



CONSERVATIVE MANAGEMENT OF “ROTATOR CUFF TEAR”: A PROSPECTIVE COMPERATIVE STUDY

Medical Science

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ABSTRACT

Introduction: Rotator cuff tear common condition produces gross impairment, hampering activity of daily living as also the earning of wages for an individual who is a self sufficient active member of the society, suddenly becomes dependent.

Objective & Aim: Evaluate and Compare the effect of therapeutic exercise vs. therapeutic exercise and Ultrasound therapy on, Functional outcome, Clinical outcome and Impact on activity of daily living.

Methodology: This open label prospective randomised comparative study was conducted over a period of one & a half year in a tertiary care teaching institution. Age and sex matched, subjects with Rotator cuff tear were enrolled in this study. Subjects were assessed for Pain, ROM, and Activity of daily living by CMS & ADL score. A good functional outcome was expected after the proposed rehabilitative measures as indicated by improved CMS and ADL score.

Results: A total of 74 subjects were enrolled. The mean age was 49.46 (SD \pm 9.33), median age was 46 (QR \pm 16) yrs. There was a significant improvement over time at the end of study period in CMS score & ADL score. Comparison within a group between visits 1 & 3 and 1 & 5 by Wilcoxon's matched pair signed rank test showing consistent improvement over time in CMS & ADL score. In the present study, statistical analysis doesn't reveal any significant difference in outcome between the two groups.

Conclusion: Therapeutic use of UST during early phase of rehabilitation doesn't prove to be of added advantage for improvement of function and patient's symptoms. Therapeutic exercise schedule including early passive ROM and stretching ex. Progressing to strengthening ex. proved to be beneficial in producing consistent improvement in shoulder function (CMS Score) as well as Activity of Daily Living (ADL Score).

KEYWORDS

Rotator cuff tear, Constant Murley Composite shoulder function assessment, Activity of daily living, Range of motion, Ultrasound therapy, randomized comparative study

INTRODUCTION

Rotator cuff tears are amongst the most common condition affecting the shoulder. Rotator cuff tears are tears of one or more of the four tendons of the rotator cuff, viz. supraspinatus, Infraspinatus, teres minor and subscapularis. Supraspinatus is most frequently torn; the tear usually occurs at its point of insertion onto the humeral head. Many rotator cuff tears cause no pain nor produce any symptoms, tears are known to have an increasing incidence with increasing age. The most frequent cause is age related degeneration and less frequently by trauma or sports injury. Tears of the rotator cuff tendon are described as partial thickness, full thickness and full thickness with complete detachment of the tendons from bone. Studies have shown that over time 45% will have enlargement of the tear over a five year period. Of those whose tears enlarge, 20% have no symptoms while 80% eventually develop symptoms¹.

Sudden trauma or chronic overuse with repetitive overhead motion with internal or external rotation is the probable mechanism of injury. Partial tears usually occur in age group older than 30 and full thickness tears can occur in younger age group². It can be diagnosed by different clinical signs (like Neer's Impingement sign, painful arc sign, Hawkin's-Kennedy sign, external/internal rotation lag sign, drop arm test, Jobe's test, Patte's test, Gerber's test etc.) with additional information from different imaging modalities like X-ray (AP view, Supraspinatus outlet view, Axillary view), USG, arthrography, CT and CT arthrography, MRI and MR arthrography³. Patient of rotator cuff tears are initially a candidate for either operative or nonoperative treatment. However, patients are re-evaluated throughout the course of treatment and may move from one group to the other based on their clinical response and findings on repeated examinations. Since many

patients with partial tear and some with even complete tear can respond to nonoperative management; generally conservative care is offered first. If a significant trauma such as dislocation or fracture or high energy force is known to have been followed by complete or near complete loss of rotator cuff mediated motion and strength, then an operative work up is initiated with plans to proceed to surgery for repair. Patient with pain and maintenance of reasonable function are generally treated for pain relief at first. Nonoperative treatment includes analgesic – anti-inflammatory medications, topical pain relievers and if warranted, a subacromial cortisone/local anesthetic injections. A sling may be offered for comfort for a day or two, with the awareness that the shoulder can become stiff with prolonged immobilization, which is to be avoided. Early physical therapy may afford pain relief with modalities (i.e., UST, cryotherapy etc.) and help to maintain motion. As pain decreases, strength deficiencies and biomechanical errors can be corrected. Work restrictions may be advised along with modifications and restrictions for activities of daily living to prevent re-injury. Shen et al shown that MRI evidence of fatty and muscular atrophy in the Cuff prior to surgery is predictive of a poor surgical outcome. The first commercial applications that demonstrated rotator cuff repair on high field MRI using percutaneously implanted stem cells is just reaching the market place. Rotator cuff tear is a striking problem in India; a good number of people both young and old are being affected either with shoulder pain, stiffness, weakness or restriction of ROM⁴, a good number of people both young and old are being affected either with shoulder pain, stiffness, weakness or restriction of ROM thereby producing impairment that is defined as “any loss or abnormality of psychological, physical, anatomical structure or function” producing functional deficit and hence disability⁶.

