

Arthroscopic Supra-scapular Nerve Release

**A study done at Sancheti institute of orthopaedic and
rehabilitation, Pune -431001**

**DISSERTATION SUBMITTED TO
UNIVERSITY OF SEYCHELLES
AMERICAN INSTITUTE OF MEDICINE**



IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

M.Ch (Orthopaedic Surgery)

By

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PROFORMA

Annexure 1

INTRODUCTION:

Suprascapular nerve (SSN) injuries have been recognized as a cause of shoulder pain and weakness. Kopell and Thompson first described these injuries in 1959.¹ Causes for SSN entrapment include transverse scapular ligament anomalies, compression from adjacent ganglia, abnormal osseous morphology of the suprascapular notch, direct trauma or traction injury, rotator cuff rupture and trauma.^{2,3,4,5,6} Isolated SSN compression is a relatively rare, hence is easily misdiagnosed.⁷ Diagnosis is usually by exclusion. EMG, NCV study has become standard for diagnosis. MRI studies helps to rule out other associated pathology like rotator cuff tears. Conservative trial of physiotherapy is given before EMG, NCV studies. As a result, many patients with SSN compression present with more than 6 months of chronic pain and weakness. A patient with chronic pain and EMG, NVC which shows evidence of SSN compression refractory to conservative management indicates surgical release of the SSN.⁸ Open surgical release used to be a method of treatment.^{9,10,11,12,13} The open technique for decompression uses a superior incision that may be extended posteriorly if the SSN at the spinoglenoid notch also requires release. This superior approach either detaches the trapezius from its insertion along the scapular spine or uses muscle-splitting. Superior access to the transverse scapular notch is technically difficult because the operative field is relatively narrow and deep and the SSN is as small as 1 mm in diameter. With the open technique, one has to wait for four - six weeks for the supraspinatus to heal after the handling in addition to the morbidity of open surgery. Arthroscopic decompression has been established treatment of choice for SSN compression.^{11,12,13,14,15} We describe our experience with supra-scapular nerve decompression using arthroscopy for surgical decompression of the SSN resulting from entrapment at the transverse scapular ligament and/or spinoglenoid ligament.

AIMS AND OBJECTIVES:

1. To evaluate surgical and functional outcome of Supra-scapular nerve Decompression.
2. To study the difficulties arising and complication associated with this procedure.

REVIEW OF LITERATURE

1) Orthopade. 2010 Dec 19. [Epub ahead of print]

[Nerve compression syndrome of the shoulder : Arthroscopic decompression procedures.]Lichtenberg S, Habermeyer P. Schulter- und Ellenbogenchirurgie, ATOS-Klinik Heidelberg, Bismarckstr. 9-15, 69115, Heidelberg, Deutschland, lichtenberg@atos.de.

Several nerve compression syndromes have been described in the literature involving compression of the axillary nerve in the quadrangular space and most importantly compression of the suprascapular nerve in the suprascapular as well as the spinoglenoid notch. This article describes the arthroscopic techniques of nerve decompression around the shoulder.

PMID: 21170516 [PubMed - as supplied by publisher]

2). J Shoulder Elbow Surg. 2010 Mar;19(2 Suppl):118-23.

Arthroscopic suprascapular nerve decompression: indications and surgical technique.

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BACKGROUND: Although entrapment of the suprascapular nerve (SSN) is an infrequent presentation of shoulder pain, proper diagnosis and treatment are critical to prevent chronic supraspinatus and infraspinatus atrophy. This article presents a technique that allows SSN decompression at the spinoglenoid notch or suprascapular notch through the subacromial space.

RESULTS AND CONCLUSIONS: This method allows for facile decompression of the SSN after repair of concomitant shoulder pathology and allows direct visualization of the medial neck of the glenoid to avoid complications of iatrogenic SSN nerve injury from aggressive medial capsule dissection. The purpose of this article is to provide surgeons with a safe, reliable method to decompress the SSN at the suprascapular or spinoglenoid notch.

PMID: 20188277 [PubMed - indexed for MEDLINE]

3). *Knee Surg Sports Traumatol Arthrosc.* 2009 Dec;17(12):1504-7. Epub 2009 Jul 11. .Arthroscopic suprascapular nerve decompression at the suprascapular notch. Kim SH, Kim SJ, Sung CH, Koh YG, Kim YC, Park YS.

