

Suprascapular nerve decompression

Overview

- Arthroscopic decompression of the suprascapular nerve provides excellent visualization and the ability to address concomitant shoulder pathology [1].
- Surgical decompression in the setting of suprascapular neuropathy leads to satisfactory outcomes as evidenced by patient-reported outcomes and return to sport rate [2].
- Suprascapular neuropathy treated with suprascapular nerve decompression significantly improves patient-reported outcomes and is noninferior to similar procedures without suprascapular nerve decompression [3].
- Arthroscopic suprascapular nerve decompression for suprascapular neuropathy at the suprascapular and/or spinoglenoid notch in the absence of major concomitant glenohumeral pathology results in good functional outcomes with significant improvements from before to after surgery [4].
- Release of the spinoglenoid ligament with resultant suprascapular nerve decompression may result in relief of pain and a return of normal shoulder function [5].
- No recommendations regarding suprascapular nerve release in conjunction with rotator cuff repair can be made at this time, and further research is necessary to better delineate the indications in the future [6].
- Decompression of the suprascapular nerve at the spinoglenoid notch did not lead to a better functional outcome compared to repair alone in patients with posterosuperior massive rotator cuff tears and suprascapular neuropathy [7].
- A novel arthroscopic technique for suprascapular nerve decompression uses the superior border of the scapula as a guide, potentially reducing operative time and tissue removal compared to previous methods [8].
- The suprascapular artery must be identified and protected along with the nerve during decompression to ensure safety [9].
- Outcomes after arthroscopic suprascapular nerve release at the suprascapular notch predictably led to successful pain relief and strength improvement in patients presenting with pain and weakness respectively [10].
- Arthroscopic release of the suprascapular nerve can be performed safely and effectively, with all patients showing improvement in postoperative electromyographic findings and marked improvement in pain relief and function [12].

- Suprascapular nerve release does not seem to be justified as an adjunct to rotator cuff repair if preoperative EMG findings document normal suprascapular nerve function [19].

Anatomy & Pathophysiology

NERVE COURSE AND ENTRAPMENT SITES

- The suprascapular nerve courses from the upper trunk of the brachial plexus to its motor insertion on the supraspinatus and, more distally, the infraspinatus [17].
- The superior transverse scapular ligament arises from the medial base of the coracoid overlying the suprascapular notch [35].
- The suprascapular artery runs superior to the superior transverse scapular ligament, while the nerve runs deep to it [35].
- Entrapment of the suprascapular nerve at the superior transverse scapular ligament causes denervation of both the supraspinatus and the infraspinatus [35].
- The spinoglenoid ligament overlies the suprascapular nerve at the spinoglenoid notch [35].
- Entrapment, traction, or compression at the spinoglenoid notch causes denervation of the infraspinatus [35].
- At the suprascapular notch, the nerve has little translational freedom as it angles around a confined space [49].
- The angled pathway and limited mobility at the suprascapular notch predispose the nerve to mechanical stretching [49].
- Mechanical stretching at the suprascapular notch may be exacerbated by extreme positions of scapular depression, retraction, or abduction [49].

ANATOMICAL VARIATIONS AND PREDISPOSING FACTORS

- Anatomical variations at the suprascapular notch include abnormally oriented subscapularis muscle fibers [22].
- Anatomical variations at the suprascapular notch include an anterior coracoscapular ligament [22].
- Anatomical variations at the suprascapular notch include a calcified superior transverse scapular ligament [22].
- These anatomical variations are predisposing factors for suprascapular nerve entrapment [22].

MECHANISMS OF INJURY

- Suprascapular neuropathy can occur as a result of traction, direct trauma, or extrinsic compression [49].
- Suprascapular neuropathy can occur as part of a more generalized brachial plexus disorder [49].
- Traction of the suprascapular nerve can occur at the suprascapular or spinoglenoid notch secondary to repetitive microtrauma [49].

