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Functional Outcome of Supraspinatus Tendon Tear Treated with Open Supraspinatus Tendon Repair with Suture Anchors

Kandi Arun Kumar[1]; V Nageswara Rao[2]; N V Ramesh Kumar[3]; Y Maniraj Chowdary[4]

[1] Post-graduate student, department of Orthopaedics, GSL MEDICAL COLLEGE AND HOSPITAL, RAJANAGARAM
[2]Professor And Head of department of Orthopaedics, GSL MEDICAL College and hospital, rajanagaram.
[3] Assistant professor department of Orthopaedics GSL MEDICAL College and hospital, rajanagaram.
[4] Senior Residency, department of Orthopaedics, Government medical College and hospital, Rajahmundry

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Corresponding Author
N V Ramesh Kumar
Assistant professor, department of Orthopaedics, GSL MEDICAL COLLEGE AND HOSPITAL, RAJANAGARAM

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ABSTRACT

Introduction: The supraspinatus plays an important role in GH joint stability and is responsible for initiating abduction and rotation of the joint as well as compression at lower elevation angles. Tears of the rotator cuff (Supraspinatus) of the shoulder are potentially painful and disabling conditions. The person with a Supraspinatus tear can have a sudden (acute/traumatic) or gradual (chronic) onset of shoulder pain with or without weakness. Treatments for Supraspinatus tears vary widely depending upon the severity of symptoms and signs.

Material and Methods:. A prospective study design was carried out from the month of April 2022 to December 2023, 20 patients were included in this study and have been followed up till December 2023 and the functional outcome was measured based on constant- Murley shoulder outcome score.

Results:. 90% of the patients had excellent to good outcomes. Preoperative constant-murley score on an average was 56-70 points with a mean of 68 and postoperavtive constant- murley shoulder outcome score of 86-100 points with a mean of 98 showing excellent results. Suture anchor repairs restored supraspinatus mechanical properties after 8 postoperative weeks. All patients have resorted back to routine work after 4 months period.

Conclusion: Open Supraspinatus repair with Suture anchors procedure offers a good surgical method of management of Supraspinatus tendon tear and to restore the functional outcome. Anchor repair provided better initial tensile strength and early mobilization of patient.

Key Words: *Supraspinatus tendon tear, Suture anchors, constant- Murley shoulder outcome score.*

INTRODUCTION

Supraspinatus tendon tear are common, with an incidence between 17% and 37% in the general population[1] and a high prevalence in overhead athletes.[3,4]

More common in patients playing contact sports and physically active patients[1]. It is most common injury in the athletic population resulting from either a direct injury by fall on outstretched hand with elbow extension resulting in a gross instability at shoulder joint[1].Different mechanisms can lead to partial articular supraspinatus tendon tear , including acute trauma, repetitive microtrauma, age-related degenerative changes to the tendon and instability with secondary impingement[2,3].

Anatomical studies demonstrate substantial differences in the morphology of the various layers of the supraspinatus tendon[3,4] . The articular layer is characterized by poor vascularization and disorganized collagen fibres, making it more vulnerable to tensile loads,[4] and the bursal layer composed by well-organized tendon bands with greater resistance to tensile loads[8] .

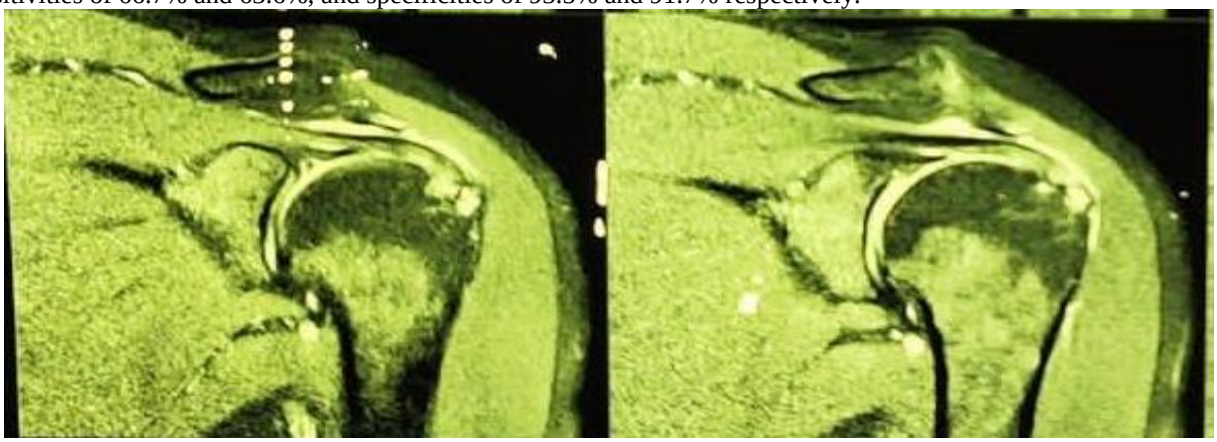
Patients with partial thickness supraspinatus tear may be asymptomatic or present a pattern of pathology-related signs and symptoms[2] .Shoulder pain and nocturnal pain with disturbed sleep are very common, and often more severe than what experienced by patients with full thickness tears[2,3].