As a member of the medical profession and a physiatrist, one should be stimulated to study such a problem, evaluation of its cost effective nonsurgical physiatric management outcome and finally to rehabilitate the individual to achieve independence, reduce any residual disability and improve the quality of life.

MATERIAL AND METHODS

The present study was conducted in the dept. of Physical medicine and rehabilitation All India Institute of Medical Science Patna during the period from March 2016 to August 2017. The institutional ethics committee clearance was obtained. In this open level parallel group randomized study total of 74 subjects were enrolled in this study. All subjects were randomly allotted into two groups by computer generated system. Subjects were selected from patient attending O.P.D. in the dept. of P.M.&R. Consequently 37 subjects per group were selected according to inclusion criteria. The criteria for the case selection were, age between 40 to 70 years, subjects having Chronic or Acute-on-Chronic shoulder pain, Restriction of active ROM of shoulder specifically forward elevation, abduction, internal/external rotation, USG documentation of rotator cuff Tear. Subjects who excluded from study presented with Acute Traumatic Tear of rotator cuff, Bony injury, Malignancy, Infection over affected area, Uncontrolled DM, neurological involvement over affected area. Both the groups receive coddman pendulum exercise, passive ROM (forward flexion, extension, internal, external rotation & capsular stretching), Active ROM (Wall-walking), strengthening exercise of rotator cuff muscles (15 repetitions, twice daily, 5 days in a week). Exercise programme were taught and performed under supervision during hospital session and repeat each exercise twice daily at home. Additional ultrasound therapy given in gr.2 participants 5 days a week for a duration of 20 minutes per day (low intensity pulsed ultrasound were delivered at 30 Mw/cm² in 200- μ s bursts of sine waves at a frequency of 1.5MHz and a 0.2 duty cycle during each). Each eligible patient will be assessed on first visit (V1) and then every two weeks for four more visits by standard musculoskeletal evaluations. Age, sex, socioeconomic, occupation, ultrasound evaluation were recorded. Assessment parameters for Pain and ROM by CMS score activity of daily living by ADL score.

Statistical analysis were done by STATISTICAL version 6 (Stats soft inc., Tulsa, Oklahoma, 2001), statistical software. Data has been summarized by usual descriptive measures viz. mean, standard deviation, median, inter quartile range. Parametric and nonparametric analysis was conducted. Numerical variables have been compared between two groups by MANN-WHITNEY U-TEST while categorical variables have been compared by CHI-SQUARE TEST or FISHER'S EXACT TEST as appropriate. FRIEDMAN'S ANOVA was used to assess change in scores over time followed by WILCOXON'S MATCHED PAIR SIGNED RANK TEST for assessing difference between any two time points. All analysis has been two-tailed. $p < 0.05$ has been taken to be statistically significant.

RESULTS

The sample size of the study was 37 subjects in each group of which there were 4 drop-outs in group 1 and 5 drop-outs in group 2. As two of the drop-outs in gr. 1 and two of the drop-outs in gr. 2 were on first and second visit, those data were excluded during statistical analysis. At baseline there is no significant difference between Age and sex. Incidence of rotator cuff tear observed during this study were most common among housewives in both the groups- in gr. 1, 14 (37.84%) and in gr. 2, 15 (40.54%), followed in frequency by farmer, retired person, carpenter, clerk, businessman, driver, mansion, manual labour and teachers. Most of the patients were from low SES in both the groups- 16 (43.24%) in gr. 1 and 19 (51.35%) in gr. 2 followed by patient from middle SES- 15 (40.54%) in gr. 1 and 14 (37.84%) in gr. 2. Right hand dominance was seen in both the groups. In the present study, dominant side affection was seen in 20 (54.05%) and 21 (56.76%) in gr. 1 and gr. 2 respectively. Non dominant side involvement was seen in 9 (24.32%) in both the groups. Bilateral involvement was seen in 8 (21.62%) and 7 (18.92%) in gr. 1 and gr. 2 patients respectively. Supraspinatus was the most frequently affected tendon in both the groups- (72.97%) in gr. 1 and (75.68%) in gr. 2 followed by involvement of Infraspinatus (13.51%) in gr. 1 and (8.11%) in gr. 2 with involvement of subscapularis was least common; (8.11%) in gr. 1 and (2.70%) in gr. 2. In the present study, all the patients presented with catching during shoulder movement and modification of ADL with pain and sleep disturbance was next in frequency. Least common symptoms were deformity, weakness, atrophy, stiffness and instability. Table 10. Constant murley composite score of shoulder function scale were assessed from visit 1 (V1) through visit 5 (V5). For gr. 1 at V1,