- Repetitive microtrauma primarily arises from overhead activities such as tennis, volleyball, and weight lifting [49].
- Repetitive microtrauma may lead to direct injury to the nerve [49].
- Repetitive microtrauma may lead to indirect injury by affecting the vascular supply to the nerve [49].
- Intimal damage to the axillary or suprascapular artery may lead to microemboli that become trapped in the vasa nervorum [49].
- Microemboli trapped in the vasa nervorum lead to ischemic injury to the suprascapular nerve [49].
- Direct trauma or indirect trauma during glenohumeral dislocation may result in suprascapular neuropathy [49].
- Direct trauma or indirect trauma during proximal humerus fracture may result in suprascapular neuropathy [49].
- Direct trauma or indirect trauma during scapular fracture may result in suprascapular neuropathy [49].
- Iatrogenic injury to the suprascapular nerve has been reported as a consequence of distal clavicle resection [49].
- Iatrogenic injury to the suprascapular nerve has been reported as a consequence of positioning during spine surgery [49].
- Iatrogenic injury to the suprascapular nerve has been reported as a consequence of transglenoid arthroscopic anterior shoulder stabilization [49].
- Iatrogenic injury to the suprascapular nerve has been reported as a consequence of shoulder arthrodesis [49].
- Iatrogenic injury to the suprascapular nerve has been reported as a consequence of procedures utilizing the posterior approach to the shoulder, such as posterior shoulder stabilization [49].
- Repetitive microtrauma or a single traumatic event is more likely to cause suprascapular neuropathy at the level of the suprascapular notch [49].
- Compression by a ganglion cyst or tumor is a cause of suprascapular neuropathy, particularly at the level of the spinoglenoid notch [49].
- Cystic lesions arising from a labral or capsular tear can compress the nerve along its course over the scapula [17].
- Nerve traction is theorized to arise from chronic overhead athletics [17].
- Nerve traction is theorized to arise from a retracted rotator cuff tear [17].

PATHOLOGICAL ASSOCIATIONS AND OUTCOMES

- The exact association and etiology of suprascapular neuropathy in patients with rotator cuff pathology remain unclear [16].
- Complete fatty infiltration of intact rotator cuffs can be caused by suprascapular neuropathy [11].
- Fatty infiltration resulting from suprascapular neuropathy is not reversible [11].

Classification

- Suprascapular neuropathy can present secondary to various etiologies including entrapment or compression [17].
- Nerve traction is theorized to arise from chronic overhead athletics or due to a retracted rotator cuff tear [17].
- Suprascapular nerve neuropathy occurs when the suprascapular nerve is injured along its course from the upper trunk of the brachial plexus to its motor insertion on the supraspinatus and, more distally, the infraspinatus [17].
- Nerve injury can occur from either compression or traction [17].

Clinical Presentation

SYMPTOMS AND SIGNS

- Patients with suprascapular nerve neuropathy usually complain of a dull, aching pain in the posterior and lateral aspects of the shoulder [18].
- Suprascapular neuropathy is a potential source of shoulder pain and functional limitation [17].
- Entrapment of the suprascapular nerve at the suprascapular notch is a cause of shoulder pathology that should be considered in people presenting with wasting of the supraspinatus or infraspinatus muscles, or both [29].
- When the nerve is entrapped at the suprascapular notch, patients present with weakness and atrophy of both the supraspinatus and infraspinatus [18].
- With entrapment at the spinoglenoid notch, symptoms of weakness and atrophy are isolated to the infraspinatus [18].
- Compression of the nerve at the level of the spinoglenoid notch leads to weakness and atrophy of the infraspinatus [18].

ETIOLOGY AND RISK FACTORS

- A variety of potential causes of compression have been described, including anomalous transverse scapular ligaments, ganglion cysts, abnormal bony morphology, direct trauma, and traction injury [18].
- The incidence of compressive neuropathy is quite high in the overhead athletic cohort [17].
- Most patients in the overhead athletic cohort do not show clinically relevant deficiencies in function [17].

DIAGNOSIS

- The diagnosis of suprascapular neuropathy is based on a combination of a detailed history, a comprehensive physical examination, imaging, and electrodiagnostic studies [17].

- A detailed history and physical examination along with appropriate workup are paramount to arrive at a diagnosis of suprascapular nerve entrapment [18].
- Shoulder surgeons should consider electrophysiologic evaluation of patients with clinical or radiographic signs of suprascapular neuropathy [20].
- Shoulder surgeons should be cognizant of the parameters that constitute an abnormal electrodiagnostic study [20].

