



Arthroscopic decompression at the suprascapular notch: a radiographic and anatomic roadmap

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Background: Arthroscopic decompression of the suprascapular nerve (SSN) at the suprascapular notch is a technically demanding procedure. Additional preoperative and intraoperative information may assist surgeons. The purpose of this study was to (1) identify which imaging modality most accurately represents the anatomic distance to the notch and (2) quantify the mean intraoperative distances from routine arthroscopic portals to the notch.

Methods: Ten matched pairs of fresh cadaveric shoulders were imaged by roentgenogram, computed tomography (CT), magnetic resonance imaging, and 3-dimensional (3D) CT, followed by arthroscopic SSN decompression at the notch and anatomic dissection. Measurements obtained included the distances from the anterolateral, posterior, and SSN portal sites to the notch in addition to the distance from the anterolateral acromion to the notch. Statistical analysis with Spearman correlation coefficients and Bland-Altman plots were used to determine the correlation and agreement between measurements.

Results: The preoperative imaging modality with the highest correlation to anatomic distances from the anterolateral acromion to the notch was 3D CT ($R_s = 0.90$, $P < .0001$). The mean intraoperative distances to the notch from the anterolateral, posterior, and SSN arthroscopic portals were 89 mm, 88 mm, and 49 mm, respectively. The mean anatomic distance from the anterolateral acromion to the notch was 64 mm.

Conclusions: Preoperative imaging with 3D CT may assist surgeons in performing arthroscopic SSN decompression. Understanding of the mean distances from the portal sites to the suprascapular notch and being cautious of arthroscopic instruments placed beyond 9 cm from laterally based portals may result in safer intraoperative medial dissection.

Level of evidence: Basic Science, Anatomy, Cadaver and Imaging Model.

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Keywords: Suprascapular nerve; suprascapular notch; decompression; arthroscopy

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Suprascapular neuropathy is typically caused by compression or traction of the suprascapular nerve (SSN). Compression neuropathy of the SSN at the level of the suprascapular notch was first described in 1959.²⁶ Many anatomic studies since then have focused on open release of

the SSN and its anatomic relationship to vascular and intra-articular structures.^{6,9,14,23,29} More recently, research has improved our understanding of the arthroscopic anatomy of the SSN and its intraoperative relationships to bony landmarks.^{3,5,15} Despite the increase in the frequency of arthroscopic decompression of the SSN,^{5,15,19} no studies have sought to identify which preoperative imaging modality most accurately predicts the distance to the suprascapular notch from universally identifiable landmarks. Additionally, the mean distances from traditional arthroscopic portals to the suprascapular notch have not been reported.

A number of etiologies, including anatomic variations, repetitive overhead trauma, and massive rotator cuff tears, have been implicated in SSN injury.^{2,10,13,17,18,22,27,28,30} The traditional evaluation for suspected SSN pathology includes history, physical examination, roentgenograms, as well as electromyography and nerve conduction velocity studies to identify the location and extent of injury.^{8,19} Magnetic resonance imaging (MRI) is commonly used to evaluate for rotator cuff tears, edema, and atrophy in addition to any space-occupying lesions, such as cysts, that may compress the nerve.²⁰ Computed tomography (CT) has been used to classify anatomic variations in the suprascapular notch and identify ossification of the superior transverse scapular ligament.^{8,21}

Arthroscopic decompression of the SSN can be a technically challenging procedure, and the surgeon should be aware of information that may decrease the risk of erroneous or far medial dissection. Techniques for arthroscopic release at the suprascapular notch have been described, and the most frequently used portals are the posterior “soft spot,” lateral, anterolateral, and SSN portals.^{4,5,16} Intraoperative arthroscopic landmarks have been described to facilitate SSN release.^{5,15} Additional guidance can be extracted from the preoperative workup, including the use of imaging to calculate the distances from common bony landmarks to the superior transverse scapular ligament and suprascapular notch. Despite numerous reports regarding SSN decompression and studies detailing anatomic relationships to and around the suprascapular notch,^{6,12,21,25,31} to our knowledge, no previous studies have investigated the accuracy of imaging in predicting anatomic distances to the suprascapular notch, and no reports of mean distances from arthroscopic portal sites to the suprascapular notch have been published.

The current study had two purposes: first, determine which preoperative imaging modality most accurately represents the anatomic distance to the suprascapular notch; and second, to report the mean distances from routine arthroscopic portal sites to the suprascapular notch.

Materials and methods

Ten matched pairs of fresh cadaveric shoulders were obtained through a local organ center donor program. The shoulders were



Figure 1 Roentgenogram of a cadaveric shoulder demonstrates a typical Grashey view. The line indicates the measured distance from the anterolateral acromion border to the suprascapular notch.

identified as right or left, and matched pairs were marked and kept at -20°C until the time of testing. None of the shoulders had undergone previous surgical procedures. Specimens were imaged before arthroscopic decompression of the SSN and then underwent gross dissection to measure distances from bony landmarks to the suprascapular notch.

Roentgenograms were taken of the 20 shoulder specimens. The specimens then underwent dual-energy CT with 2-mm slice cuts with subsequent 3-dimensional (3D) reconstruction. MRI scans with standard axial, coronal, and sagittal reformats were completed using a 1.5-Tesla Siemens magnet (Siemens Healthcare, Erlangen, Germany).

On all imaging modalities, measurements were performed on the coronal image that most readily displayed the suprascapular notch. The measurements on the roentgenograms were made using a standardized Grashey view¹¹ because it best approximated the coronal view. Measurements were recorded for the distance from the anterolateral edge of the acromion to the lateral portion of the suprascapular notch (Fig. 1). The magnification effect on the measurements was minimal because the specimens were positioned close to the image receptor. All measurements were made by a board-certified musculoskeletal radiologist (M.C.L.) using the Philips iSite picture archiving and communication system (Philips Healthcare, Andover, MA, USA).

After imaging analysis was complete, each shoulder was placed in an arthroscopic shoulder station in the beach chair position. Arthroscopic evaluation of each shoulder was performed with arthroscopic dissection of the suprascapular artery and nerve as they traverse the suprascapular notch. This was accomplished using standard posterior, lateral, and anterolateral portals as described by Lafosse et al.¹⁵ An additional suprascapular nerve portal (superomedial portal) was made in each specimen for direct

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