

Suprascapular neuropathy

Overview

- The exact association and etiology of suprascapular neuropathy in patients with rotator cuff pathology remain unclear [1].
- Shoulder surgeons should consider electrophysiologic evaluation of patients with clinical or radiographic signs of suprascapular neuropathy [2].
- Shoulder surgeons should be cognizant of the parameters that constitute an abnormal electrophysiologic study for suprascapular neuropathy [2].
- Suprascapular neuropathy has been described with complete neurogenic fatty replacement in patients with intact rotator cuff tendons in the absence of traction or compression mechanisms [3].
- Preoperative suprascapular nerve injuries do not have a significant clinical impact [4].
- Preoperative suprascapular nerve injuries do not predispose to an acute postoperative lesion [4].
- In a young, active cohort, suprascapular neuropathy presented with one of two distinct primary presenting complaints: pain or weakness [5].
- 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 [6].
- Arthroscopic suprascapular nerve decompression for suprascapular neuropathy at the suprascapular and/or spinoglenoid notch in the absence of major concomitant glenohumeral pathology results in significant improvements from before to after surgery [6].
- In the absence of a well-defined lesion producing mechanical compression of the suprascapular nerve, suprascapular neuropathy should be treated non-operatively [7].
- Initial treatment of isolated suprascapular neuropathy is typically nonoperative, consisting of physical therapy, nonsteroidal anti-inflammatory drugs, and activity modification [8].
- Open or arthroscopic operative intervention is warranted for isolated suprascapular neuropathy when there is extrinsic nerve compression or progressive pain and/or weakness [8].

- 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 [9].
- No recommendations regarding suprascapular nerve release in conjunction with rotator cuff repair can be made at this time [10].
- Further research is necessary to better delineate the indications for suprascapular nerve release in conjunction with rotator cuff repair [10].
- Combined arthroscopic release of the superior transverse scapular ligament and rotator cuff repair in patients with large/massive rotator cuff tears and suprascapular neuropathy did not produce statistically significant improved outcomes compared with repair of the rotator cuff alone [22].

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 [13].
- The superior transverse scapular ligament arises from the medial base of the coracoid overlying the suprascapular notch [32].
- The suprascapular artery runs superior to the superior transverse scapular ligament, while the nerve runs deep to it [32].
- Entrapment of the suprascapular nerve at the suprascapular notch causes denervation of both the supraspinatus and the infraspinatus [32].
- The spinoglenoid ligament overlies the suprascapular nerve at the spinoglenoid notch [32].
- Entrapment, traction, or compression of the suprascapular nerve at the spinoglenoid notch causes denervation of the infraspinatus [32].
- Anatomical variations at the suprascapular notch, including abnormally oriented subscapularis muscle fibers, anterior coracoscapsular ligament, and calcified superior transverse scapular ligament, are predisposing factors for suprascapular nerve entrapment [47].
- The distances from the posterolateral corner of the acromion to the suprascapular and spinoglenoid notches were approximately 43 and 32 mm, respectively, regardless of height and sex [46].

ETIOLOGY AND MECHANISMS

- Suprascapular nerve neuropathy occurs when the nerve is injured along its course from the upper trunk of the brachial plexus to its motor insertion on the supraspinatus and infraspinatus [13].
- Nerve injury can occur from either compression or traction [13].
- Cystic lesions arising from a labral or capsular tear can compress the nerve along its course over the scapula [13].

- Nerve traction is theorized to arise from chronic overhead athletics or due to a retracted rotator cuff tear [13].
- Suprascapular neuropathy with complete neurogenic fatty replacement has been described in patients with intact rotator cuff tendons in the absence of traction or compression mechanisms [3].
- A lipoma can cause suprascapular nerve entrapment [11].
- A large hematoma of the scapula can cause suprascapular nerve entrapment [16].
- Malpositioned superior screws from reverse shoulder arthroplasty can cause suprascapular nerve entrapment [28].
- Placement of the superior and posterior screws in the glenoid baseplate during reverse total shoulder arthroplasty risks injury to the suprascapular nerve [48].