Department of Orthopaedic Surgery, Yonsei Sarang Hospital, Seoul, Korea.

Release of a transverse scapular ligament (TSL) is indicated for the entrapment of the suprascapular nerve (SSN). Previous arthroscopic techniques use step-wise reference landmarks leading to the notch to identify a TSL, and the key landmarks are the conoid ligament of the coracoclavicular ligament and the coracoid. This technique needs considerable amount of fibro-fatty tissue removal, which is time-consuming procedure. The technique described herein uses the superior border of scapula as a key landmark. A lateral portal is used as

a viewing portal, and an anterolateral portal, SSN portal, and accessory portal are required for the working portals. To identify the superior border of the scapula, dissection proceeds along the anterior border of the supraspinatus and advances medially into the supraspinatus fossa. Then, the TSL could be identified by palpating laterally along the superior border of scapula as a dimpling portion.

PMID: 19593548 [PubMed - indexed for MEDLINE]

4. Arthroscopy. 2009 Apr;25(4):439-45.

Arthroscopic decompression of the suprascapular nerve at the spinoglenoid notch and suprascapular notch through the subacromial space.

Ghodadra N, Nho SJ, Verma NN, Reiff S, Piasecki DP, Provencher MT, Romeo AA. Department of Orthopedic Surgery, Rush University Medical Center, Rush Medical College of Rush University, Chicago, Illinois 60612, USA. Ghodadra.neil@gmail.com

Suprascapular nerve entrapment can cause disabling shoulder pain. Suprascapular nerve release is often performed for compression neuropathy and to release pressure on the nerve associated with arthroscopic labral repair. This report describes a novel all-arthroscopic technique for decompression of the suprascapular nerve at the suprascapular notch or spinoglenoid notch through a subacromial approach. Through the subacromial space, spinoglenoid notch cysts can be visualized between the supraspinatus and infraspinatus at the base of the scapular spine. While viewing the subacromial space through the lateral portal, the surgeon can use a shaver through the posterior portal to decompress a spinoglenoid notch cyst at the base of the scapular spine. To decompress the suprascapular nerve at the suprascapular notch, a shaver through the posterior

portal removes the soft tissue on the acromion and distal clavicle to expose the coracoclavicular ligaments. The medial border of the conoid ligament is identified and followed to its coracoid attachment. The supraspinatus muscle is retracted with a blunt trocar placed through an accessory Neviaser portal. The transverse scapular ligament, which courses inferior to the suprascapular artery, is sectioned with arthroscopic scissors, and the suprascapular nerve is decompressed.

PMID: 19341933 [PubMed - indexed for MEDLINE]

5). J Shoulder Elbow Surg. 2009 May-Jun;18(3):e1-3. Epub 2008 Nov 30.

Subligamentous suprascapular artery encountered during arthroscopic suprascapular nerve release: a report of three cases. Reineck JR, Krishnan SG.

Shoulder and Elbow Service, The Carrell Clinic, Dallas, Texas 75231, USA.

PMID: 19046638 [PubMed - indexed for MEDLINE]

6). J Shoulder Elbow Surg. 2008 Jul-Aug;17(4):616-23. Epub 2008 Feb 14.

Original portals for arthroscopic decompression of the suprascapular nerve: an Anatomic study. Soubeyrand M, Bauer T, Billot N, Lortat-Jacob A, Gicquelet R, Hardy P. Department of Orthopaedic Surgery, Hôpital Universitaire de Bicêtre, and University of Paris-Sud, Le Kremlin-Bicetre, France.

Operative treatment of suprascapular nerve entrapment consists of decompression of the nerve, either at the suprascapular notch or the spinoglenoid notch. The aim of this study was to describe new arthroscopic portals to approach these 2 notches at the same time. Twenty shoulders in 10

fresh frozen cadavers were investigated. Four portals were used in line with the scapular spine (S1, S2, S3, S4). The suprascapular pedicle was visualized passing under the supraspinatus muscle. The technique was performed for each specimen. The efficacy and safety of the technique were assessed by open dissection. No injury to the nerve was identified after performing the technique. Decompression was complete in 18 of 20 cases at the suprascapular notch and in all cases at the spinoglenoid notch. With this technique, arthroscopic decompression of the nerve at the suprascapular and spinoglenoid notches is anatomically possible.