pain score showing mean and median of 2.58 (SD \pm 3.06), 0 (QR \pm 5) respectively- improving consistently and on V5 showing mean of 13.14 (SD \pm 2.99) and median 15 (QR \pm 5). For gr. 2 at V1, pain score showing mean and median of 2.8 (SD \pm 2.9), 5 (QR \pm 5) respectively- improving consistently and on V5 showing mean of 13.38 (SD \pm 2.7) and median 15 (QR \pm 5). CMS ROM in flexion, abduction, external rotation, internal rotation and abduction force for gr. 1 at V1, showing mean & median, 1.5 (SD \pm 1.6) & 2 (QR \pm 2), 2.45 (SD \pm 1.7) & 2 (QR \pm 2), 1.8 (SD \pm 1.6) & 2 (QR \pm 4), 1.2 (SD \pm 1.4) & 2 (QR \pm 2), 4.1 (SD \pm 1.7) & 4 (QR \pm 4) respectively- improving consistently and on V5 showing mean & median, 8.6 (SD \pm 2) & 10 (QR \pm 2), 8.7 (SD \pm 2.7) & 10 (QR \pm 2), 8.4 (SD \pm 2.4) & 10 (QR \pm 2), 7 (SD \pm 1.6) & 8 (QR \pm 2), 12 (SD \pm 2.5) & 13 (QR \pm 4) respectively. For gr.2 at V1 showing mean & median, 2.1 (SD \pm 1.7) & 2 (QR \pm 4), 1.9 (SD \pm 1.4) & 2 (QR \pm 2), 1.8 (SD \pm 1.6) & 2 (QR \pm 4), 1 (SD \pm 1.2) & 0 (QR \pm 2), 3.6 (SD \pm 1.3) & 4 (QR \pm 2) respectively- improving consistently and on V5 showing mean & median, 8.9 (SD \pm 1.9) & 10 (QR \pm 2), 8.7 (SD \pm 2.7) & 10 (QR \pm 2), 8.8 (SD \pm 2.1) & 10 (QR \pm 2), 6.6 (SD \pm 1.9) & 8 (QR \pm 2), 11.8 (SD \pm 1.9) & 11 (QR \pm 2) respectively. There was a significant improvement over time at the end of study period in CMS score. ADL score for gr. 1 at V1, showing mean of 26.4 (SD \pm 7.9) and median 28 (QR \pm 10) respectively- improving consistently and on V5 showing mean of 68 (SD \pm 7.5) and median 70 (QR \pm 10). For gr. 2 at V1, showing mean and median of 30 (SD \pm 11.9), 30 (QR \pm 14) respectively- improving consistently and on V5 showing mean of 65.3 (SD \pm 13.5) and median 71 (QR \pm 12). In the present study, comparison within a group between visits 1 & 3 and 1 & 5 by Wilcoxon's matched pair signed rank test showing consistent improvement over time in CMS & ADL score. In the present study, statistical analysis doesn't reveal any significant difference in outcome between the two groups.

In present study, USG were done in both the groups at V1. In gr. 1 at V1, USG showed cuff tear of 3cm in 12 cases, 2cm in 12 cases, 1cm in 11 cases and 4cm in 2 cases. Calcific tendinitis of the Supraspinatus along with bicipital tendinitis was seen in 7 cases. Follow-up USG at V5 showed resolution of tear in 14 cases. In gr. 2 at V1, USG showed cuff tear of 3cm in 6 cases, 2cm in 15 cases, 1cm in 12 cases and 4cm in 4 cases. Calcific tendinitis of the Supraspinatus along with bicipital tendinitis was seen in 2 cases, with isolated calcific tendinitis in 2 cases and bicipital tendinitis in 2 cases. Follow-up USG at V5 showed resolution of tear in 14 cases.

