An osteoplasty is inevitable when the SN is compressed by bone tissue.