PMID: 18276165 [PubMed - indexed for MEDLINE]

7). Arthroscopy. 2006 Sep;22(9):1009-13.

Arthroscopic suprascapular nerve decompression at the suprascapular notch.

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Cape Shoulder Institute, Cape Town, South Africa. thebonesmith@gmail.com

The suprascapular notch is a common location for entrapment of the suprascapular nerve. Open surgical procedures for excision of the transverse scapular ligament are associated with pain relief and functional improvement. Arthroscopic procedures have been described for decompressing ganglion cysts, which compress the nerve at the spinoglenoid notch. However, there is no description of an arthroscopic procedure for decompression of the nerve at the suprascapular notch, and this is probably related to unfamiliarity with the complex anatomy of the region. The technique described herein is based on standard anatomic landmarks and utilization of these as reference points for arthroscopic orientation and reproducibility. The acromioclavicular joint, conoid ligament, and coracoid process are stepwise reference landmarks leading to the suprascapular notch. Arthroscopic identification of structures around the notch

is necessary before ligament resection. A new suprascapular portal, in combination with an accessory portal, is described for retraction, blunt dissection, nerve stimulation, and ligament resection. Key instruments include a 4-mm arthroscope of standard length (160 mm), with a 70 degree angled lens for adequate visualization and a calibrated probe to guide and limit dissection.

PMID: 16952732 [PubMed - indexed for MEDLINE]

ANATOMY OF SUPRASCAPULAR NERVE:

The suprascapular nerve arises from the trunk formed by the union of the fifth and sixth cervical nerves. It innervates the supraspinatus muscles and infraspinatus muscles.

It runs lateral ward beneath the Trapezius and the Omohyoideus, and enters the supraspinatous fossa through the suprascapular notch, below the superior transverse scapular ligament; it then passes beneath the Supraspinatus, and curves around the lateral border of the spine of the scapula to the infraspinatous fossa.

In the supraspinatous fossa it gives off two branches to the Supraspinatus muscle and an articular filament to the shoulder-joint; and in the infraspinatous fossa it gives off two branches to the Infraspinatous muscle, besides some filaments to the shoulder-joint and scapula.

MATERIALS AND METHODS

Type of study: Prospective and Retrospective study

Conducted at: Sancheti Institute of Orthopaedics and Rehabilitation

Duration of study: June 2009 to Jan 2011.

Inclusion Criteria:

1) Isolated supra scapular nerve compression confirmed by EMG NCV studies.

Exclusion Criteria:

1) Associated Rotator cuff repair

2) Any associated brachial plexus injury or associated other nerve injury within brachial plexus

TREATMENT PROTOCOL

During the period between 2009 and 2011, all patients diagnosed with suprascapular nerve were screened using the inclusion and exclusion criteria. Informed consent was taken for all patients that fit the inclusion criteria and all patients willing to undergo the trial was included.

PREOPERATIVE PLANNING

Radiograph of the Shoulder –True AP, EMG, NCV, UCLA Score, Shoulder Pain on VAS Scale

During the period from June 2007 to June 2009, 40 consecutive skeletally mature patients with isolated suprascapular nerve compression as diagnosis, confirmed by EMG and NCV studies and other associated injuries ruled out by MRI report were followed up to 2 years. 5 patients with other injuries were excluded from study after MRI report.

The inclusion criteria was isolated supra scapular nerve compression confirmed by EMG NCV studies. Associated Rotator cuff repair and any associated brachial plexus injury or associated other nerve injury within brachial plexus were excluded from study. Informed written consent from all patients was taken. After discussion with the ethical committee post operative EMG, NCV study was differed. Hence Post operative EMG, NCV study was not done for any patient.