DISCUSSION

Despite numerous studies, there is still some controversy regarding the nonoperative rehabilitative management of rotator cuff tears. In the present study, the maximum age group affected was 70 yrs & minimum was 40 yrs in gr. 1 & 2 which was corroborative with previous studies. The annual incidence is estimated at 10 cases per 1000 population, peaking at 25 cases per 1000 population in the age category of 42-46 years. In the population aged 70 years or more, 21% of persons were found to have shoulder symptoms. In cadaver studies, the incidence of full thickness tears varies from 18-26%. The incidence of partial thickness tears varies from 32-37% after age 40 years. Before 40, tears rarely are observed. After 60 years, 26% of patients have partial thickness tears, and 28% demonstrate full thickness tears (Hijioka A et al, 1993). In present study it has been seen that male and female almost have equal incidence of cuff tears in which was consistent with previous studies. Housewives were most frequently affected among all different occupations even greater than all the other occupations. In one study, there is a predominance of male patients (66%) seeking consultation for rotator disease, but, in other studies, the male-to-female ratio is 1:1 (Hijioka A et al, 1993). Middle and lower SES patient were mostly affected in the present study. This observation was corroborative with previous studies; in one study of cuff tear in manual labour, showed predominant involvement of low SES. In the present study, though, dominant side involvements were seen in most of the cases but there was significant involvement of non dominant side in both the groups. This finding of our study was corroborative with an Indian study but not so much study agrees with this statement, in those studies, people whose occupation demands repetitive overhead activities were mostly affected bilaterally. Supraspinatus was the most frequently affected tendon followed by Infraspinatus, combined affection of Supraspinatus & subscapularis and subscapularis only has equal incidence and combined affection of supra & Infraspinatus was least common. The result is corroborative with other studies. Rotator cuff disease is characterized by variable episodes of recurrence of pain following more intensive shoulder activities, followed by remission with rest or treatment. As the disease progresses, shoulder pain becomes more constant. Overhead and arm-length activities typically increase the pain. Discomfort and night pain also can be present. With

time, the individual can notice some weakness during shoulder elevation. Crepitus also can be noted. In the present study, most common symptomatology was catching during shoulder movement and modification of ADL along with pain and sleep disturbances. Least common symptoms were deformity, atrophy, weakness, stiffness, Crepitus and instability. This result was not perfectly corroborative with our study. Some other studies show that rotator cuff tear may be asymptomatic⁸. In the present study, shoulder function (as assessed by Constant Murley score and ADL score) were seem to improve consistently over time from visit 1 to visit 5. Different studies by Itoi & Tabata (1992), Bukor et. al (1993), Hawkins et. al (1995), Goldberg et. al (2001) and Koubaa et. al (2006) showed similar result. Therapeutic use of UST during early phase of rehabilitation doesn't prove to be of added advantage for improvement of function and patient's symptoms adding extra cost to the therapy. This observation of our study is consistent with other studies. Based on these review studies, it appears that ultrasonographic therapy, transcutaneous electrical nerve stimulation (TENS), magnetotherapy, and different methods of thermotherapy are not effective in the treatment of shoulder disorder. Effectiveness of UST was seen only in cases associated with calcific tendinitis of the involved tendon. This view is corroborative with the study done by Ebenbichler et. al. they showed in a randomized, double-blind, placebo-controlled study that the use of pulsed ultrasonography performed 5 times a week for 15 minutes (0.89 MHz frequency, 2.5 watts per square centimeter, pulsed mode 1:4) significantly resolves calcification of the shoulder, decreases pain, and improves the short-term quality of life (QOL). This theory may explain why the use of ultrasonography is only significantly effective in the short term. The short-term efficacy of ultrasonographic therapy has been demonstrated only in calcifying tendinitis. Its efficacy in other shoulder disorders has not been shown. As per our study, therapeutic exercise schedule were proved to be equally effective for improving functional outcomes in both groups of patient. Initial emphasis in passive ROM with stretching progressing to strengthening exercise after attaining full passive ROM followed by neuromuscular retraining, proprioceptive & ADL training were shown to be associated with consistent improvement in function and early return to work and community participation. In a landmark study, Brox compared the efficacy of supervised exercises with arthroscopic surgery and placebo laser. At 6 months, there was a significant difference between the exercise group and the placebo group in terms of pain reduction, functions, and increased ROM. However, there was no significant difference between the exercise group and the arthroscopic surgery group^{16, 17}. Other studies on the nonoperative treatment of rotator disease have shown satisfactory and unsatisfactory results, but they were all retrospective uncontrolled trials. Therefore, on the basis of the Brox study, a supervised exercise program should be part the conservative treatment of rotator cuff disease. It is this author's opinion that an exercises program is the basis of the conservative treatment and no therapeutic modality will provide long-term relief of pain and increased functional status unless it is complemented by an exercise program as well as the findings of the Brox study. Studies by Kuhlman JR et. al (1992), Blackburn et. al (1990), Davis GJ et. al (1989) and van der Heijden et. al (1997) also support this view. In our study, poor prognostic factors for improvement in shoulder function and ADL were female sex, bilateral involvement, tear of Infraspinatus only/combined affection of supra & Infraspinatus tendon, initial symptoms of patient consisting of atrophy, deformity, Crepitus and instability and predominant restriction of internal rotation, AC joint sclerosis and USG finding of large tear 3-5cm, associated with Calcific tendinitis of the involved tendon and Bicipital tendinitis. This view was corroborative with other studies. Long term disabilities, psychosocial and vocational outcome in patients with poor response to nonsurgical rehabilitative measures could not be studied due to short follow-up. Whether the residual deficits in patients with poor outcome can cause long term disability is unknown, although nonsurgical rehabilitative measures have benefited the patients.

