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CASE REPORT

Suprascapular Neuropathy in Collegiate Baseball Player

Andrew J. Niemann[ABCDEG], MS, ATC; Laura S. Juzeszyn[ABCDEG], BS, ATC; Leamor Kahanov[ACEG], EdD, ATC; Lindsey E. Eberman[CEG], PhD, ATC

Authors' Affiliation:

Department of Applied Medicine and Rehabilitation, Indiana State University, USA

*** Authors' Contribution**

A Concept / Design
B Acquisition of Data
C Data Analysis / Interpretation
D Manuscript Preparation
E Critical Revision of the Manuscript
F Funds Collection
G Approval of the Article

*** Corresponding Author;**

Address: Indiana State Unversity, Department of Applied Medicine and Rehabilitation, Terre Haute IN, 47809, USA

E-mail: aniemann@sycamores.indstate.edu

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Abstract

Background: **Suprascapular neuropathy (SSN) is generally thought of as a diagnosis of exclusion. However, increasing attention is being paid to the diagnosis, treatment and rehabilitation of this pathology to prevent chronic supraspinatus and infraspinatus atrophy in patients. To date, literature has only articulated variable or customized treatment and rehabilitation plans without clear standardized care. This case study provides a detailed description of the diagnosis, treatment, and rehabilitation of a collegiate baseball player's recovery from suprascapular nerve release.**

***Case Presentation*: A 20 year-old male baseball pitcher with right shoulder pain reported for athletic training evaluation, was treated conservatively, and due to lack of resolution was referred for further imaging and evaluation by an orthopedist. Following inconclusive magnetic resonance imaging findings the patient underwent electrodiagnostic testing which showed decreased nerve conduction velocity of the right suprascapular nerve. The patient elected for surgical intervention. Post-operative rehabilitation followed and the patient was able to pitch in 22 weeks. The patient provided positive subjective feedback and was able to return to unrestricted pitching without pain, loss of velocity, or loss in pitch control.**

Conclusion: **This study demonstrates a need for further investigation into the most appropriate treatment and rehabilitation of suprascapular nerve injury.**

Key Words: Nerve Injury, Rehabilitation, Baseball, Rotator Cuff

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BACKGROUND

Treatment, rehabilitation, and return to activity criteria for those with suprascapular neuropathy (SSN) are variable [1-18] creating elusive guidelines for achieving optimal outcomes (Table 1).

SSN has traditionally served as a diagnosis of exclusion [3,14], occurring when the suprascapular nerve is compressed at the suprascapular or spinoglenoid notch [19]. The prevalence of SSN is unknown and most estimates are based on case study articles in elite athletes not a representation of the general population [1-18]. SSN occurs between 12% to 33% and 8% to 100% in the athletic population with massive rotator cuff tears [15]. Beyond the extreme rotator cuff pathologies, SSN has been associated with infraspinatus paralysis, which results in humeral head depression and altered mechanics. These concomitant may create diffuse symptoms thus complicating diagnosis [1-18].

To prevent chronic supraspinatus and infraspinatus atrophy, clinicians should make an accurate diagnosis of SSN [12]. SSN can be treated operatively or conservatively, yet the time to return varies significantly beyond the two approaches: operative – 3 months [13] conservative – 6 months [8]. Treatment and rehabilitation protocols are largely individualized and a standardized protocol has yet to be articulated in the literature. The purpose of this case study is to introduce a unique case involving a baseball pitcher with posterior shoulder pain who presented with uncharacteristic symptoms and underwent supra

