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ACCELERATED FUNCTIONAL RECOVERY AFTER SUPRASPINATUS TENDON REPAIR USING NUCLEAR MAGNETIC RESONANCE THERAPY: A CASE REPORT

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ABSTRACT

The rotator cuff comprises the supraspinatus, infraspinatus, teres minor, and subscapularis muscles.[1] The tendons of these 4 muscles connect with the shoulder capsule when passing through the upper, back, and front of the shoulder joint; they form a similar sleeve like structure around the shoulder joint, which plays an important role in the shoulder joint's stability.[2] Supraspinatus muscle tears are the most common rotator cuff injuries, with a prevalence of 61.9% in men and 38.1% in women.[3] Depending on the patient cohort, failure rates of surgical repair of rotator cuff tears have been reported between 25 and 90%.[4-5] Treatment options providing pain relief and improvement of symptoms are not necessarily equivalent with healing of the damaged tissues. Symptoms may get better over time, with still little or no healing response within the tendon. Discussions and evidence regarding non-operative treatment options that both provide relief of symptoms and promote healing at the cellular level is lacking in the literature.[6] Recently, new technology named Nuclear Magnetic Resonance Therapy—a specialized type of Magnetic Resonance technology and a treatment method based on nuclear magnetic resonance—was created. The active principle is focused upon the same ideas as diagnostic devices for magnetic resonance imaging (MRI). So, in the present study we will be evaluating the performance of the Magnetic Resonance Therapy in the Post Operative Supraspinatus tear and improvement in the Range Of Motion (ROM).

KEYWORDS: Supraspinatus Tear, Nuclear Magnetic Resonance therapy, ROM.

INTRODUCTION

The rotator cuff comprises the supraspinatus, infraspinatus, teres minor, and subscapularis muscles as well as a sleeve-like structure that includes tendons wrapped around the humeral head.[7] The tendons of these 4 muscles connect with the shoulder capsule when passing through the upper, back, and front of the shoulder joint; they form a similar sleeve like structure around the shoulder joint, which plays an important role in the shoulder joint's stability.

Epidemiology studies[8,9] have shown that rotator cuff tears are one of the most common causes of shoulder pain and limited movement, and rotator cuff tears account for pain in 30% to 70% of all patients with shoulder pain. The prevalence of rotator cuff tears increases with age.[10] Some patients with symptomatic rotator cuff tears may have shoulder dysfunction in which the affected limb cannot be lifted or abducted because of secondary weakness caused by pain. Supraspinatus muscle tears are the most common rotator cuff injuries, with a prevalence of 61.9% in men and 38.1% in women.[11]

Supraspinatus tears are very common in people >60 years of age; furthermore, 70% of people >80 years develop these tears.[12] Identifying medium to large tears over-the-rotator cuff early and treating them surgically can significantly shorten the lesion repair time and reduce the occurrence of postoperative re-tears.[13] The

pathogenesis of rotator cuff tears remains unclear. At present, age, trauma, smoking, hypercholesterolemia, and family genetic factors have been confirmed to be associated with rotator cuff injuries.[14]

Depending on the patient cohort, failure rates of surgical repair of rotator cuff tears have been reported between 25 and 90%.[4-5] However, clinical results of those with intact repairs and those with failed repairs in terms of imaging are often comparable.[15] Furthermore, as the economic value provided by surgical procedures is becoming increasingly important due to aging population and rising health-care costs, the decision about surgical *vs.* non-surgical treatment has also become one about cost-effectiveness.[16]

On the other hand, rotator cuff tendon healing is a complex, cell-mediated process following the stepwise progression of inflammatory, proliferative and remodelling phases.[17] Of interest, Hernigou *et al.* recently revealed that the level of mesenchymal stem cells (MSCs), which are of great relevance for the structural healing at the tendon-bone-interface, in the greater tuberosity was significantly reduced in patients with rotator cuff tear, emphasizing the potential for biologic augmentation for these patients.[18] Treatment options providing pain relief and improvement of symptoms are not necessarily equivalent with healing of the damaged tissues. Symptoms may get better over time, with still little or no healing response within the tendon. Discussions and evidence regarding non-operative treatment options that both provide relief of symptoms and promote healing at the cellular level is lacking in the literature.

CASE REPORT

A female patient in her late fifties presented with complaints of pain and restricted movement of the left shoulder for a duration of three months. The symptoms began following an injury sustained while pulling a heavy flower pot at home. At the time of injury, she experienced a sudden snapping sensation in the left shoulder accompanied by severe pain and an immediate inability to move the affected shoulder.

