

ANATOMICAL RELATIONSHIP OF THE SUPRASCAPULAR NERVE TO THE CORACOID PROCESS, ACROMIOCLAVICULAR JOINT AND ACROMION

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ABSTRACT

Objective: To establish the anatomical relationship of the suprascapular nerve (SSN) located in the suprascapular notch, to the medial border of the base of the coracoid process, the acromial joint surface of the acromioclavicular joint and the anterolateral border of the acromion. **Methods:** We dissected 16 shoulders of 16 cadavers (9 males and 7 females). The distances from the suprascapular nerve (at its passage beneath the transverse ligament) to certain fixed points on the medial border of the base of the coracoid process, the acromial joint surface of the acromioclavicular joint, and the anterolateral border of the acromion were measured with the aid of calipers and correlated

with age and sex. Cadavers with previous surgical interventions were excluded. **Results:** The mean measurements from the notch of the suprascapular nerve were: 3.9 cm to the medial border of the base of the coracoid process (ranging from 3.1 cm to 5.2 cm); 4.7 cm to the acromioclavicular joint (ranging from 3.9 cm to 5.2 cm); and 6.1 cm to the anterolateral border of the acromion (ranging from 5.7 cm to 6.8 cm). **Conclusion:** Accurate anatomical knowledge of the nerves of the anterior region of the shoulder is essential in order to avoid iatrogenic injuries and to achieve satisfactory results in surgical treatment for shoulder diseases, whether performed as open or arthroscopic procedures.

Keywords – Shoulder; Brachial plexus; Anatomy

INTRODUCTION

The suprascapular nerve is formed basically by the C6 and C7 nerve roots, and is a branch of the upper trunk of the brachial plexus⁽¹⁾. It is responsible for 70% of the sensitive innervations of the shoulder joint and also innervates the supraspinatus and infraspinatus muscles, which are components of the rotator cuff⁽²⁻⁴⁾.

Although reports of lesions of the suprascapular nerve are rare, the nerve is at risk of becoming injured during arthroscopic procedures⁽⁵⁻⁷⁾. In the literature, there are reports that the suprascapular nerve can be injured during surgical procedures that require posterior dissection of the shoulder joint, such as rotator cuff advancement, capsulorrhaphy, osteotomy for posterior instability and transglenoid suturing for anterior instability, among others⁽²⁾. Furthermore,

mechanisms for compression and traction of this nerve in athletes have been described⁽⁴⁾, along with a real possibility of causing injury while opening up an anterior access to treat acromioclavicular joint injuries or fractures of the coracoid process⁽³⁾.

There is a scarcity of studies correlating the suprascapular nerve with anatomical parameters. Given the importance of knowledge of the macroscopic and arthroscopic reference parameters for this nerve, in order to treat diseases of the nerve itself or of the shoulder, the purpose of this study was to measure the distances between fixed anatomical points (medial border of the base of the coracoid process, anterolateral border of the acromion and acromial joint face of the acromioclavicular joint) and the suprascapular nerve, at its notch under the transverse scapular ligament.

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METHODS

This study was approved by the Discipline of Descriptive and Topographic Anatomy and was submitted for assessment by the Medical Research Ethics Committee of the Federal University of São Paulo – Paulista School of Medicine.

Material

Dissections were performed on 16 shoulders of 16 cadavers. The right or left side was chosen randomly. There were nine male and seven female cadavers, of ages ranging from 46 to 82 years (mean of 59 years).

The dissections were performed on cadavers at the Anatomy Laboratory of the Federal University of São Paulo that had been conserved in a 10% formaldehyde solution for periods ranging from three to five years.

Method

The dissections were performed by means of a “sword blade” incision, and the bone parameters were the coracoid process, acromioclavicular joint and middle third of the clavicle.

After making the incision, we crossed the acromioclavicular joint and came back to the clavicle through deinsertion of the coracoclavicular ligaments and trapezius muscle. Next, we deinserted the supraspinal muscle in order to have a better view of the scapular incisure, in which we found the upper transverse ligament of the scapula and the nerve under the ligament (Figure 1).