Table 1: Current Literature-Case Studies

Author	Suprascapular Nerve Palsy Signs and Symptoms	Surgery	Treatment/Outcome
Sergides et al 2009 [14]	Pain-6 months, weakness in abduction and ER, difficult to lift objects, atrophy of supraspinatus and infraspinatus, MMT 3/5 supraspinatus and infraspinatus	Arthroscopy	Returned to daily activities 3 months post-op
Lee et al 2007 [7]	Posterior shoulder pain, difficult to perform overhead activities	Arthroscopic decompression of cyst	No pain at month 4; cyst resolution at month 3
Lee et al 2007 [7]	Vague shoulder pain exacerbated with overhead activities	Open decompression and excision of cyst	Complete resolution at month 6
Walsworth 2004 [17]	Difficult to carry luggage and perform overhead activities, supraspinatus and infraspinatus atrophy, painful arc, MMT infraspinatus 2/5, MMT supraspinatus 3/5, Hawkins-Kennedy Test +, Neer Impingement Test +	Release of superior transverse scapular ligament	Minimal decrease in pain and strength improvement, unable to return to full activities due to pain and weakness
Sandow & Ilic 1998 [13]	Posterior shoulder pain, wasting of infraspinatus, weak ER	Spinoglenoid Notchplasty	Average RTP-3 months
Ligh et al 2009 [8]	Posterior shoulder pain at midpoint of throwing motion, could not throw more than 50 ft. without pain, Impingement sign +, mild infraspinatus atrophy, ER in adduction weakness, pain with ER and abduction	Arthroscopic labral debridement, decompression of suprascapular nerve	Participated in 6 month rehabilitation program, able to compete successfully the following season

scapular nerve decompression with success.

CASE PRESENTATION

A right handed 20 year old male baseball pitcher sought evaluation for right posterior shoulder pain from the athletic training staff in Spring 2010, at the start of his second season of Division-I competitive baseball. At the time, the closing pitcher had completed 29 innings of play in the first three weeks of the competitive season. Upon initial evaluation, the patient primarily complained of sharp pain in his posterior right shoulder during throwing, particularly upon ball release. Pain symptoms generally persisted for several days, up to one week. He also described an inability to throw further than 20-30 feet and increased pain in the posterior shoulder after throwing. He reported rehabilitating intermittently for the past one and a half years for diffuse and intermittent right shoulder pain.

The athletic trainer (AT) assessed for labral pathology, joint instability, shoulder dyskinesis, swelling and deformity, of which all findings were negative (Table 2).

The evaluation revealed decreased right shoulder infraspinatus strength (MMT: 4/5) with bilateral comparison. After the initial evaluation, the AT withheld the patient from sport participation, required rest and managed discomfort with conservative treatment. The AT aimed to decrease pain, improve range of motion, increase strength, complete functional and sport-specific activities, and return to play. Treatments occurred for two weeks with no change, so the AT referred the patient to an orthopedic specialist.

The orthopedic physician's initial evaluation yielded negative results for right shoulder impingement, apprehension, instability, and labral pathology. The physician's exam again revealed infraspinatus weakness resulting in orders for magnetic resonance imaging (MRI) and electromyography (EMG) analyses to examine soft tissue and nerve involvement. The diagnostic imaging revealed nothing remarkable. One week after orthopedist evaluation (three weeks from initial evaluation) an MR arthrogram with intraarticular contrast of the patient's right shoulder identified only a minor lesion affecting the posterior labrum (Table 3).

After ruling out several pathologies with the physical exam and diagnostic imaging (after three

Table 2: Objective Findings upon initial evaluation by athletic trainer

Observation or Test	Result	Comment	Possible Diagnosis
Observation	No deformity, swelling or discoloration		
AROM/ PROM	110° Arc	Pain with external rotation	RC pathology (specific to external rotators)
Manual Muscle Testing	5/5 throughout, External Rotation 4/5 upon bilateral comparison		RC pathology (specific to external rotators)
Scapulothoracic Rhythm	Normal		
Biceps Load I and II	Negative	Pain and apprehension in external rotation positioning	Superior labral pathology
Internal Rotation Lag Sign	Negative		
External Rotation Lag Sign	Negative		
Kim Test	Negative		
Jerk Test	Negative		
Anterior Apprehension Test	Positive for pain		Inconclusive (no apprehension)
External Rotation Apprehension Test	Negative		
Relocation Test	Negative		
Surprise Test	Negative		