Initially, the patient sought native treatment, following which the acute pain gradually subsided over the next few weeks. However, persistent stiffness and marked restriction of shoulder movements continued to affect her daily activities. She reported significant difficulty performing routine tasks such as combing her hair, dressing, reaching overhead, and carrying out household activities. The functional limitations adversely affected her confidence and reduced her social participation. The pain was aggravated by lying on the affected side and during passive overhead movements, while it was relieved with rest and oral analgesics.

The patient had no known history of diabetes mellitus, hypertension, bronchial asthma, or any other significant systemic illness. She also complained of disturbed sleep due to pain while lying on the left side and difficulty maintaining personal hygiene because of restricted shoulder mobility. There was no significant family history of musculoskeletal disorders.

With all the above-mentioned complaints she came to Svasthi Orthopaedic and Respiratory Health Care, for better management. Here the patient was thoroughly examined.

O/E inspection

- Drooping of Lt shoulder
- Atrophy of shoulder muscle compared with normal side
- No swelling
- No skin colour changes or local inflammatory changes.

Palpation

- Tenderness around the anterior joint line
- No palpable bony deformity

Range of Movements

Active movements:

- Abduction – 0^0
- External rotation – 40^0
- Internal rotation – 20^0

Active assisted movements

- Abduction – 50^0
- External rotation 60^0
- Internal rotation – 30^0

Magnetic Resonance Imaging (MRI) of the left shoulder demonstrated:

- Full-thickness tear of the supraspinatus tendon.
- Retraction of the supraspinatus tendon with fatty degeneration of the muscle.
- Mild capsular thickening.
- Mild adhesive periarthritis of the glenohumeral joint.
- Reduction of both glenohumeral and subacromial joint spaces.

Based on the clinical and radiological findings, a diagnosis of [full-thickness supraspinatus tendon tear with associated adhesive capsulitis and shoulder dysfunction] was established.

Treatment

The patient underwent *arthroscopic supraspinatus tendon repair* following thorough debridement of the torn tendon edges. The repair was performed using [two suture anchors].

Postoperatively, the affected shoulder was immobilized using a shoulder immobilizer for *three weeks*. The patient was advised complete shoulder rest during this period and was prescribed non-steroidal anti-

inflammatory drugs (NSAIDs), analgesics, and collagen/tendon-supportive nutritional supplements.

Post 3 weeks follow up

At the first follow-up visit after three weeks, the patient reported complete resolution of resting pain.

Clinical examination revealed only minimal tenderness over the subacromial region.

Active movements

- Abduction – 30^0
- External rotation – 40^0
- Internal rotation – 20^0

Active assisted movements

- Abduction – 70^0
- External rotation 60^0
- Internal rotation – 30^0

She underwent physiotherapy and Shoulder rehab for 3 weeks along with **NMRT therapy** which is branded under **QRST** for **9 days** using **cervical shoulder card**.

Physiotherapy included IFT, TENS, USG massage. Rehab include Active and Active assisted ROM like shoulder shrugging, pendulum with resistance. She was advised to continue the Rehab for next 3 months with chondro protective as well as Tendon supplements.

After 3 months the pain was completely subsided with achievement of complete Range Of Motion. On Examination

Active movements:

- Abduction – 90^0
- External rotation – 90^0
- Internal rotation – 60^0.

DISCUSSION

Rotator cuff tears, particularly supraspinatus tendon injuries, remain one of the most frequent causes of chronic shoulder pain and functional disability in middle-aged and elderly individuals. Even though arthroscopic repair techniques have significantly improved over the last decade, postoperative recovery continues to present substantial challenges because tendon healing is biologically slow and functionally demanding. Persistent pain, stiffness, muscle atrophy, limited range of motion, and re-tear rates continue to affect the overall clinical outcome after surgery. In this context, adjunctive therapies that can accelerate tissue healing and improve functional recovery are gaining considerable clinical interest.

The present case report demonstrated significant improvement in pain reduction, restoration of shoulder mobility, and functional recovery following arthroscopic supraspinatus tendon repair combined with Nuclear Magnetic Resonance Therapy (NMRT) and structured rehabilitation. The patient initially presented with severe restriction of shoulder abduction and external rotation associated with complete thickness supraspinatus tear, tendon retraction, fatty degeneration, and peri-arthritic changes. These findings are generally associated with poor functional outcomes and delayed recovery due to compromised tendon quality and degenerative changes.

