Association of the area of sensory disturbance with the area of suprascapular nerve palsy

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ABSTRACT

Purpose. To determine the association of the area of sensory disturbance with the area of suprascapular nerve (SSN) palsy in healthy volunteers and patients with SSN palsy.

Methods. Five male and one female and healthy volunteers aged 23 to 44 (mean age, 32.2) years underwent an experiment of distal and proximal SSN block (at the spinoglenoid notch and suprascapular notch, respectively). A pinprick test was performed to determine pain sensation and the area of sensory disturbance. In addition, records of 21 male and 19 female patients aged 21 to 75 (mean, 54.1) years who underwent arthroscopic SSN release for SSN palsy were reviewed. The same pinprick test was performed.

Results. After distal SSN block, 5 volunteers had a sensory deficit in the area below the scapular spine, and one had no sensory deficit. After proximal SSN block, the sensory deficit spread to both lateral and medial sides above and below the scapular spine. In the 40 patients with SSN palsy, only 5 (12.5%) patients exhibited no sensory deficit above the scapular spine; 4 of them had ganglion cysts and one had entrapment of the nerve at the spinoglenoid notch. In 30 patients with palsy at the suprascapular notch, all had sensory deficit in the lateral side above the scapular spine. In 5 patients with ganglion and one patient with palsy at the spinoglenoid notch, sensory deficit was noted below (and not above) the scapular spine in all patients except for one.

Conclusion. The area of sensory disturbance is associated with the area of SSN palsy.

Key words: nerve block; paralysis; shoulder

INTRODUCTION

Suprascapular nerve (SSN) palsy can be caused by entrapment or traction at the suprascapular notch or the spinoglenoid notch, ganglion cysts, and rotator cuff tears.12 Symptoms of SSN palsy have been reported to include a chronic and dull shoulder pain, weakness of the supraspinatus or infraspinatus
muscles, and a lack of sensory deficit. Studies of sensory disturbance over the lateral and posterior area of the shoulder have been reported in patients with SSN palsy.\(^{2-4}\) This study aimed to determine the association of the area of sensory disturbance with the area of SSN palsy in healthy volunteers and patients with SSN palsy.

**MATERIALS AND METHODS**

Five male and one female healthy volunteers aged 23 to 44 (mean age, 32.2) years underwent an experiment of distal and proximal SSN block by a single physician. The distal SSN was blocked by injecting an anaesthetic mixture (5 ml of 2% lidocaine and 5 ml of sodium meglumine diatrizoate) into the spinoglenoid notch under image intensification. After 15 minutes, a pinprick test was performed to determine pain sensation and the area of sensory disturbance. The proximal SSN was then blocked by injecting only 5 ml of 2% lidocaine (because the sensory branch of the SSN usually runs along the dorsal aspect of the base of the coracoid process\(^{7}\)) into the suprascapular notch (the midpoint of the anterolateral edge of the acromion and the medial edge of the scapular spine) \([\text{Fig. 1}]\). The needle was inclined 30° toward the dorsal direction from the axis of the body until it reached the base of the coracoid process. The same pinprick test was performed.

In addition, records of 21 male and 19 female patients aged 21 to 75 (mean, 54.1) years who underwent arthroscopic SSN release for SSN palsy and sensory disturbance between October 2006 and March 2013 were reviewed. Clinical features of these patients included rotator cuff tear \((n=18)\), ganglion cyst \((n=5)\), entrapment of the SSN at the spinoglenoid notch \((n=1)\), contracture of the shoulder joint \((n=2)\), rheumatoid arthritis \((n=1)\), superior labrum lesion \((n=1)\), anterior instability of the shoulder joint \((n=2)\), and calcific rotator cuff tendinopathy \((n=1)\). The same pinprick test was performed.

