# Functional Outcomes of Conservative Management in Rotator Cuff Tendinitis

Vivian R. D' Almeida*, K. Raghuveer Adiga, Tils Mathew, John E. Benny

Dept of Orthopaedics, Fr. Muller Medical College, Mangalore, Karnataka, INDIA.

*Corresponding Address:

v.dal1981@gmail.com

***Research Article***

***Abstract:*** Tendinitis of the rotator cuff and the shoulder impingement are considered to be common intrinsic causes of shoulder pain and disability. They are characterized by pain and painful arc of abduction and signs of impingement. A combination of treatment modalities have been used, Tendinitis of the rotator cuff and the shoulder impingement are considered to be common intrinsic causes of shoulder pain and disability. They are characterized by pain and painful arc of abduction as indicators of impingement. Physiotherapy such as exercise and manual therapy are time tested modalities of treatment in rotator cuff tendinidtis. Instead of resolving the specific pathology, these modalities target the specific modifiable functional impairments that contribute to pain and dysfunction. Rotator cuff and scapular muscle weakness and dysfunction, Rigidity of posterior capsule and postural abnormalities are the commonly associated functional impairments. 53 shoulders with tendidnitis confirmed by ultrasound were analysed and their functional outcome has been assessed. **Materials and Methods:** A prospective follow up study of clinical and ultrasonographic outcome following conservative treatment of 53 shoulders with rotator cuff tendinitis has been studied. The outcome measures were assessed with clinical improvement in pain, range of movements and SPADI questionnaire. **Results:** In the total pool of 53 patients taken together at a mean follow up of 3.8 months there was mean increase in the range of abduction by 25.8 degrees, adduction by 8.40 degrees, flexion by 20.38 degrees, extension by 7.83 degrees, external rotation by 16.89 degrees and internal rotation by 17.55 degrees. The SPADI functional outcome measurement showed decrease in pain % by 13.08%, disability by 11.95% and total SPADI 11.43%. With an overall percentage of improvement being 73.58% of the total group. **Conclusion:** The results of our study re-enforces the fact that conservative management is optimal in the management of Rotator Cuff Tendinitis. A combination of Short course NSAIDS and 3 phase physiotherapy has been found effective in management of the condition.

***Keywords:*** rotator cuff, functional outcome.

## Introduction

The shoulder joint is a complex joint both anatomically and functionally. Its stability and concurrent multidirectional mobility is dependent on various structures. The shoulder has the greatest mobility of any joint in the whole body and has most predispositions to dislocation. Rotator cuff is one of the main structures essential for static and dynamic stability as well as mobility of the joint. The function of the shoulder girdle requires the integrated motion of sternoclavicular, acromioclavicular, glenohumeral and scapula-thoracic joints. This motion is created by the delicate interaction of almost 30 muscles that control the shoulder system complex. One or more rotator cuff tendons may be inflamed from overuse, ageing (degeneration) and a fall on outstretched hand or from collision. Sports requiring repeated overhead arm motion or occupation requiring heavy lifting are also prone for strain on rotator cuff tendons and muscles. Normally tendons are strong but a long standing wearing down process may lead to tear. **Charles Neer**[1] (1972) introduced the concept of impingement syndrome as a continuum from bursitis to tear. He also classified rotator cuff lesions into three stages: stage1, odema and haemorrhage; always responded to non-operative care; stage 2, tendinitis and fibrosis (impingement syndrome) occasionally required subacromial decompression and stage 3, partial and complete tendon tears, for which operation to repair the tendon was indicated. Shoulder pain and its associated disability have two important intrinsic causes -Tendinitis of the rotator cuff and shoulder impingement[2]. Pain at the joint and painful arc of abduction characterizes impingement. Physiotherapy such as exercise and manual therapy are time tested modalities of treatment in rotator cuff tendinidtis.