Clinical examination includes supraspinatus specific tests such as Jobe test,Drop arm test, empty can test, impingement signs tests and 60–120° painful arc sign.[8,11]

Clinical features should be correlated with imaging studies. Ultrasound (US) is a reliable and accurate non-invasive method to examine the rotator cuff for the presence of tears but with a greater diagnostic accuracy of complete compared to partial thickness tears[3].

US generally underestimates tear sizes compared with direct arthroscopic evaluation with sensitivity 0.96 and 0.84 and specificity 0.93 and 0.89 in the assessment, respectively, of full thickness and partial thickness tears[3,4,5] .

Magnetic resonance imaging (MRI) is excellent for the detection of full thickness supraspinatus tears, but more limited for the detection of partial thickness tear and in distinguishing partial tears from tendinopathy, particularly using older low magnetic field machines.[3,4] Results in the detection of part comparing US with MRI are similar, with sensitivities of 66.7% and 63.6%, and specificities of 93.5% and 91.7% respectively.[6]



MATERIAL AND METHODS:

Prospective study design was carried out from the month of April 2022 to December 2023, 20 patients were included in this study and have been followed up till December 2023 and the functional outcome was measured based on constant- Murley shoulder outcome score.

Ellman Classification

Grade I	<3 mm
Grade Il	3–6 mm
Grade Ill	6 mm

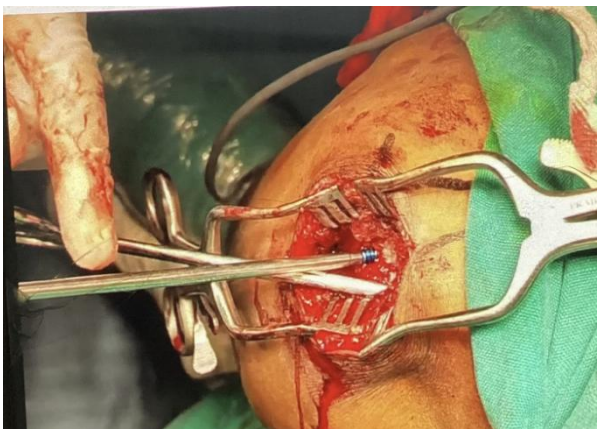
SURGICAL PROCEDURE

The patient in supine position under general anesthesia, Patient was kept in beach chair position. Scrubbing,painting and draping were done at operative sites.

A 6 cms longitudinal skin incision given starting from lateral margin of tip of acromian process and extending laterally over the deltoid. Dissection was done along skin, subcutaneous tissue and deltoid muscle layers were separated and retracted. Acromian process identified and performed the osteotomy at the anterosuperior aspect of the acromion and continue it through the junction of the anterior and middle thirds of the acromion, including the entire anterior acromion from medial to lateral. The defect has been identified and mobilization anteriorly and posteriorly with the infraspinatus using a finger to release adhesions inside and outside the joint. Debride the end of the mobilized tendon to obtain a raw edge. Raw area created over the greater tubercle.The anchor was then introduced through the tendon layers into the greater tuberosity checking the correct position with direct intra-articular visualization. Suture anchor of size 5mm buried into the greater tubercle. Tie the suture of the anchor down on top of the tendon with four or five knots to prevent impingement of the suture material.