weeks since initial evaluation), the physician ordered an electrodiagnostic study. The test indicated right suprascapular neuropathy at the suprascapular notch with supraspinatus and infraspinatus involvement, evidence of mild ongoing denervation and mild chronic neuropathic changes of the suprascapular nerve with absence of right cervical radiculopathy or brachial plexopathy. Approximately five weeks post initial evaluation, the patient underwent right suprascapular nerve release and extensive debridement of the glenoid labrum and bursa. The surgeon predicted a 3 to 5 month recovery.

Surgical intervention detected significant superficial fraying of the entire posterior labrum, which was debrided to create a smooth and stable surface (Table 4). Analysis of the subacromial bursa indicated significant fibrosis of the bursa thus a need for a partial bursectomy. The transverse scapular ligament was transected to release the suprascapular nerve in the suprascapular notch.

Post surgically, the physician referred the patient for physical rehabilitation to relieve pain, increase function, increase strength, and increase range of motion. Two weeks following surgery (seven weeks post initial evaluation with the AT), the patient demonstrated decreased shoulder range of motion and strength, with significant decreases in internal rotation and visible atrophy of the right infraspinatus as a consequence of immobilization. The patient underwent physical rehabilitation with ATs and PTs for 22 weeks (Table 5). Rehabilitation followed a standard progression from pain management and strengthening to sport specific exercises through therapeutic interventions, exercise and manual therapy.

Table 3: Magnetic resonance arthrogram with intraarticular contrast findings

Injury	MR-Arthrogram Findings
Rotator Cuff Tendons	Intact
Biceps Tendon	Intact
Coracoclavicular ligaments	Intact
Acromioclavicular ligaments	Intact
Hill-Sachs lesion	Absent
Glenoid Labrum	Minor posterior lesion
Bennet lesion	Absent

Table 4: Post-Operative Diagnoses
Right suprascapular neuropathy
Posterior glenoid labral tear, absence of flap tears or displacement
Extensive subacromial bursa fibrosis, bursectomy

The athlete returned to live throwing and simulated games without any complaints or deficits in performance. Time to return to sport without restrictions from date of surgery totaled approximately seven months. The patient has since returned to competitive collegiate baseball pitching without issues related to pain, fatigue, pitching velocity, or pitch control.

DISCUSSION

Neuropathies affecting the suprascapular nerve are typically the result of traction or compression from repetitive overhead activities, rotator cuff tears, displaced labral tears in conjunction with cysts, and space-occupying lesions at the suprascapular or spinoglenoid notch [4,6,7,12,14,15,20]. Uniquely, our patient demonstrated an absence of the concomitant pathologies usually associated with the neuropathy: he lacked a displaced labral tear, SLAP lesion, cystic changes around the labrum, or a retracted distal rotator cuff tendon. Individuals usually present with pain and weakness in the posterior, lateral, and superior aspect of the shoulder [14,15], atrophy and weakness of the infraspinatus and supraspinatus muscles [15]. Yet some individuals may be altogether asymptomatic [14]. Our patient, presented with some of the common pathogenesis, but specifically pain was narrowed, versus more global, in the posterior shoulder with infraspinatus weakness. Our athlete was unique, most significantly because of the lack of a debilitating labral tear. Although the patient's symptoms had a debilitating affect on performance, only superficial fraying was revealed during the surgical intervention.