After isolating the nerve branches (motor to the supraspinal and infraspinal and sensitive to the posterior region of the capsule), we measured the distances that were to be evaluated in this study.

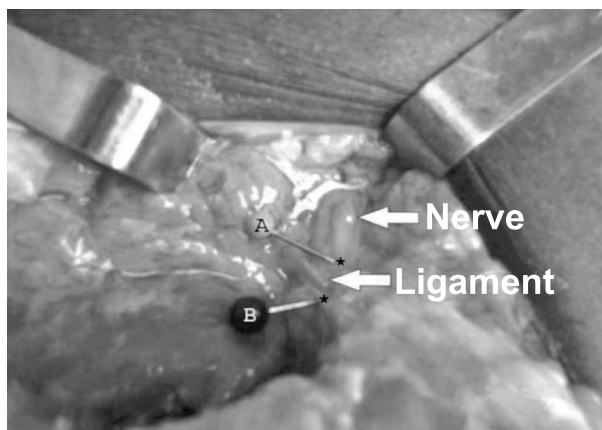


Figure 1 – Suprascapular nerve (pin A) and the upper transverse ligament of the scapula (pin B)

The measurements were made using properly calibrated calipers. The distances were measurement from the suprascapular nerve, at its notch under the transverse ligament of the scapula, to the following anatomical marks: medial border of the base of the coracoid process; acromial joint face of the acromioclavicular joint; and anterolateral border of the acromion (Figure 2).



Figure 2 – Distance AB (SSN* to the acromioclavicular joint); distance AC (SSN* to the medial border of the base of the coracoid process); distance AD (SSN* to the anterolateral border of the acromion). *SSN: suprascapular nerve

In this manner, the following distances were obtained: A – suprascapular nerve to the medial border of the base of the coracoid process; B – suprascapular nerve to the anterolateral border of the acromion; and C – suprascapular nerve to the acromial joint face of the acromioclavicular joint (Figure 3).

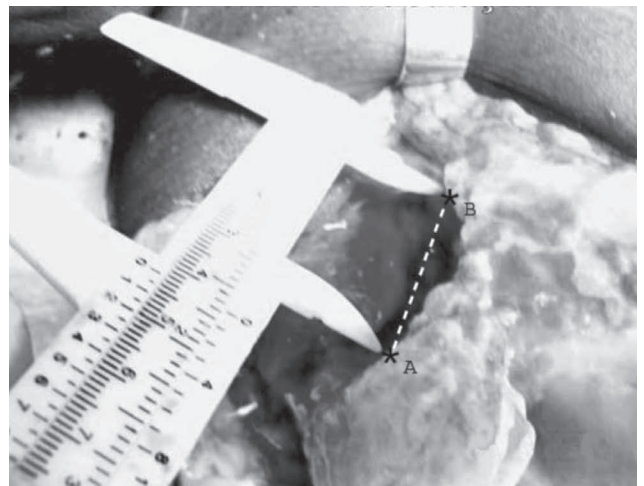


Figure 3 – Distance AB: SSN* to the acromioclavicular joint (joint face of the acromion). *SSN: suprascapular nerve

RESULTS

The anatomical measurements were as follows: distance A – from the suprascapular nerve to the medial border of the base of the coracoid process: mean of 3.9 cm; distance B – from the suprascapular nerve at the suprascapular incisure to the anterolateral border of the acromion: mean of 6.1 cm; distance C – from the suprascapular nerve to the acromioclavicular joint: mean of 4.7 cm (Tables 1 and 2).

DISCUSSION

Paralysis of the suprascapular nerve has been reported as a complication from surgical procedures for advancement and manipulation of the rotator cuff, capsulorrhaphy⁽⁸⁻¹²⁾ and osteotomy of the glenoid to treat posterior instability^(8,12-14). This motivated us to study the anatomical parameters in the anterior region of the shoulder and correlate them with the suprascapular nerve.