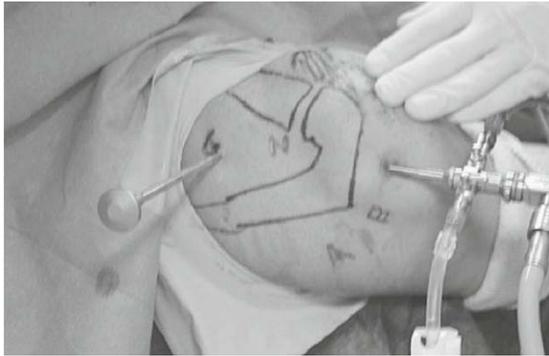
All patient with provisional diagnosis of suprascapular nerve compression were given a 6 weeks trial of physiotherapy. Patient who didn't improved after 6 weeks were investigated further by routine investigations along with radiograph of the Shoulder –True AP, EMG and NCV studies, MRI of shoulder and functional assessment was done by UCLA shoulder score and shoulder pain on VAS scale. After confirmation of diagnosis the patients were operated with arthroscopic decompression.

Operative procedure and surgical technique

A standard anaesthesia protocol was used for all patients in whom general anaesthetic with short-acting muscle relaxants was used to ensure identification of the nerve intraoperative with a nerve stimulator. Sitting- chair position was used for all patient with the back tilted 90° to the horizontal. A standard posterior portal, a 4 mm arthroscope with a 30° angled lens was used to perform a routine glenohumeral and bursal arthroscopy. A lateral portal was used for excision of the subacromial bursa which is 3 to 5 cm posterior to the anterolateral corner of the acromion. Visualization of acromioclavicular joint anteriorly and the spine of the scapula posteriorly was done. A posterolateral portal was created midway between the lateral and posterior portals, and the arthroscope was shifted to this portal. The acromioclavicular (AC) joint was marked with a needle pierced from outside-within to facilitate reorientation with respect to the new portal. The AC joint was identified, medial to which the coracoclavicular ligament was identified. The mean distance between the acromioclavicular joint and the attachment of the ligaments on the distal clavicle is 15 mm, with a range between 11 and 22.8 mm. The Conoid ligament is visualized at its attachment on the clavicle and is followed inferiorly to its attachment on the coracoid process. The suprascapular notch was identified which lies medial to the coracoid process, The mean distance between the posterolateral acromial angle and the suprascapular notch was 5 cm. The supraspinatus muscle is identified and the fat pad covering it dissected by blunt

dissection for visualization of suprascapular notch. Suprascapular portal was created between the clavicle and the spine of the scapula, overlying the suprascapular notch. Instruments passed through this portal lie in the plane between the supraspinatus and trapezius muscles, at the level of the suprascapular notch. After Cauterization of the bleeding small vessels within fat pad and retracting the supraspinatus muscle inferiorly the suprascapular artery was identified. The suprascapular notch bounded by the Conoid ligament laterally and the omohyoid muscle medially was visualised. The suprascapular artery is identified as a pulsating vessel passing from medial to lateral above the ligament.

The suprascapular nerve is identified as a cordlike structure passing under the ligament and was stimulated with a nerve stimulator for confirmation. The muscle fibers of the omohyoid were visualized at the medial border of the notch. The suprascapular vessels were retracted medially with a probe passed through the suprascapular portal. An arthroscopic capsular resection punch or scissors was introduced through the same portal. The superior transverse scapular ligament was resected while the artery and nerve were protected. The nerve was dissected proximally from surrounding adhesions until the muscle belly of the omohyoid was seen. Adequacy of decompression of the nerve was confirmed by lifting the nerve out of the notch with the blunt probe.



Portals pre operative planning fig 1 and fig 2

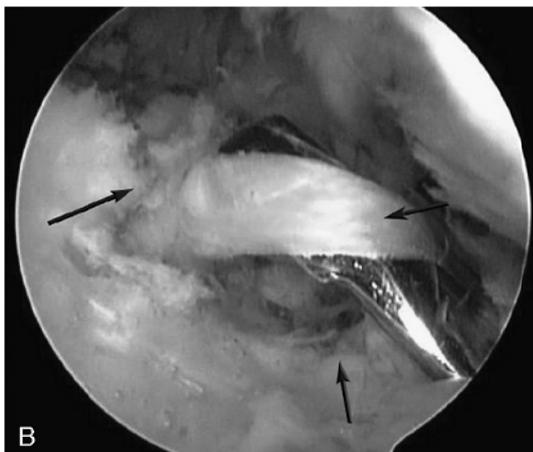


Photo 3: SSN identified (fig 3)