### Pathogenesis of Rotator cuff tendinopathy[4]

Rotator cuff lesions are common problems affecting the shoulder. Any or all of the rotator cuff tendons may be affected, but supraspinatus affects most commonly due a combination of attrition, mechanical, vascular and traumatic factors. The anatomic position and make up of supraspinatus makes it vulnerable to both compressive and tensile loading. Neer classically described degenerative changes in the rotator cuff in three stages with predominant causative factors being true mechanical impingement of the rotator cuff on the anterior acromion. Biceps tendon inflammation can occur in isolation; however pathology of this structure has been widely correlated with rotator cuff tendinopathy. Critical analysis of the rotator cuff tendinopathy reveals other causative factors. Although the morphology of the

acromion is thought to cause true primary compression of the rotator cuff and bursa, many individuals have minimal access or no osseous abnormalities yet have rotator cuff tendinopathy ranging from tendinitis to full thickness tears. Another area of rotator cuff impingement occurs at posterior glenoid rim. At 90 degrees or slightly higher and full external rotation the intra articular aspect of the supraspinatus contacts the posterior labrum and glenoid. When an individual has glenohumeral instability the humeral head may translate further, thus increasing the contact of supraspinatus and glenoid rim. This is proposed the mechanism of injury in throwing athletes. Other mechanisms of rotator cuff damage are primary tensile overload, causing microtearing and inflammation of the tendon. Both compression and tensile load can occur secondary to instability scapular muscle weakness or in a tight posterior capsule. Many individuals experience painless degenerative tears of rotator cuff and function quiet well until an acute traumatic event. Conservative treatment is first attempted; however, individuals with progressive loss of function and/or pain may require surgical intervention ranging from debridement, acromioplasty and/ or repair of the defect. Tendinitis is thought to be microtearing of the tendon which results in healing and microscarring of the tendon. This healing process may occur normally with rest from aggravating factors. The exercise performed during this healing phase must encourage collagen synthesis without irritating. Additionally, strength is improved. If the tissue is not given a chance to fully recover the result will be prolonged inflammation and symptoms. Sometimes rest from exercise needs to be delayed to avoid this prolongation of symptoms. Even with adequate healing, the tendon is left slightly less tolerant of tensile loading because the residual scar tissue does not have the same tensile strength as the neighbouring healthy fibers

## Materials and methods

A total of 53 patients with age above 18 years diagnosed clinically and ultrasonographically with Rotator cuff tendinitis, underwent the conservative management protocol with NSAIDS and physiotherapeutic modalities. The functional outcome was studied during follow up at 3 months and 6 months. Patients with previous shoulder surgery. infection, bone disease, neoplasm, pathological fractures,mental or psychiatric disorder, inflammatory arthritis, with history of nerve blocks to the shoulder , intra-articular injections and neurological impairment were excluded from the study

**Examination**

Three clinical tests (Neer's, Hawkins's, and Yocum's) were used to detect shoulder impingement syndrome. Four manoeuvres for determining the location of the tendon lesion, Jobe's test for supraspinatus, Patte's test for infraspinatus and teres minor, Gerber's lift off test and resisted internal rotation assessment for subscapularis, were performed[5-8]. Clinical diagnosis was established by the positivity of the tests. The presence of previous symptoms in the opposite shoulder was recorded in the clinical assessment of the patients. The, opposite shoulders was clinically evaluated and findings documented. The clinical ranges of motion of both the shoulders were measured using a goniometer.

**Musculoskeletal Ultrasonography[9]**

Ultrasonography is an effective imaging modality in the evaluation of both rotator and non-rotator cuff disorders. Because of low cost and availability, it can be an alternative procedure for the diagnosis of painful shoulder. In the assessment of shoulder pathology, USG had a sensitivity of 73.3%, specificity of 88.2%, Positive predictive value (PPV) of 84.6%, Negative predictive value (NPV) of 78.9% and an accuracy of 81.3%. USG is a useful modality for evaluation the shoulder joint in case of painful shoulder even plain X-ray is non-conclusive. All patients were examined with commercially available real time equipment using a 7.5MHz (Toshiba, Xario, Japan ) linear phased array transducer. High resolution imaging afforded by the current generation of high frequency (greater than 7.5 MHz) linear transducers allows us to effectively assess superficial tendon and muscle lesions and bursitis.This technique has also been shown to be accurate for detecting intra-articular fluid and synovitis and abnormalities of articular cartilage.Transverse and longitudinal planes from the biceps tendon groove, rotator cuff, and subacromial-subdeltoid bursa and transverse planes from the posterior glenohumeral recess and glenoid labrum were scanned. In all patients, comparable images of the opposite shoulder were obtained in order to compare US findings. US examination of the opposite side is routinely performed to facilitate detection of subtle abnormalities.