Electromyography (EMG) was not performed, as it can be invasive and cause pain. Suprascapular nerve pathology is a dynamic phenomenon and thus not always demonstrable on EMG.\(^{8}\) Indications for suprascapular nerve release include weakness of the infraspinatus with or without wasting of the supraspinatus muscle, pain, or positive EMG findings.\(^{8}\)

**RESULTS**

After distal SSN block, 5 volunteers reported sensory deficit in the area below the scapular spine only, and one had no sensory deficit. After proximal SSN block, the sensory deficit spread to both lateral and medial sides above and below the scapular spine (\[\text{Fig. 2}\]), indicating correlation of the area of sensory disturbance with location of SSN block. One volunteer continued to report no sensory deficit, despite a remarkable weakness of the supraspinatus and infraspinatus muscles.

In the 40 patients with SSN palsy, sensory deficit was noted in the lateral side above the scapular spine \((n=35, 87.5\%)\), the area below the scapular spine \((n=34, 85\%)\), the lateral side of the shoulder \((n=32, 80\%)\), and the medial side above the scapular spine \((n=11, 27.5\%)\), as well as both lateral and medial sides above and below the scapular spine \((n=28, 70\%)\) \[\text{Figs. 3 and 4}\]. Only 5 (12.5\%) patients exhibited no sensory deficit above the scapular spine; 4 of them had ganglion cysts and one had entrapment of the nerve at the spinoglenoid notch \(\text{Fig. 5}\). In 30 patients with palsy at the suprascapular notch, all had sensory deficit in the lateral side above the scapular spine \(\text{Fig. 6}\). In 5 patients with ganglion and one patient with palsy at the spinoglenoid notch, sensory deficit was noted below (and not above) the scapular spine in all patients except for one \(\text{Fig. 6}\).

**DISCUSSION**

A cutaneous branch of the SSN has been reported to be present in 6 arms of 5 out of 61 cadavers\(^{9}\) and

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**Figure 1** Superior view of the shoulder showing the anterolateral edge of the acromion (arrowhead A), the medial edge of the scapular spine (arrowhead B), and the midpoint—the suprascapular notch (arrow) for proximal suprascapular nerve block.
The absence of the cutaneous branch of the SSN can be because (1) the nerve may have been damaged when the deltoid is divided near its origin, (2) the cutaneous branches of the axillary nerve that pierce the deltoid at variable points could be confused with the nerve, and (3) the nerve may be lost when the deltoid is dissected near its origin. The presence of sensory branches of the SSN is more common; a sensory branch of the SSN has been noted in 27 (87%) out of 31 shoulders, all 12 shoulders, and all 8 cadavers. In our study, 5 (83%) of 6 normal volunteers exhibited sensory disturbance after SSN block, indicating the presence of a sensory branch of the SSN.

Patients with SSN palsy typically complain of deep and dull pain, numbness, and sensory disturbance around the shoulder. In a patient with SSN palsy caused by entrapment of the SSN at the suprascapular notch, pain and sensory disturbance
in the upper lateral shoulder improved after an open release of the SSN, suggesting the presence of a cutaneous branch of the SSN. In 7 patients with SSN palsy, 6 had sensory disturbance and heat sensation at the posterior aspect of the shoulder and axilla, which improved after puncture of the ganglion and further surgery. Sensory function tests are thus suggested to evaluate SSN palsy. In 16 shoulders with rotator cuff...
tear, sensory disturbance improved after arthroscopic release of the SSN at the suprascapular notch.\textsuperscript{2} In patients with SSN palsy, sensory disturbance in the posterior angle of the acromion and lateral side of the shoulder to the posterior aspect of axilla resolved after arthroscopic release of the SSN.\textsuperscript{6}

There is variation in the sensory branch of the SSN splitting off from the main stem. It may be proximal, inferior, or distal to the superior transverse scapular ligament,\textsuperscript{7,9,10,12} and is responsible for different areas of sensory disturbance, even when the suprascapular nerve is entrapped at the suprascapular notch.

**CONCLUSION**

The area of sensory disturbance in patients with SSN palsy is associated with the location of SSN compression.

**DISCLOSURE**

No conflicts of interest were declared by the authors.