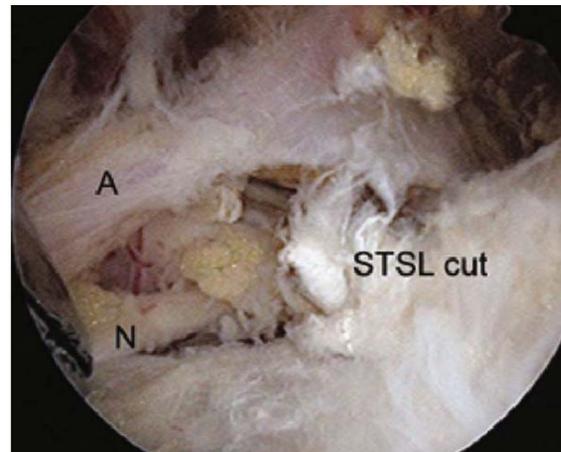


Photo 4 Decompression done of SSN

At the completion of the procedure, all instruments were withdrawn and the portals were sutured. Postoperatively, the arm was kept in a sling for a day to avoid discomfort. Thereafter the sling was discarded, and active use of the extremity was permitted within limits of pain.

POST OPERATIVE EVALUATION:

The patients evaluated post-operatively and during follow up (up to 2yrs) on the basis of University of California at Los Angeles (UCLA) Score, VAS Score.

OBSERVATION AND RESULTS

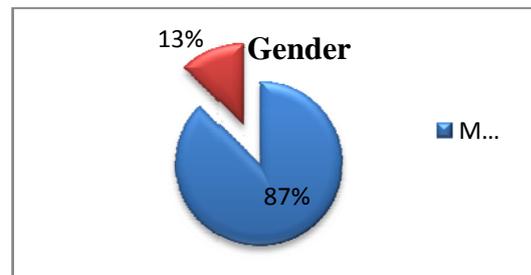
The demographic data of the study included 35 males and 5 females (Table 1) in an age group of 19 to 65 years (mean = 46.07 years) (Table 2). The mechanism of injury in 35 patients was overuse while 5 patients have idiopathic cause. The SSN compression was present in 39 patients (97.5%) in their dominant upper limb while 1 patient (2.5%) had it in non dominant side (Table 3). The duration of surgery was in range of 1 to 2 hours with average duration of surgery was 1.35 hours. The time interval from onset of symptoms to surgery was in range of 6 to 9 months the average was 7.25 months interval. The mean follow-up was 2 years [range, 21 to 27months]. Of the 40 patients 5 patients had diabetes and 4 patient had hypertension. The mean EMG and NCV pre operative was

Out of the 40 operated cases of isolated suprascapular nerve compression with the mean follow up of 2 years, the mean time of recovery was 6 months. We had 30 Excellent/Good (75%) and 10 fair/poor (25%) results using UCLA shoulder rating scale. There was significant pain relief in all patients by VAS score from a mean of 73 mm preoperative to mean of 11 mm post-operative. The Data was analyzed statically by using Wilcoxon sign rank test. If p value < 0.05 then the data is significant. The p value for UCLA score (Table 5) and VAS score (Table 6) was less than 0.001 hence both the data was significant and there is definite benefit of the procedure in patient in both pain control and functional outcome after surgery.

One complications encountered in this series was of recurrence of symptoms in 1 patient for whom aggressive physiotherapy was done and showed improvement.