PATHOPHYSIOLOGY AND TISSUE CHANGES

- Suprascapular nerve injury is an underlying mechanism leading to compromise of the rotator cuff enthesis structure [12].
- Suprascapular nerve injury may cause severe fatty changes and inhibition of postoperative tendon healing in large rotator cuff tears [51].
- Decompression provides reliable pain relief, but recovery of shoulder function and restoration of atrophied muscle tissue may be incomplete [18].

Classification

- Suprascapular neuropathy can present secondary to various etiologies including entrapment or compression [13].
- Entrapment of the suprascapular nerve usually occurs at the suprascapular or spinoglenoid notch [19].
- Suprascapular nerve entrapment has been reported secondary to a lipoma [11].
- Varicose veins at the spinoglenoidal notch have been identified as an unusual cause of suprascapular nerve compression [19].
- Suprascapular neuropathy is associated with rotator cuff tendon tears and fatty degeneration [1].
- Chronic rotator cuff tendon tears and suprascapular neuropathy are both associated with fatty infiltration and muscle atrophy of the rotator cuff muscles, but the pattern of fatty infiltration is markedly different in the two situations [14].
- Suprascapular nerve injury can occur after reverse total shoulder arthroplasty, with correlation to screw out of vault penetration [4].

Clinical Presentation

- Suprascapular neuropathy is a potential source of shoulder pain and functional limitation [13].

- Suprascapular nerve entrapment syndrome was first described and correctly interpreted by André Thomas in 1936, predating the commonly credited work of Kopell and Thompson [21].

Investigations

- Shoulder surgeons should consider electrophysiologic evaluation for patients with clinical or radiographic signs of suprascapular neuropathy [2].
- High-resolution magnetic resonance imaging is recommended to evaluate complex cases of nerve entrapment [49].
- MRI-documented spontaneous resolution of a spinoglenoid notch cyst and associated suprascapular nerve palsy has been reported [52].
- Surgical treatment for a spinoglenoid notch cyst and associated suprascapular nerve palsy could be withheld if patients show signs of clinical recovery, provided they are followed closely [52].
- 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 [11].
- The pattern of fatty infiltration is markedly different in patients with chronic rotator cuff tendon tears compared to those with suprascapular neuropathy [14].
- Chronic rotator cuff tendon tears and suprascapular neuropathy are both associated with fatty infiltration and muscle atrophy of the rotator cuff muscles [14].
- The axillary view taken with the arm in the functional position of elevation in the plane of the scapula is oriented so that both the spinoglenoid notch and the scapular neck are visible [24].
- Standardized plain films are almost always sufficient to garner the information needed for shoulder evaluation [24].
- The temptation to “overimage” should be resisted, obtaining only the scans or reconstructions that are necessary for the care of the patient [24].
- CT scans may offer a few degrees of increased precision in the measurement of glenoid version, but this precision does not improve the quality of the surgery or the clinical outcome [24].
- 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].
- At least two X-ray views should be obtained: 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 [37].
- Magnetic resonance imaging is useful to identify osteonecrosis of the humeral head, or a bone tumour [37].
- Magnetic resonance imaging can identify labral tears and rotator cuff tears, although the accuracy for these is enhanced by combining the scan with arthrography [37].
- Computed tomography is helpful for planning fracture surgery and shoulder joint replacement [37].
- Ultrasound is a simple and accurate test for identifying rotator cuff tears and calcific tendinitis [37].

- Ultrasound can be useful in guiding injections or barbotage (aspirating calcific deposits in the rotator cuff) [37].
- Arthroscopy is useful for diagnosing and treating subacromial impingement, intra-articular lesions, detachment of the glenoid labrum and rotator cuff tears [37].
- The shoulder is a three-dimensional structure that cannot be represented by a single planar view [39].
- Critical relationships—such as the degree of centering of the humeral head—change with the position of the arm [39].
- Shoulder pathology may be found in a large number of different bones and soft tissues [39].
- Overlying and superimposed structures as well as metallic implants may complicate imaging the structures of interest [39].
- Surgeons need to develop a judicious approach to imaging that yields the information necessary to treat the patient while avoiding the tendency to “over-image” [39].