Investigations

- Shoulder surgeons should consider electrophysiologic evaluation of patients with clinical or radiographic signs of suprascapular neuropathy and be cognizant of the parameters that constitute an abnormal study [20].
- In the absence of a well-defined lesion producing mechanical compression of the suprascapular nerve, suprascapular neuropathy should be treated non-operatively [15].
- Anatomical variations at the suprascapular notch, including abnormally oriented subscapularis muscle fibers, anterior coracoscapular ligament, and calcified superior transverse scapular ligament, are predisposing factors for suprascapular nerve entrapment [22].
- The purpose of imaging of the shoulder is to help establish the diagnosis, determine the severity of the pathoanatomy, assist in surgical planning, and enable the surgeon to illustrate the condition of the shoulder to the patient [24].
- Unless a specific research protocol is in place, the temptation to “overimage” should be resisted, obtaining only the scans or reconstructions that are necessary for the care of the patient [24].
- Standardized plain films are almost always sufficient to garner the information needed for shoulder evaluation [24].
- The first key radiographic view is the anteroposterior (AP) in the plane of the scapula taken so that the x-ray beam passes through the glenohumeral joint [24].
- The second key radiographic view is the axillary view taken with the arm in the functional position of elevation in the plane of the scapula and oriented so that both the spinoglenoid notch and the scapular neck are visible [24].
- At least two X-ray views should be obtained for shoulder imaging: an anteroposterior in the plane of the glenoid and an axillary projection with the arm in abduction to show the relationship of the humeral head to the glenoid [40].
- Magnetic resonance imaging (MRI) is useful to identify osteonecrosis of the humeral head, or a bone tumour [40].
- MRI can also identify labral tears and rotator cuff tears, although the accuracy for these latter two is enhanced by combining the scan with arthrography [40].
- Computed tomography (CT) is helpful for planning fracture surgery and shoulder joint replacement [40].
- Ultrasound is a simple and accurate test for identifying rotator cuff tears and calcific tendinitis [40].

- Ultrasound can also be useful in guiding injections or barbotage (aspirating calcific deposits in the rotator cuff) [40].
- Arthroscopy is useful for diagnosing and treating subacromial impingement, intra-articular lesions, detachment of the glenoid labrum and rotator cuff tears [40].

Treatment

NON-OPERATIVE MANAGEMENT

- Initial treatment of isolated suprascapular neuropathy typically consists of physical therapy, nonsteroidal anti-inflammatory drugs, and activity modification [14].

OPERATIVE INDICATIONS

- Open or arthroscopic operative intervention is warranted when there is extrinsic nerve compression or progressive pain and/or weakness [14].
- Surgical decompression is indicated in cases refractory to conservative management [18].

SURGICAL TECHNIQUES

- The anterior release of the suprascapular nerve is a feasible alternative to the lateral approach [26].
- Open decompression at the spinoglenoid notch permits direct visualization of the suprascapular nerve and allows for a safe, reliable, and thorough decompression [18].
- For open spinoglenoid notch decompression, the patient is placed in the lateral decubitus position with the head elevated 30° and the body over-rotated 10° to 20° past parallel anteriorly [50].
- During open spinoglenoid notch decompression, the deltoid is split in line with its fibers beginning approximately 4 to 5 cm from the posterolateral corner of the acromion [50].
- The spinoglenoid ligament is released sharply from the edge of the scapular spine during open decompression [50].

SAFETY CONSIDERATIONS

CLINICAL OUTCOMES

- Suprascapular neuropathy treated with suprascapular nerve decompression significantly improves patient-reported outcomes and is noninferior to similar procedures without decompression [3].
- Arthroscopic management of suprascapular neuropathy provides patients with significant improvements in pain, strength, and subjective function of the shoulder, and has a low incidence of complications [13].

Complications

- Arthroscopic management of suprascapular neuropathy has a low incidence of complications [13].
- Ultrasound-assisted intralesional methylene blue injection may facilitate uneventful decompression of symptomatic spinoglenoid notch cysts while preventing iatrogenic suprascapular nerve injury [51].
- A malpositioned superior screw from reverse shoulder arthroplasty can cause suprascapular nerve entrapment [30].
- Baseplate screw penetration in reverse total shoulder arthroplasty poses a risk of iatrogenic suprascapular neuropathy by screw violation [31].
- Failure to treat multiple diagnoses in the same shoulder can lead to missed pathologic features and the necessity for revision operations [21].