Meyer and Gravelleau⁽⁶⁾ reported that the lateral portal of the rotator cuff was at a mean distance of 5.3 cm from this nerve, and that care should be taken in this regard. Although reports of injury to the suprascapular nerve are rare in the literature⁽¹⁵⁻¹⁷⁾, this nerve is at risk of injury during arthroscopic procedures⁽¹⁶⁾, especially at the posterior and superior portals (Neviaser)^(7,15,18). One of the references for procedures involving the latter is the medial border of the acromion, which in our study was at a mean distance of 4.7 cm from the nerve.

Our investigation defined the distances of predefined anatomical structures (medial border of the base of the coracoid process, acromial joint face of the acromioclavicular joint and anterolateral border of the acromion) from the suprascapular nerve, located at the scapular incisure. In this study, we found that the mean distances from the suprascapular nerve to the acromioclavicular joint and to the medial border of the base of the coracoid process were 4.7 cm and 3.9 cm, respectively.

Bigliani⁽⁵⁾ showed mean distances of 1.8 cm and 2.5 cm from the suprascapular nerve to the posterosuperior labrum and supraglenoid tubercle, respectively. In the present study, the mean distance from the nerve to the anterolateral border of the acromion was 6.1 cm.

There is a scarcity of studies in the literature evaluating the distance from the suprascapular nerve to the coracoid process⁽¹⁹⁻²¹⁾. In the present study, we made measurements of the distance between the medial border of the base of the coracoid process and the nerve at

Table 1 – Results from measurements in centimeters of the distances A, B and C on 16 shoulders, with the mean measurements

N	Sex	Age	Distance A	Distance B	Distance C
1	M	51	3.2	5.9	3.9
2	M	49	3.8	5.9	4.6
3	F	82	4.2	6.6	4.8
4	M	46	3.2	6.1	5.1
5	M	77	3.9	6.8	4.8
6	M	77	3.9	6.3	5.1
7	F	71	3.6	6	4.4
8	F	63	3.3	6.4	4.1
9	M	47	3.1	5.7	3.9
10	F	57	3.2	6.3	5.1
11	M	55	4.4	6.3	3.9
12	M	53	5.2	6.1	5.2
13	F	59	5.1	6	5.1
14	F	63	3.9	5.9	5
15	F	63	3.9	5.9	5
16	M	48	5.2	5.9	5.2
Mean		68	3.9	6.1	4.7

Distance A: Medial border of the base of the coracoid process

Distance B: Anterolateral border of the acromion

Distance C: Acromioclavicular joint

Note: The distances were measured in centimeters.

Table 2 – Means in centimeters for the distances A, B and C

DISTANCE	MEAN (cm)
AB: SSN* to ACJ**	4.7 (3.9-5.1)
AC: SSN* to medial border of the base of the CP***	3.9 (3.1-5.2)
AD: SSN* to anterolateral border of the acromion	6.1 (5.7-6.8)

* SSN: suprascapular nerve

** ACJ: acromioclavicular joint

*** CP: coracoid process

its incisure, and found a mean distance of 3.9 cm. This finding is extremely importance for surgical techniques that use the coracoid process as a graft, in that the location of the suprascapular nerve has not been studied so much and the nerve is in an area that is at risk, particularly in the medial and posterosuperior regions of the base of the coracoid process.

CONCLUSION

The present study showed the distances from the suprascapular nerve to the medial border of the base of the coracoid process, the acromioclavicular joint and the anterolateral border of the acromion. These measurements are important for therapeutic management of pathologi-

cal conditions of the shoulder, in order to avoid placing the nerve at risk in procedures that involve the anterior region of the shoulder, such as fixation and reduction of fractures of the clavicle and coracoid process, reduction of acromioclavicular luxation and corrective surgery for anterior instability, along with the construction of the surgical accesses and arthroscopic portals.

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