Treatment

NON-OPERATIVE

- Nonoperative treatment should include a period of rest and activity modification, and antiinflammatory medication followed by a supervised physical therapy program [41].
- The focus of physical therapy is to preserve the normal physiologic range of motion of the shoulder and strengthen the shoulder girdle [41].
- Physical therapy exercises include scapular stabilization, and resistive strength straining of the trapezius, rhomboids, and serratus musculature [41].
- When a space occupying lesion is present or there is visible atrophy of the infraspinatus, the course of nonoperative treatment should be minimal (maximum 3 months) to avoid irreversible damage to the infraspinatus [41].

OPERATIVE

- Open or arthroscopic operative intervention is warranted when there is extrinsic nerve compression or progressive pain and/or weakness [8].
- The primary indications for arthroscopic decompression of the suprascapular nerve and the spinoglenoid notch are a prolonged course of symptoms, most commonly a chronic ache in the posterolateral aspect of the shoulder, and a failed minimum 6 month course of nonoperative treatment [41].
- 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 [6].
- 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 [44].

- Arthroscopic release of the suprascapular nerve and transverse ligament is a safe and effective treatment for competitive swimmers with suprascapular neuropathy, allowing return to sport with resolution of pain and improvement in function [45].
- Release of the spinoglenoid ligament with resultant suprascapular nerve decompression may result in relief of pain and a return of normal shoulder function [15].
- Decompression gives reliable pain relief, but recovery of shoulder function and restoration of atrophied muscle tissue may be incomplete [18].
- Combined arthroscopic release of the superior transverse scapular ligament and rotator cuff repair in patients with large/massive RCTs and suprascapular neuropathy did not produce statistically significant improved outcomes compared with repair of the rotator cuff alone [22].
- 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 [10].

POSTOPERATIVE REHABILITATION

- In cases of isolated suprascapular nerve palsy at the spinoglenoid notch, patients were placed in a simple sling with immediate initiation of pendulum exercises and passive range of motion [42].
- Patients were seen again at 1 week after surgery to assess strength and begin physical therapy, which consisted of passive range-of-motion and isometric exercises [42].
- If significant infraspinatus atrophy was present, electrical stimulation was used [42].
- Resistance and overhead exercises started at 4 to 8 weeks postoperatively in cases of isolated suprascapular nerve decompression at the spinoglenoid notch [42].

Complications

- Preoperative suprascapular nerve injuries do not have a significant clinical impact and do not predispose to an acute postoperative lesion [4].

Recovery

- 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 [6].
- Full recovery of shoulder function was achieved following treatment for suprascapular nerve entrapment caused by a large hematoma of the scapula [16].

Key Evidence

- [L3] The exact association and etiology of suprascapular neuropathy in patients with rotator cuff pathology remain unclear. [1] ([10.1016/j.jse.2013.06.011](#))
- [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. [2] ([10.1016/j.jse.2010.10.039](#))
- [L4] This is the first description of suprascapular neuropathy with complete neurogenic fatty replacement in patients with intact rotator cuff tendons in the absence of traction or compression mechanisms. [3] ([10.1016/j.arthro.2014.01.010](#))
- [L1] Preoperative suprascapular nerve injuries do not have a significant clinical impact and do not predispose to an acute postoperative lesion. [4] ([10.1016/j.jse.2023.06.026](#))
- [L4] In this young, active cohort, suprascapular neuropathy presented with one of two distinct primary presenting complaints: pain or weakness. [5] ([10.1177/2325967123s00003](#))
- [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. [6] ([10.1016/j.arthro.2020.10.020](#))
- [L4] In the absence of a well-defined lesion producing mechanical compression of the suprascapular nerve, suprascapular neuropathy should be treated non-operatively. [7] ([10.2106/00004623-199708000-00007](#))
- [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. [8] ([10.2106/jbjs.i.01743](#))
- [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. [9] ([10.1186/s12891-021-04075-1](#))
- [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. [10] ([10.1016/j.jse.2011.11.033](#))
- [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. [11] ([10.1097/01.blo.0000063791.32430.59](#))
- [L5] This study identifies suprascapular nerve injury as an underlying mechanism leading to compromise of the rotator cuff enthesis structure. [12] ([10.1016/j.jse.2019.12.028](#))
- [L5] [13] ([10.5435/jaaos-d-19-00526](#))
- [L4] Chronic rotator cuff tendon tears and suprascapular neuropathy are both associated with fatty infiltration and muscle atrophy of the rotator cuff muscles, but the pattern of fatty infiltration is markedly different in the two situations. [14] ([10.1016/j.jse.2013.01.028](#))