Recovery

- Surgical decompression for suprascapular neuropathy leads to satisfactory outcomes as evidenced by patient-reported outcomes and return to sport rate [2].
- Suprascapular neuropathy treated with suprascapular nerve decompression significantly improves patient-reported outcomes [3].
- Suprascapular nerve decompression is noninferior to similar procedures without suprascapular nerve decompression [3].
- Arthroscopic suprascapular nerve decompression at the suprascapular and/or spinoglenoid notch in the absence of major concomitant glenohumeral pathology results in good functional outcomes [4].
- Arthroscopic suprascapular nerve decompression at the suprascapular and/or spinoglenoid notch in the absence of major concomitant glenohumeral pathology results in significant improvements from before to after surgery [4].
- Release of the spinoglenoid ligament with resultant suprascapular nerve decompression may result in relief of pain [5].
- Release of the spinoglenoid ligament with resultant suprascapular nerve decompression may result in a return of normal shoulder function [5].
- Outcomes after arthroscopic suprascapular nerve release at the suprascapular notch predictably led to successful pain relief in patients presenting with pain [10].
- Outcomes after arthroscopic suprascapular nerve release at the suprascapular notch predictably led to strength improvement in patients presenting with weakness [10].
- Patients experienced immediate improvement in pain following treatment for suprascapular neuropathy [11].

- Patients experienced immediate improvement in subjective shoulder value following treatment for suprascapular neuropathy [11].
- Fatty infiltration was not reversible following treatment for suprascapular neuropathy [11].
- All patients showed improvement in postoperative electromyographic findings after arthroscopic release of the suprascapular nerve [12].
- All patients showed marked improvement in pain relief after arthroscopic release of the suprascapular nerve [12].
- All patients showed marked improvement in function after arthroscopic release of the suprascapular nerve [12].
- Full recovery of shoulder function was achieved in a case of suprascapular nerve entrapment caused by a large hematoma of the scapula [25].

Key Evidence

- [L5] Arthroscopic decompression of the suprascapular nerve provides excellent visualization and the ability to address concomitant shoulder pathology. [1] ([10.1016/j.jse.2010.01.006](https://doi.org/10.1016/j.jse.2010.01.006))
- [L4] Surgical decompression in the setting of suprascapular neuropathy leads to satisfactory outcomes as evidenced by the patient-reported outcomes and return to sport rate. [2] ([10.1016/j.jse.2017.09.025](https://doi.org/10.1016/j.jse.2017.09.025))
- [L4] Suprascapular neuropathy treated with SSND significantly improves patient-reported outcomes and is noninferior to similar procedures without SSND. [3] ([10.1016/j.xrrt.2024.05.007](https://doi.org/10.1016/j.xrrt.2024.05.007))
- [L4] Arthroscopic SSN decompression for suprascapular neuropathy at the suprascapular and/or spinoglenoid notch in the absence of major concomitant glenohumeral pathology results in good functional outcomes with significant improvements from before to after surgery. [4] ([10.1016/j.arthro.2020.10.020](https://doi.org/10.1016/j.arthro.2020.10.020))
- [L4] Release of the spinoglenoid ligament with resultant suprascapular nerve decompression may result in relief of pain and a return of normal shoulder function. [5] ([10.1177/03635465990270062101](https://doi.org/10.1177/03635465990270062101))
- [L4] No recommendations regarding suprascapular nerve release in conjunction with rotator cuff repair can be made at this time, and further research is necessary to better delineate the indications in the future. [6] ([10.1016/j.jse.2011.11.033](https://doi.org/10.1016/j.jse.2011.11.033))
- [L3] Decompression of the suprascapular nerve at the spinoglenoid notch did not lead to a better functional outcome compared to repair alone in patients with posterosuperior massive rotator cuff tears and suprascapular neuropathy. [7] ([10.1186/s12891-021-04075-1](https://doi.org/10.1186/s12891-021-04075-1))
- [L4] The study describes a novel arthroscopic technique for suprascapular nerve decompression that uses the superior border of the scapula as a guide, potentially reducing operative time and tissue removal compared to previous methods. [8] ([10.1007/s00167-009-0858-1](https://doi.org/10.1007/s00167-009-0858-1))
- [L4] The authors emphasize that the suprascapular artery must be identified and protected along with the nerve during decompression to ensure safety. [9] ([10.1016/j.jse.2008.08.007](https://doi.org/10.1016/j.jse.2008.08.007))