**Table 1:** Ultrasonographic findings in Rotator Cuff pathology

| Shoulder Abnormality | Ultrasonographic findings |
|---|---|
| ***Rotator cuff tendinitis*** | ***Tendon hypoechogenicity or tendon thickening with or without internal hypo or hyperechoic foci*** |
| Rotator cuff calcifications | Hyperreflective foci or lines with acoustic shadowing |
| Rotator cuff impingement | A buckling of the cuff/rippling effect as the cuff passes beneath the coracoacromial arch or fluid distending the subacromial-subdeltoid bursa or thickened bursa in front of the acromion while the arm is abducted |

Impingement syndrome is evaluated by dynamic examination.[10] A dynamic view of the supraspinatus

tendon is obtained by moving the patient's arm from a neutral position to 90° abduction in order to detect encroachment of the acromion into the rotator cuff. US findings from the clinically evaluated painful shoulders and the asymptomatic opposite shoulders were recorded. Sensitivity was low in the clinical diagnosis of all shoulder lesions, especially rotator cuff tear and subacromial-subdeltoid bursitis. However, specificity was high for some of these lesions such as rotator cuff tear and fairly good for infraspinatus lesion, subscapularis lesion and tendinitis, subacromial-subdeltoid bursitis, and involvement of the acromioclavicular joint. However, it was very low for the detection of supraspinatus lesion, biceps tendinitis, and rotator cuff impingement. Physical examination was unable to differentiate rotator cuff tendinitis from tear, and partial thickness tear from full thickness tear. Clinical examination is usually supplemented by plain radiography. However, the ability of this technique to show only non-specific indirect signs of chronic rotator cuff lesions limits its use for ruling out osteoarthritis, periarticular calcifications, and other bone causes of shoulder pain. Ultrasonography has considerable advantages over other imaging techniques: it can routinely be used for dynamic examination of the musculoskeletal system; it is quick and easy to perform; it has no secondary effects; the costs are low. It has proved to be accurate and reliable in diagnosing a wide range of shoulder disorders compared with arthrography, MRI, arthroscopy, and surgical findings. Several studies have shown an accuracy for US detection of rotator cuff lesions compared with surgical findings of greater than 0.85[11] and an inter observer reliability of 0.63[12] Disadvantages of US include lack of visualisation of the posterior aspect of the supraspinatus and infraspinatus tendons and a limited view of the glenohumeral joint and the glenoid labrum. However, most rotator cuff lesions involve the "critical zone" in the anterior aspect of the tendons. Furthermore, ultrasonography is considered to be the most operator dependent imaging technique. However, the results of any imaging technique depend on the skill of the examiner. Initial conservative treatments of periarticular shoulder disorders are quite similar relying on the use of non-steroidal anti-inflammatory drugs, physiotherapy, and local injections of corticosteroids. The overall prognosis for patients with these conditions is considered to be good. However; previous studies of the effectiveness of conservative therapeutic approaches have relied largely on clinical assessment. Patient groups have been rather heterogeneous and not matched, making interpretation of results difficult. In addition, few studies have evaluated the outcome of the different periarticular lesions diagnosed by an accurate imaging technique.[36] It would therefore be desirable to obtain an exact diagnosis of the different periarticular shoulder lesions in order to evaluate their prognosis and their response to various conservative treatment options. The availability of US in regular practice offers the possibility of establishing a more accurate diagnosis of the painful shoulder and therefore improving the treatment of this common disorder and hence added to our study protocol. Currently, both magnetic resonance imaging (MRI) and high frequency US are used to evaluate soft tissue disorders of the shoulder. The diagnostic value of MRI for shoulder pathologies has been widely reported. However, it is expensive, time consuming, and not widely available.

**Management**

Once the diagnosis of Rotator cuff Tendinitis was confirmed, patients were started on short course of analgesics and started on US therapy and physical therapy and followed up at 3 and 6 months.