- [L4] Release of the spinoglenoid ligament with resultant suprascapular nerve decompression may result in relief of pain and a return of normal shoulder function. [15] ([10.1177/03635465990270062101](#))
- [Case_report] Full recovery of shoulder function was achieved. [16] ([10.1186/s12891-023-06723-0](#))
- [L5] Decompression gives reliable pain relief, but recovery of shoulder function and restoration of atrophied muscle tissue may be incomplete. [18] ([10.5435/00124635-199911000-00002](#))
- [L4] Entrapment of the suprascapular nerve usually occurs at the suprascapular or spinoglenoid notch. [19] ([10.1016/j.jse.2011.05.022](#))
- [L4] Suprascapular nerve entrapment syndrome was first described and correctly interpreted by André Thomas in 1936, predating the commonly credited work of Kopell and Thompson. [21] ([10.2106/00004623-200108000-00018](#))
- [L1] Combined arthroscopic release of the superior transverse scapular ligament and rotator cuff repair in patients with large/massive RCTs and suprascapular neuropathy did not produce statistically significant improved outcomes compared with repair of the rotator cuff alone. [22] ([10.1177/03635465211021834](#))
- [Case_report] This case is the first report of malpositioned superior screw from reverse shoulder arthroplasty causing suprascapular nerve entrapment. [28] ([10.1016/j.jse.2009.10.004](#))
- [L4] [41] ([10.1016/j.xrrt.2021.04.004](#))
- [L4] [42] ([10.1016/j.jse.2013.03.009](#))
- [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. [44] ([10.1016/j.arthro.2006.10.003](#))
- [L4] Arthroscopic release of the suprascapular nerve and transverse ligament is a safe and effective treatment for competitive swimmers with suprascapular neuropathy, allowing return to sport with resolution of pain and improvement in function. [45] ([10.1177/0363546513477383](#))
- [L4] Regardless of height and sex, the distances from the posterolateral corner of the acromion to the suprascapular and spinoglenoid notches were approximately 43 and 32 mm, respectively. [46] ([10.1016/j.jseint.2022.04.002](#))
- [L4] 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. [47] ([10.1007/s00167-003-0378-3](#))
- [L5] Placement of the superior and posterior screws in the glenoid baseplate during rTSA risks injury to the SSN. [48] ([10.1016/j.jse.2020.07.008](#))
- [L5] They recommend high-resolution magnetic resonance imaging to evaluate complex cases of nerve entrapment. [49] ([10.1007/s11552-014-9652-8](#))
- [L5] In clinical settings, SN injury may cause severe fatty changes and inhibition of postoperative tendon healing in large RCTs. [51] ([10.5397/cise.2022.01207](#))
- [Case_report] The authors report the first MRI-documented spontaneous resolution of a spinoglenoid notch cyst and associated suprascapular nerve palsy, proposing that surgical treatment could be withheld if

patients show signs of clinical recovery, provided they are followed closely. [52] ([10.1016/j.jse.2006.06.014](https://doi.org/10.1016/j.jse.2006.06.014))

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