1. Gender wise distribution of patients.

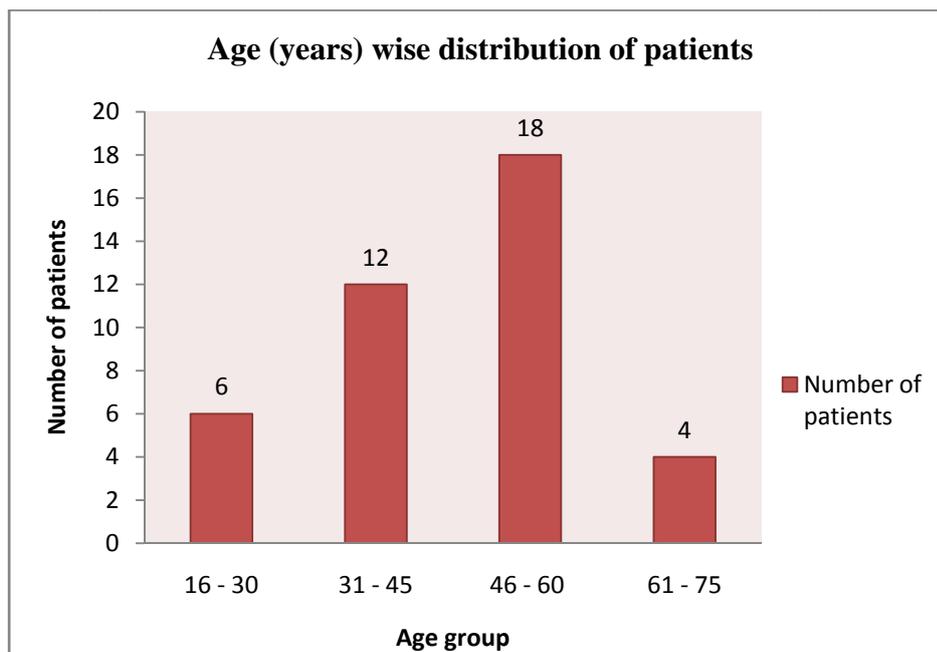
Gender	Number of patients	Percentage (%)
Male	35	87.50
Female	5	12.50
Total	40	100.00



2. Age (year) wise distribution of patients.

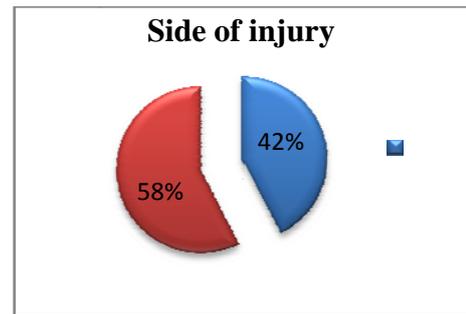
Age group	Number of patients	Percentage (%)
16 - 30	6	15.00
31 - 45	12	30.00
46 - 60	18	45.00
61 - 75	4	10.00
Total	40	100.00

Mean \pm SD of age is 46.08 ± 12.22 . With range (19, 70)



3. Distribution of patients with respect to side of SSN compression.

Side	Number of patients	Percentage (%)
Left	17	42.50
Right	23	57.50
Total	40	100.00

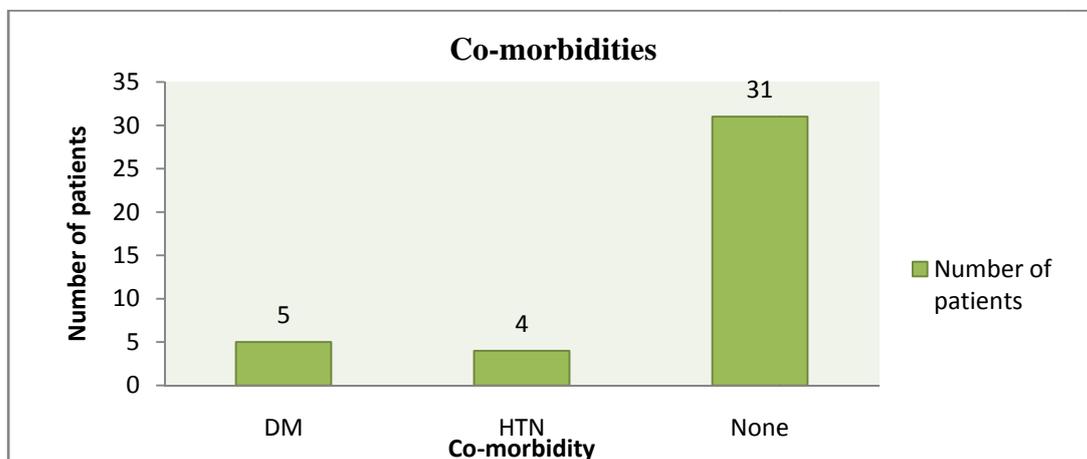


Lesion in dominant hand	Number of patients	Percentage (%)
Yes	39	97.50
No	1	2.50
Total	40	100.00



4. Distribution of patients with respect to co-morbidities.

Co-morbidity	Number of patients	Percentage (%)
DM	5	12.50
HTN	4	10.00
None	31	77.50
Total	40	100.00