A 6 cms longitudinal skin incision given starting from lateral margin of tip of acromian process and extending laterally over the deltoid.

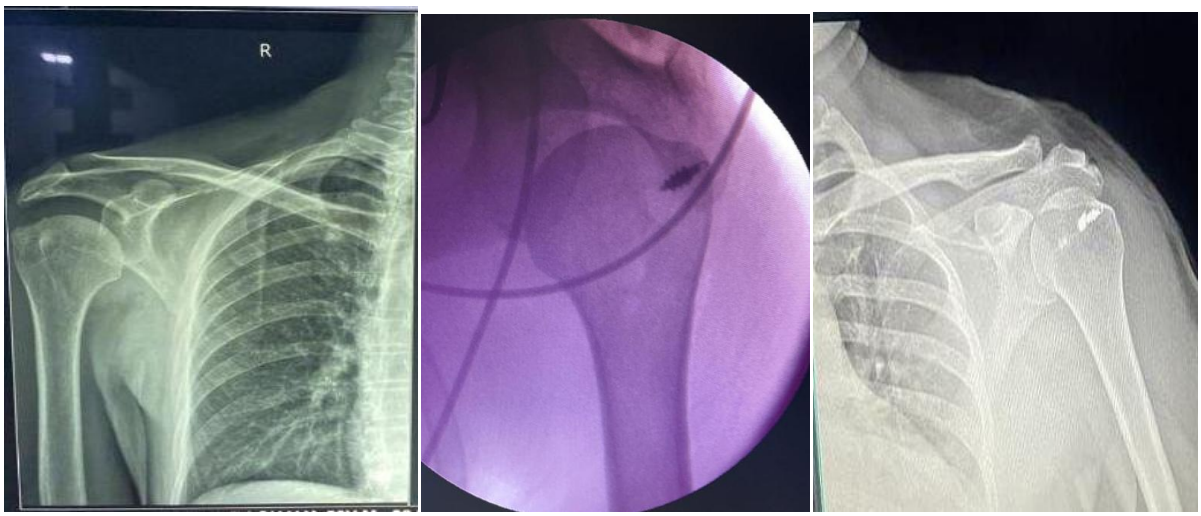
Partial Acromioplasty done. Supraspinatus tear identified and mobilized Debride the end of the mobilized tendon to obtain a raw.Raw area created over the greater tubercle.



Ethibond sutures are used pull on the tendon. Suture anchor of size 5mm into the greater tubercleburied

The use of strong Ethibond sutures rather than Kocher clamps or hemostats to pull on the tendon while suturing avoids crush injury to the tendon. Next secure the sutures from the suture anchors over the tendon, completing the double-row repair. Most repairs are done with the shoulder in 30-45° degrees of abduction. Wound was closed in layers, sterile dressing applied. Arm maintained in abduction by using an Abduction pillow.

Shoulder maintained 30-45° degrees of abduction with shoulder immobilizer and abduction brace

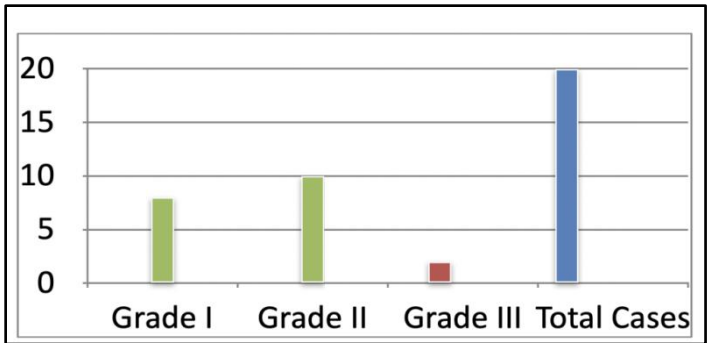


Preoperative Intraoperative postoperative radiograph C-arm image (2 weeks radiograph)

POSTOPERATIVE CARE

0-6 weeks – arm abduction brace, pendulum exercises, gentle self passive ROM exercises, no rotations or active movements.
6-12 weeks – passive and active assisted ROM exercises, gentle self passive rotations, scapular stabilization exercises.
12-16 weeks – active ROM exercises, isometric and isotonic cuff strengthening exercises.
16 weeks – cuff strengthening exercises, plyometric exercises.