**Ultrasound therapy**

For disorders of the soft tissue, the use of ultrasound has been widely accepted. The action of ultrasound on soft tissues is via both thermal and non thermal mechanisms, though some mechanisms are still inconclusive. Superficial heating modalities act by heating deeper tissues when applied with appropriate intensity. Ultrasound however differs from this. Non thermal effects may accelerate healing; though in vivo studies remain inconclusive13 Systematic reviews of clinical trials on shoulder disorders have disproven US as an effective modality. Many studies have found ultrasound to be of little clinical benefit. US can be effective in symptomatic relief, other studies depict. In our experience and contrary to the published data, US have proven to be of immense benefit in the management of shoulder disorders20 .The use of US is to decrease inflammation (eg, tendinitis, bursitis) (83.6% of the respondents), increase tissue pliabilty (70.9%), accelerate scar tissue remodelling (68.8%), augment soft tissue healing (52.5%), reduce pain (49.3%), and reduce soft tissue edema and effusion (35.1% and this has been confirmed by a large number of surveys.13The concerned subjects have used US to deliver medication (phonophoresis) for soft tissue inflammation (54.1%), pain relief (22.2%), and soft tissue swelling (19.8%)

**Dual frequency ultrasound therapy unit (electroson-709).**

Ultrasound38: Dual frequency ultrasound therapy unit (electroson-709). It is an advanced microcontroller based ultrasound therapy equipment. It combines the function of both 1MHz and 3MHz. Advantage of this machine is that, 1MHz and 3 MHz treatment heads can be plugged in simultaneously and whichever frequency required can be selected.

Machine Settings: Intensity=0.8W/cm2 for a duration 8 minutes. The frequency used
was 3 MHz with pulsed mode of 1:4. 38 were used in our study.

## Results

In our study we found that, there was a male prepondance in the group which was in correspondence with the previous studies. Male represented 62.26% of the sample. In our study the majority of the population belonged to the productive age group of 20-60 which was in correspondence with the earlier studies. There were a total of 37 patients in the 40-60 age group.The study revealed that the dominant hand was more involved which was right in a majority of the cases and it accounted for 58.5% of the sample size which was in accordance with the previous studies. Majority of the patients in the current study had complaints of shoulder pain and gradual restriction of mobility for a period less than 6 months. Thirty four patients had complaints for 4-6 months. The outcome measures following the therapy were measured in terms of improvement in range of motion and SPADI questionnaire. In our study, the most important parameter in the assessment was the range of abduction considering that supraspinatus is the most common tendon involved. The pre and post treatment showed significant improvement with an improvement of difference percentage by 37.36% and a highly significant p value. The pre-treatment mean was 67.92 degree and it had improved to 93.30 post treatment .The t value was 9.99. The range of adduction had increased by a difference percentage of 6.9% and an overall increase of 8.40 degree. Results off ourstudy showed thatthe flexion had improved by a mean difference off 20.38 and statistically significant p value. The minimum degree off presentation was 30. In our study the flexion had improved by a mean difference off 20.38 and statistically significant p value. The minimum degree off presentation was 30 and the overall mean was 59.81 the post treatment value was at 80.19 degree. The p value was 0.000. Extension had improved by difference of 7.83degree and difference % of 66.94% .thepre treatment mean was at 11.70 and it had improved to 19.53 at the end of the treatment. The p value was statistically significant. The pre and post external rotation degree had improved by 16.89 degree in the patients with a difference percentage 102.87%. The initial presentation was 16.42 degree and at the end of the treatment it had improved to 33.30. the p value was highly significant 0.000. The pre and post mean difference in internal rotation was 17.55 degree. The rotations were assessed with the arm by the side of the body. The p value was highly significant. It had improved from 17.36 degree at presentation to 34.91 at the end of the treatment. Patients outcome was assessed with SPADI a decrease by 10% is considered significant. In our study there was a significant mean difference of 9.21 and difference percentage 11.43. The mean value was at 80.60 at presentation and had dropped to 71.39. the p value was highly significant. The pain percentage had decreased by 10.77 and difference percentage of 13.80%. with a highly significant p value. The initial mean value at presentation was 78.06 and the value had reduced to 67.28 at the end of the treatment. The disability score had come down by a percentage of 11.95 and a mean difference 9.74. the p value being highly significant. The initial mean value at presentation was 81.58 and post treatment the value had come down to 71.84.