- [L4] Outcomes after arthroscopic suprascapular nerve release at the suprascapular notch predictably led to successful pain relief and strength improvement in patients presenting with pain and weakness respectively. [10] ([10.1177/2325967123s00003](#))
- [L4] Patients experienced immediate improvement in pain and subjective shoulder value, though fatty infiltration was not reversible. [11] ([10.1016/j.arthro.2014.01.010](#))
- [L4] Arthroscopic release of the suprascapular nerve can be performed safely and effectively, with all patients showing improvement in postoperative electromyographic findings and marked improvement in pain relief and function. [12] ([10.1016/j.arthro.2006.10.003](#))
- [L4] Results indicate that arthroscopic management provides patients with significant improvements in pain, strength, and subjective function of the shoulder, and has a low incidence of complications. [13] ([10.1007/s00167-017-4694-4](#))
- [L5] Initial treatment of isolated suprascapular neuropathy is typically nonoperative, consisting of physical therapy, nonsteroidal anti-inflammatory drugs, and activity modification; however, open or arthroscopic operative intervention is warranted when there is extrinsic nerve compression or progressive pain and/or weakness. [14] ([10.2106/jbjs.i.01743](#))
- [L4] In the absence of a well-defined lesion producing mechanical compression of the suprascapular nerve, suprascapular neuropathy should be treated non-operatively. [15] ([10.2106/00004623-199708000-00007](#))
- [L3] The exact association and etiology of suprascapular neuropathy in patients with rotator cuff pathology remain unclear. [16] ([10.1016/j.jse.2013.06.011](#))
- [L5] [17] ([10.5435/jaaos-d-19-00526](#))
- [L5] [18] ([10.1016/j.eats.2024.103051](#))
- [L2] Suprascapular nerve release does not therefore seem to be justified as an adjunct to RC repair if preoperative EMG findings document normal suprascapular nerve function. [19] ([10.1016/j.jse.2020.03.051](#))
- [L4] Shoulder surgeons should consider electrophysiologic evaluation of patients with clinical or radiographic signs of suprascapular neuropathy and be cognizant of the parameters that constitute an abnormal study. [20] ([10.1016/j.jse.2010.10.039](#))
- [L4] A complete history and physical, careful attention to auxiliary tests, and treatment of multiple diagnoses in the same shoulder avoids missed pathologic features and necessity for revision operations. [21] ([10.1097/01.blo.0000063791.32430.59](#))
- [L4] Anatomical variations at the suprascapular notch, including abnormally oriented subscapularis muscle fibers, anterior coracoscaphal ligament, and calcified superior transverse scapular ligament, are predisposing factors for suprascapular nerve entrapment. [22] ([10.1007/s00167-003-0378-3](#))
- [Case_report] Full recovery of shoulder function was achieved. [25] ([10.1186/s12891-023-06723-0](#))
- [L5] The anterior release of the suprascapular nerve is a feasible alternative to the lateral approach. [26] ([10.1016/j.eats.2024.103237](#))

- [L5] Entrapment of the SSN at the suprascapular notch is a cause of shoulder pathology that should be considered in people presenting with wasting of the supraspinatus or infraspinatus muscles, or both. [29] ([10.1016/j.jse.2010.12.003](https://doi.org/10.1016/j.jse.2010.12.003))
- [Case_report] This case is the first report of malpositioned superior screw from reverse shoulder arthroplasty causing suprascapular nerve entrapment. [30] ([10.1016/j.jse.2009.10.004](https://doi.org/10.1016/j.jse.2009.10.004))
- [L3] [31] ([10.1016/j.jse.2021.10.024](https://doi.org/10.1016/j.jse.2021.10.024))
- [L5] [49] ([10.5435/00124635-199911000-00002](https://doi.org/10.5435/00124635-199911000-00002))
- [L4] [50] ([10.1016/j.jse.2013.03.009](https://doi.org/10.1016/j.jse.2013.03.009))
- [L4] We believe that this technique may facilitate uneventful decompression of symptomatic spinoglenoid notch cysts while preventing iatrogenic suprascapular nerve injury. [51] ([10.1016/j.jse.2021.03.076](https://doi.org/10.1016/j.jse.2021.03.076))

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