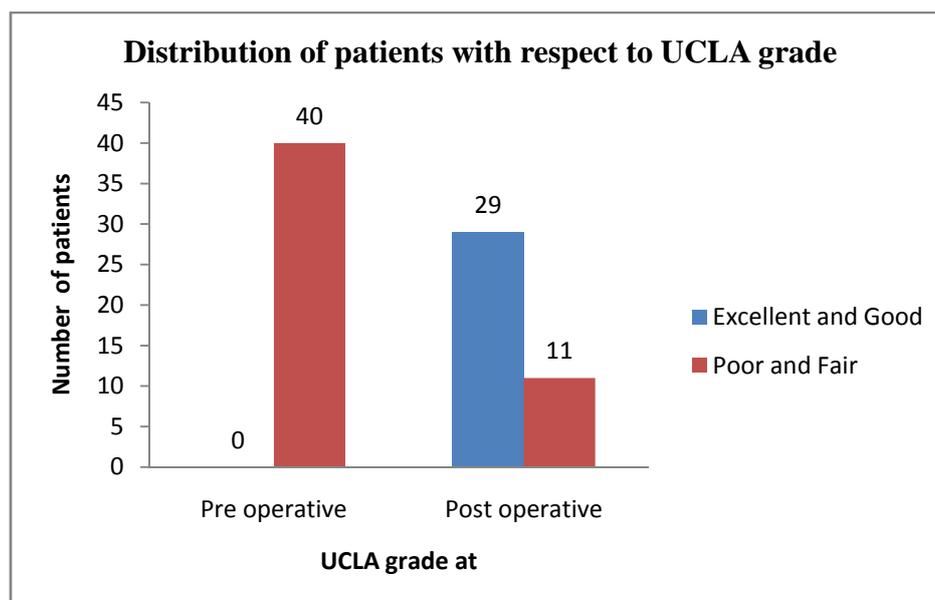


5. Comparison of pre operative and post operative UCLA score.

UCLA Grade	Pre operative	Post operative
1	0	29
2	40	11
Total	40	40

	Number of patients	p-value
Positive rank	29	< 0.001
Negative rank	0	
Ties	11	

Conclusion: - By using Wilcoxon sign rank test p-value < 0.05 therefore there is significant difference between pre operative UCLA score and post operative UCLA score.

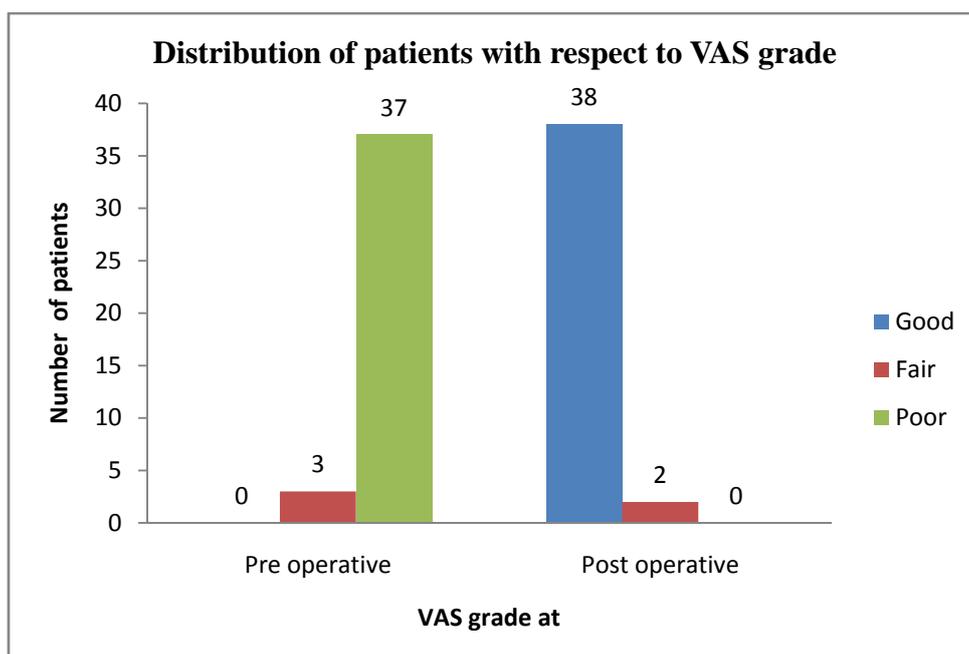


6. Comparison of pre operative and post operative VAS score.

VAS Grade	Pre operative	Post operative
1	0	38
2	3	2
3	37	0
Total	40	40

	Number of patients	p-value
Positive rank	40	< 0.001
Negative rank	0	
Ties	0	

Conclusion: - By using Wilcoxon sign rank test p-value < 0.05 therefore there is significant difference between pre operative VAS grade and post operative VAS grade.