CONCLUSION

Present study showed that male and female almost have equal incidence of cuff tears which was consistent with previous studies. Housewives were most frequently affected among all different occupations. Middle and lower SES patient were mostly affected. There was small but significant proportion of involvement of non-dominant side, in both the groups. Bilateral involvement is as common in housewives as in farmers, carpenters, mansion and manual labors. Supraspinatus was the most frequently affected tendon followed by Infraspinatus, combined affection of Supraspinatus & subscapularis and subscapularis only has equal incidence and combined affection of supra & Infraspinatus was least common. Most common symptomatology was catching during shoulder movement and

modification of ADL along with pain and sleep disturbances. Therapeutic use of UST during early phase of rehabilitation doesn't prove to be of added advantage for improvement of function and patient's symptoms adding extra cost to the therapy. Therapeutic exercise schedule including early passive ROM and stretching ex. Progressing to strengthening ex. proved to be beneficial in producing consistent improvement in shoulder function (CMS Score) as well as Activity of Daily Living (ADL Score). Long term disabilities, psychosocial and vocational outcome in patients with poor response to nonsurgical rehabilitative measures could not be studied due to short follow-up.

LIMITATION OF STUDY

This study has certain limitations. A large sample size was required before definitive recommendation. Also shorter duration of our study restricted our interest in studying wide variations that could exist between groups. Drop out was an unexpected problem that we faced in our study.

INFORMED CONSENT

Written and informed consent was taken from all eligible participants.

CONFLICT OF INTEREST

None declared

SOURCE OF SUPPORT

Nil

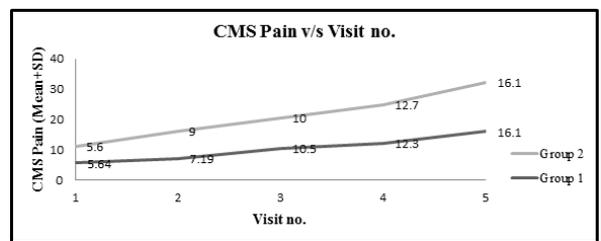


Chart 1 shows consistent improvement of pain score over time in both the groups.

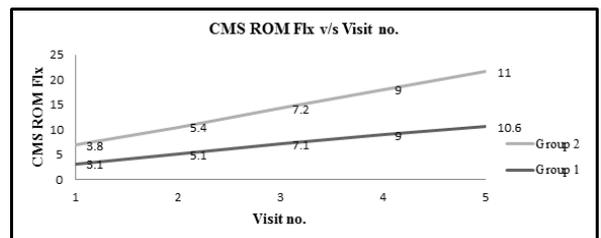


Chart 2 shows consistent improvement of ROM flexion score over time in both the groups.

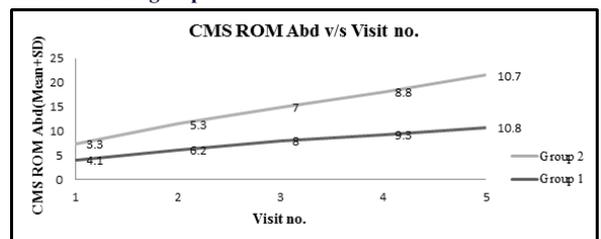


Chart 3 shows consistent improvement of ROM abduction score over time in both the groups.

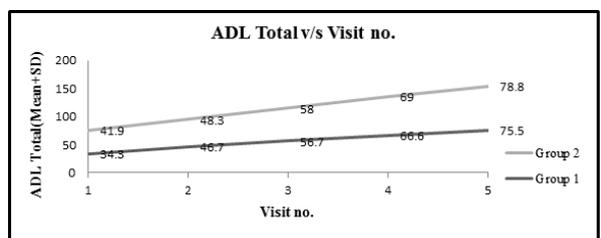


Chart 4 shows consistent improvement of Total ADL score over time in both the groups.

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