Postoperatively, although pain reduction was observed after surgical repair, the patient continued to exhibit marked restriction in shoulder movements during the early rehabilitation phase. Following the integration of NMRT therapy along with physiotherapy and rehabilitation exercises, substantial clinical improvement was noted within three months, including complete pain relief and near restoration of functional shoulder movements. The rapid recovery in active range of motion observed in this patient suggests that NMRT may have contributed positively to tendon healing and tissue regeneration.

The mechanism behind NMRT is believed to involve cellular bio-stimulation through low-intensity electromagnetic resonance fields that influence cellular metabolism, ion exchange, tissue oxygenation, and microcirculation. Experimental evidence suggests that magnetic resonance–based therapies may stimulate fibroblast proliferation, collagen synthesis, and extracellular matrix remodelling, which are essential components in tendon repair. Since tendon-to-bone healing after rotator cuff repair involves inflammatory, proliferative, and remodelling phases, therapies capable of enhancing cellular activity may improve the biological healing environment.

An important aspect of this case was the presence of fatty degeneration and tendon retraction before surgery. These pathological findings are known predictors of poor postoperative tendon healing and recurrent tears. Nevertheless, the patient achieved substantial functional recovery within a relatively short duration. This may indicate that the addition of NMRT enhanced tissue remodelling and reduced postoperative inflammatory changes, thereby facilitating rehabilitation progression. Furthermore, the reduction in pain enabled the patient to actively participate in physiotherapy and shoulder mobilization exercises, which are critical for preventing postoperative stiffness and muscle wasting.

Previous literature has shown that successful clinical outcomes following rotator cuff repair do not always correlate with complete structural tendon healing. Many patients may achieve symptomatic relief despite incomplete tendon regeneration. However, therapies targeting biological repair mechanisms may provide an additional advantage by improving both structural and functional recovery. In the present case, the combination of surgical stabilization, physiotherapy, and NMRT appeared to provide a synergistic effect that resulted in

accelerated rehabilitation and restoration of activities of daily living.

Another clinically relevant observation in this case was the psychosocial improvement experienced by the patient. Before treatment, the patient reported difficulty in performing routine activities such as combing hair, dressing, and sleeping comfortably, which significantly affected her confidence and quality of life. After treatment, restoration of shoulder function improved independence and daily activity performance. This highlights the broader impact of successful shoulder rehabilitation beyond simple pain reduction.

The findings of this case report are consistent with emerging evidence suggesting that regenerative and bio-stimulatory therapies may serve as useful adjuncts in musculoskeletal rehabilitation. While conventional physiotherapy primarily focuses on mechanical restoration of joint mobility and muscle strength, NMRT may provide additional biological support at the cellular level, potentially enhancing tendon healing and reducing recovery time.

However, despite the encouraging outcome observed in this case, several limitations should be acknowledged. This report represents a single-patient observation and therefore the findings cannot be generalized to the larger population. Objective postoperative imaging such as follow-up MRI to assess tendon integrity and biological healing was not performed. Additionally, the exact independent contribution of NMRT cannot be isolated because the patient simultaneously received surgical repair, medications, physiotherapy, and rehabilitation exercises.

Nevertheless, this case provides preliminary clinical evidence supporting the potential role of NMRT as a complementary modality in postoperative supraspinatus tendon rehabilitation. The therapy appeared safe, non-invasive, and well tolerated, with notable improvements in pain relief, functional recovery, and shoulder mobility.

CONCLUSION

The present case report demonstrated that the combination of arthroscopic supraspinatus tendon repair, structured physiotherapy, rehabilitation exercises, and Nuclear Magnetic Resonance Therapy (NMRT) resulted in substantial clinical improvement in a patient with complete thickness supraspinatus tear associated with tendon retraction and fatty degeneration. Significant reduction in pain, restoration of shoulder range of motion, and improvement in activities of daily living were observed within three months of treatment.

NMRT appears to be a promising non-invasive adjunctive therapy that may enhance postoperative tendon healing and accelerate functional recovery by supporting cellular repair and tissue remodelling mechanisms. The therapy also appeared to improve patient participation in rehabilitation by reducing pain and stiffness during the recovery period.

Overall, the integration of NMRT with conventional surgical and rehabilitative management may represent an innovative and clinically beneficial approach for improving recovery outcomes in patients with supraspinatus tendon tears.

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