## Discussion

The study was conducted in Father Muller Medical College from May2011 to 2013. Our study was done to investigate the functional outcome following conservative management of rotator cuff tendinitis. Trivial trauma during daily activities accounted for nearly eighty percent of injuries, remaining were trauma due to fall and insidious onset due to degeneration. This corresponds with the previous studies by Neer and co-workers. Patients were put on a short course of analgesics (NSAIDs) and on a 3 phase rehabilitation program which included simultaneous pain management and assigned low graded exercise therapy and then stepped to high grade exercise therapy over a period of 7 days. Patients were followed up after 3 months and at 6 months. The outcome measures were measured in terms of clinical improvement in pain and range of movements and SPADI score and a follow-up musculoskeletal ultrasonogram for patients with persistent signs and symptoms. In our study of the 53 patients 30 were male and 23 were females indicating a male preponderance which is in correspondence with the study by Lehman and associates. In our study Right side was involved in 58.5% and Left in 41.5% with right side more commonly involved which was the dominant hand, is in correspondence with the study by Chard et al. Out of the 53 patients diagnosed of rotator cuff tendinitis thirty four had supraspinatus involvement, ten had subscapularis, two had teres minor and three had infraspinatus involvement. Therefore it can be stated that supraspinatus is the most commonly involved tendon in rotator cuff injuries which is on par with Frederick A Masten III et al study. Ultrasonography being a tool for diagnosis has been moderate diagnostic significance and the inter observer agreement being high in the diagnosis of rotator cuff partial tear , tendinitis as per Middleton *et al* . The scope of a dynamic testing specially in the setting of rotator cuff pathology adds to the edge of using ultrasonography as a diagnostic study. However MRI and clinical evaluation remain the gold

standard. In our study the patient's age group was mainly in the productive compartment of 30-60 years of age group accounting for forty seven of the fifty three patients(88.7%). This was in agreement with the literature studies [8]. The duration of symptoms ranged from 4-6 months in a majority, thirty four patients (64.2%) of the total 53 were in the 4-6month age group. In our study, the most important parameter in the assessment was the range of abduction considering that supraspinatus is the most common tendon involved. The pre and post treatment showed significant improvement with an improvement of difference percentage by 37.36% and a highly significant p value, which agrees with the other studies[18,19]. The study by Karen et al showed an overall 22 degree increase in the Abduction in our study the improvement was 25.8degree. The improvement signified that such movement is considerably compromised in the shoulder injuries and can be improved with conservative management. The biomedical view of function of supraspinatus muscle is that it abducts, externally rotates and together with the other shoulder girdle muscles depresses the gleno-humeral joint. According to WHO World Health Organisation's International classification of functioning, Disability and Health ICF[18] another approach has been presented, the task of supraspinatus to work with the other rotator cuff muscles, shoulder girdle muscles, and the trunk and arm muscles to position the hand to perform a functional activity. The view was applied in choosing the semi global and local exercises with three sets of 30 repetitions of each exercise along with three global aerobic circulation exercises. In our study the flexion had improved by a mean difference off 20.38 and statistically significant p value. The results in our study are better than the study by Karen et al. which had total mean increase by 16 degrees. Extension had improved by difference of 7.83degree and difference % of 66.94% and a highly statistically significant p value. Rotations- external rotation had improved by diff % of 102.87 and internal rotation by101.90%. In the SPADI score outcome assessment of the 53 patients 39 patients had improved by a 10% margin 14 had a cut off that ranged between 7-9%. Percentage of improvement being 73.58% of the total group. In the total pool of 53 patients taken together at a mean follow up of 3.8 months there was a decrease in pain % by 13.08%, disability by 11.95% and total SPADI 11.43%. The p value being highly significant in all the three outcome measures. Off the 53 patients 1 had progressed from tendinitis to partial tear and 1 had a complete tear for which he underwent arthroscopic repair. From our study we conclude that there enough evidence that the patients had improved following a short course NSAID and Physiotherapy (low and high grade). Our results demonstrate that there was a statistically significant improvement in pain and disability of the patients. Ginnet al[19] reported improvement in function and ROM with painfree abduction and flexion among patients following conservative therapy. He reported no improvement in pain in the study group. In our study there was significant improvement in the range of motion with a pain free abduction, flexion and rotations which is comparable to the study done by Ginn et al. However our study showed significant improvement in pain differing from results of Ginn et al and in correspondence with the study by HavadOsteraset al[20]. In spite of the methodological limitations of diagnostic accuracy of USG and short term follow up we can claim that the present study has a certain amount of generalizability. A large sample with a double blind study and longer follow-up can be more conclusive. And MRI as a diagnostic tool will help increase the accuracy and avoid the inter observer variability.