The decision to conduct surgery on this athlete was based on neurological symptoms present in early stages, minor concurrent posterior labral pathology,

Table 5: Rehabilitation Progression

Rehabilitation Phase	Treatment Goal	Intervention
Early Acute Phase	Decrease pain and inflammation	Game Ready Cryocuff BioWave
Late Acute Phase	Increase ROM	PROM AROM Pendulum exercises
Subacute Phase	Pain management	Game Ready Cryocuff BioWave
	Regain ROM	AROM
	Increase Strength	Isometric exercises (RC and scapular stabilizers)
Proliferation/regeneration phase	Pain management	BioWave
	Regain ROM and strength	Stretching Strengthening (RC and scapular stabilizers)
	Improve coordination	Agility exercises Sport-specific activities Interval throwing program
Remodel/maturation phase	Regain sport-specific function	Interval throwing program Mount progression throwing program

and infraspinatus atrophy. Typically, a conservative non-operative approach focusing on infraspinatus strengthening and range of motion is implemented for six to nine months or until the patient is able to reach 80% shoulder strength upon bilateral comparison [7,12,15,21]. In this case, the patient underwent supervised (and consistent) conservative treatment for approximately one month prior to surgical intervention. Cases of SSN in and of themselves are not necessarily unique, and therefore different approaches to manage of SSN exist, yet they are not standardized in the literature (Table 1). Surgical management of SSN injury is generally indicated when conservative treatment has failed to resolve issues after six months, or obvious indications exist [7,12,15,21]. Our patient did not incur the typical 6 month conservative treatment and the decision to conduct surgery was based simply on infraspinatus atrophy, decreased ROM, and decreased nerve conduction velocity, which is unique to the literature.

Our patient underwent arthroscopic decompression, but not the more common open technique where the upper trapezius is dissected [6,12,14,15]. The open decompression technique is invasive and requires a long recovery time [6,12,14,15]. Arthroscopic management is less invasive, requires less recovery time and allows for repair of concurrent shoulder pathology (usually the rotator cuff tear or labral defect) [6,12,14,15], and was therefore the preferred choice for our patient. During surgical intervention, the suprascapular nerve is generally released in one of two places, the spinoglenoid notch or the suprascapular notch [6,14,15]. Release at the spinoglenoid notch is indicated when the patient presents with a SLAP lesion and cystic changes exist requiring aspiration to relieve the impingement of the suprascapular nerve [12,15,21]. Our patient received a suprascapular nerve release at the suprascapular notch because these associated conditions were not present. Release at the suprascapular notch is accomplished through an anterior portal hole, guiding the shaver past the coracoid process then superiorly to release the transverse suprascapular ligament as it spans the notch [6,7]. According to the surgical report, the posterior labrum was thoroughly debrided prior to the resection of the suprascapular ligament. Our athlete demonstrated characteristics of posterior impingement, which is atypical in other patients, but should be considered among overhead throwing athletes.

Post surgically the patient underwent supervised rehabilitation sessions for approximately five months prior to the initiation of a throwing progression and simulated game throwing (total time=7 months). A detailed time to return to full sport participation post surgically in baseball pitchers is variable in the literature (Table 1). Previous literature regarding conservative treatment in three different athletes indicated great variability in time to full recovery [9] Timelines varied from a few short weeks up to 30 months [9]. Case reports among general population patients have detailed full recovery from arthroscopic repair in three to six months [7,12,15]. Reports focused on elite volleyball players and other overhead athletes showed complete recovery in six to eight months [13,21,22]. The return to participation in this study was 7 months, which is consistent with previous cases.

CONCLUSION

In most cases of SSN, several months of conservative treatment precede any surgical intervention. Although our patient complained of generalized shoulder pain for up to one year prior to this debilitating injury, only a brief period (1 month) of conservative treatment preceded the surgical intervention. The physician pursued an aggressive diagnostic study, followed by an arthroscopic surgical intervention, which likely aided in the speedy recovery of our patient. The treatment plan our athlete followed is not consistent with the current literature [7,12,15,22], yet the election of surgical treatment in conjunction with thorough physical rehabilitation, returned the athlete to full sport participation by the subsequent baseball season. Current literature lacks a standardized method for surgical intervention and conservative treatment. The current case indicates that early surgical intervention may decrease recovery time and increase return to participation in an athletic population.

Conflict of interests: None

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