Follow Up : Patients were followed up postoperatively, 6 weeks, 3rd month and 6th month they were assessed using constant- Murley shoulder outcome score.



Results

96% of the patients had excellent to good outcomes. Preoperative constant-murley score on an average was 56-70 points and postoperative constant- murley shoulder outcome score of 86-100 points showing good to excellent results. Out of 20 patients 19 had a good functional outcome only one had moderate outcome.

Ellmans classification	Number of patients
Grade l	10
Grade ll	8
Grade lll	2

CONSTANT-MURLEY SHOULDER SCORE:

pain (0-15) + ADL(0 -20) + Mobility (0-40) + Strength (0-25)

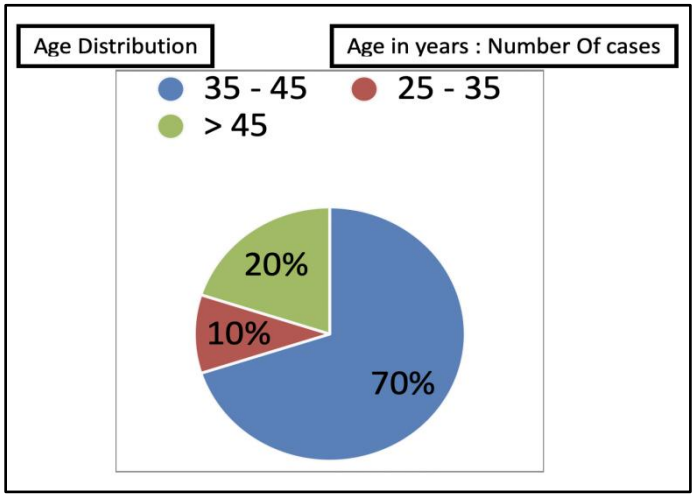
The Constant-Murley Score is interpreted as follows:

	Poor (0 - 55)	Mediocre (55-70)	Good (71 - 85)	Excellent (85 - 90)
Pre-operative	6	8	6	-
3rd Month Post-Operative			12	8
6th Month Post-Operative			1	19

Discussion

Given their particular location and morphology, supraspinatus lesions present peculiar biomechanical and healing features.

When analyzing partial rotator cuff tears, there are wide ranges in patient age, tear pattern, tear depth, location, and grade. Younger overhead athletes often develop articular-sided partial rotator-cuff tears from internal impingement, and middle-aged patients are more likely to have partial tears secondary to external impingement or intrinsic tendon degeneration.[10, 11]. In order to focus our review, we identified studies that reported clinical outcomes in patients who had open surgical treatment of symptomatic patients. The three primary surgical techniques for managing partial articular-sided rotator cuff tears are debridement, transtendon repair, or takedown and suture anchor repair. This systematic review focused on comparing clinical outcomes on suture anchor repair .



Ellmans classification	Number of patients
Grade I	8
Grade II	10
Grade III	2

Conservative treatment is mandatory in the first instance, but can lead to the progression of the lesion. In 10 patients with a grade 1 Ellmans lesion managed conservatively, progression of the tear was reported. A decreased size of the

lesion in only 10% of patients, an enlargement of the tear size in 50%, and progress to full thickness cuff tear in 25% of patients.[7]

Surgery is recommended when conservative treatment fails and symptoms are present for at least 6 months.[7,8]

Debridement of partial tears with or without acromionplasty results in satisfactory results in 87% patients , while two patients developed a full thickness tear.

In active throwing athletes, transtendon surgical repair produces successful results. Martinez et al. evaluated nine patients (Ellman classification: 4 Grade II and 2 Grade III), and reported a Constant murley score improvement from 72 to 99 (6 months follow-up) without complication.[66]

CONCLUSION

Surgical repair of articular partial thickness supraspinatus tears is recommended when the tear involves over 50% of the supraspinatus footprint and conservative management has failed.

Open Supraspinatus repair with Suture anchors procedure offers a good surgical method of management of Supraspinatus tendon tear and to restore the functional outcome. Anchor repair provided better initial tensile strength and early mobilization of patients.

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