## Conclusion

The results of our study re-inforce the fact that conservative management is optimal for the management of Rotator Cuff Tendinitis. A combination of Short course NSAIDS and 3 phase physiotherapy is effective in management of the condition.

## References


1. Neer CS II; Impingement Lesions, Clinical Orthopaedics, 173:70-77,1983.
2. Ellman H. In Arthroscopic Shoulder Surgery and Related Disorders. Philadelphia, Pa: Lea and Febiger; 1993 :98-119.
3. E.A. CODMAN.Rupture of the Supraspinatus. 1834 TO 1934, J. Bone Joint Surg. Am., Jul 1937;19: 643-634.
4. Iannotti Joseph P, Williams Jr. Gerald R. Disorders of the Shoulder Diagnosis and Management. 1999\
5. Hawkins RJ, Impingement syndrome in athletes. Am J Sports Med 1980;8:151–8.
6. Yocum LA. Assessing the shoulder.Clin Sports Med 1983;2:281–9.
7. Jobe FW, Painful athletic injuries of the shoulder.ClinOrthop 1983;173:117–24.
8. Gerber C, Isolated rupture of the tendon of the subscapularis muscle. Clinical features in 16 cases. J Bone Joint Surg [Br] 1991;73:389–94.
9. NaredoE ;Painful shoulder: comparison of physical examination and ultrasonographic findings ;Ann Rheum Dis2002;61:132-136 doi:10.1136/ard.61.2.132
10. Crass JR, Craig EV, Feinberg SB. The hyperextended internal rotation view in rotator cuff ultrasonography. J Clin Ultrasound 1987;15:416–20.
11. Swen WAA, Jacobs JWG, Algra PR, Manoliu RA, Rijkmans J, Willems WJ. Sonography and magnetic resonance imaging equivalent for the assessment of full-thickness rotator cuff tears. Arthritis Rheum 1999;42:2231–8.

12. Farin PU, Jaroma H, Harju A, Soimakallio S. Shoulder impingement syndrome: sonographic evaluation. Radiology 1990;176:845–9.
13. Rita A Wong. A Survey of Therapeutic Ultrasound Use by Physical Therapists Who Are Orthopaedic Certified Specialists. PhysTher. 2007; 87:986-994.
14. Hodler J, Kursunoglu-Brahme S, Snyder SJ, Cervilla V, Karzel RP, Schweitzer ME, et al. Rotator cuff disease: assessment with arthrography versus standard MR imaging in 36 patients with arthroscopic confirmation. Radiology 1992;182:431–6.
15. Middleton WD, Kneeland JB, Carrera GF, Cates JD, KellmanGM,Campagna NG, et al. High-resolution MR imaging of the normal rotator cuff. AJR Am J Roentgenol 1987;148:559–64.
16. Baker KG, Robertson. A review of therapeutic ultrasound: biophysical effects. PhysTher.2001 ;81:1351–1358.
17. Van der Heijden GJMG, Physiotherapy for patients with soft tissue disorders: a systematic review of randomised clinical trials. BMJ.1997 ;315:25–30.
18. Karen A Ginn, Treatment for Shoulder Pain A Randomized, Controlled Clinical Trial Physical 'Therapy . Volume 77 . Number 8 . August 1997.
19. Ginn KA, Herbert RD, Khouw W, Lee R. A randomized, controlled clinical trial of a treatment for shoulder pain. PhysTher 1997;77 802-11.
20. Harvard Osteras The dose response effect of medical exercise therapy on impairment in patients with unilateral long standing sub acromial pain, Open Orthop journal 2010 4;1-6.
21. Middleton WD, Edelstein G, Reinus WR, Melson CL, Totty WG, Murphy WA. Sonographic detection of rotator cuff tears. AJR Am J Roentgenol 1985;144:349–53.