DISCUSSION

These rare injuries were caused by repetitive overuse of usually dominant arm (97.5%) and 87.5% of cases in our series were due to over use. These injuries are more prevalent in the productive age with of group who are more prone to injury by this mode, 75% of patients in our series are in the age group 30-60 years and 87.5% of them are males. Similar age and sex distribution is also described by Laurent Lafosse, et al (15).

In our series all the SSN compression were diagnosed before planning surgery. In many series the associated rotator cuff tear was missed at initial presentation (4, 8, 15, 16, and 17). We didn't have a single incomplete diagnosis. This may be attributed to high index of suspicion and routine use of MRI to rule out associated rotator cuff injury. At our center all patients with rotator cuff tear are operated with arthroscopic repair and SSN is routinely decompressed in these cases. Hence all patients with associated injury were excluded from study. If SSN compression is provisional diagnosis in acute trauma with fracture involving scapula then in suspected cases CT scan is also carried out routinely if SSN compression is associated with trauma and fracture of scapula. These cases were also excluded from study. There has been no technical difficulty in doing arthroscopic decompression in our series with no incidence of any vascular injury. However authors using arthroscopic decompression of SSN have reported good results in multiple case series. The disadvantage of arthroscopic decompression of SSN is that it requires familiarity with the arthroscope which has a long learning curve.

Our study has few limitations. There was no control group, post Operative EMG, NCV was not carried out and other scoring systems like constant scoring were not used to compare the data with other case series.

CONCLUSION:

We can safely conclude that arthroscopic suprascapular nerve release is safer operation with good results and low complication rates. The pain relief is significantly better.

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PROFORMA

Arthroscopic Supra-scapular Nerve Release

ID:

Investigator:

Name:

Age

Sex:

Address:

Registration Number:

Diagnosis:

Operation:

Side:

Height:

Weight:

BMI of patient:

Associated co morbidity:

Symptoms;

Duration of symptoms:

Signs:

Tenderness

Wasting

Date of admission:

Date of operation:

Date of discharge:

Date of visit of follow up:

Pre-operative and post-operative pain on VAS SCORE: At

Pre Op	6weeks	3 months	6 months	1 year	1.5 years	2 years

Pre-operative and post-operative UCLA Score: At

Pre Op	6weeks	3 months	6 months	1 year	1.5 years	2 years

EMG BEFORE SURGERY:

NCV BRFORE SURGERY:

ANNEXURE 1

UCLA Shoulder rating scale

Section 1 – Pain

1) Present always and unbearable; strong medication frequently	1
2) Present always but bearable' strong medication occasionally	2
3) None or little at rest' present during light activities; salicylates used frequently	4
4) Present during heavy or particular activities only; salicylates used occasionally	6
5) Occasional and slight	8
6) None	10

Section 2 – Function

Unable to use limb	1
Only light activities possible	2
Able to do light housework or most activities of daily living	6
Slight restriction only; able to work above shoulder level	8
Normal activities	10

Section 3 - Active forward flexion

150°	5
120°-150°	4
90°-120°	3
45°-90°	2
30°-45°	1
<30°	0

Section 4-Strength of forward flexion (manual muscle testing)

Grade 5 (normal)	5
Grade 4 (good)	4
Grade 3 (fair)	3
Grade 2 (poor)	2
Grade 1 (muscle concentration)	1
Grade 0 (nothing)	0

Section 5 - Satisfaction of patient

Satisfied and better	5
Not satisfied and worse	0

>27 Good/Excellent 1

< 27 Fair/ Poor 2

The maximum score is 35 points. Excellent / good indicates satisfactory results, where as fair / poor indicates unsatisfactory results

