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Fixation Rotator cuff repair of shoulder by Patch augmentation technique. A Case Report

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Abstract: ***Rotator cuff repair has excellent outcomes for many patients but continues to be suboptimal for large, retracted tears, and revision procedures. In certain circumstances, augmentation may be explored to aid healing. This is a case study. A 61-year-old man with a 3-month history of left shoulder arthroscopic subacromal decompression with bursectomy, acromioplasty, rotator cuff repair with patch augmentation, strengthening with bio synthetic graft fleece, and ACJ excision. After a physical examination, the left shoulder was found to have active forward elevation of 130 degrees and passive forward elevation of 150 degrees, pain in the periscapular region, rotator cuff strength of 4/5, and distal neurovascular integrity. Finally, the patient is pleased with the results of the operation, and he now has a decent functional range of motion, although he still has weak muscles and severe scapular discomfort.***

I. INTRODUCTION

Shoulder pain is one of the most prevalent complaints among people over the age of 60. The most prevalent cause of shoulder discomfort is rotator cuff disease. The majority of rotator cuff diseases are treated conservatively in older people, and exercise therapy is not yet a widely acknowledged treatment for rotator cuff tears [(1)]. Shoulder disorders are quite prevalent. Almost one-third of the population suffers from shoulder discomfort at some point in their lives. Shoulder discomfort is the most frequent musculoskeletal complaint among persons over 65old year. In addition to the high prevalence, shoulder dysfunction is frequently persistent and recurring, with 54% of patients reporting ongoing symptoms after 3 years. Pathology of the rotator cuff and subacromial bursa are thought to be the primary causes of shoulder pain and discomfort. What is concerning is that shoulder disease is linked to significant dysfunction and morbidity [(2)].

One of the most prevalent reasons of shoulder pain is a rotator cuff tear. When conservative therapies fail, surgical repair is typically advised for active people. The cornerstone of its surgical treatment is arthroscopic repair with a suture anchor, and a current trend for repair of torn cuff tendon has turned focus away from the classic single row repair using open method and toward arthroscopic double row or transosseous comparable repair. [(3)] The healing or retear of a repaired cuff tendon is determined by numerous factors, including the biological state of the repaired tendon, the biomechanical characteristics of the repair construct, the design of the suture anchor, and bone quality [(4)].

Given the high failure rate of large rotator cuff surgeries, patch augmentation materials have been developed to improve the repair's strength and healing capacity. Patch augmentation materials such as degradable or non-degradable synthetic scaffolds and extracellular matrix-based patches have been created and utilized in clinical trials. Patch-augmented rotator cuff repair is often recommended for patients who have large, retracted rotator cuff injuries with reasonably healthy muscle and poor tendon quality. This is common in revision situations following a botched rotator cuff surgery [(5)].

Patch augmentation of rotator cuff repair might potentially address the above-mentioned gap. Following the publication of early results in the 2000s, there has been a surge in interest in ways to enhance rotator cuff healing by patch augmentation. Patch augmentation can be done in a variety of ways. First, the patch can bridge the gap between the tendon and the tuberosity in a tear that can't be advanced to the tuberosity. Patch interposition is the term used to describe this method. Second, if the tear can only be advanced to the medial aspect of the tuberosity, the patch can be applied to the bursal side of the tendon and tuberosity to strengthen the repair while also resurfacing the exposed tendon footprint. Third, in the case of a tear that can be fully advanced to the original footprint, the patch can be placed between the tendon and the bone to aid in the restoration of the native enthuses [(6)].

Rotator cuff patch augmentation has been documented using a range of materials. These materials are classified as xenografts, synthetics, allografts, and autografts. The porcine dermis and porcine small intestinal submucosa are common harvest sources for xenografts; for synthetic grafts, the polyglycolic acid sheet, polypropylenes, the mersilene mesh, the gore-tex patch, and others; for allografts, the human dermal matrix and freeze-dried cadaveric rotator cuffs; and for autografts, the biceps tendon [(7)].

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In fact, the majority of degenerative rotator cuff tears occur in the elderly, and given the age distribution, these tears are frequently associated with osteoporosis. Because low local bone density in older individuals might cause the suture anchor to loosen and impair the healing of the repaired tendon, improving fixation quality is more critical in these patients than other variables. Several techniques have been developed to enhance the suture anchor's fixing strength in osteoporotic bone. However, in previous studies, the augmentation of suture anchor Strength was conducted only on cadavers, and thus, clinical cases regarding augmentation techniques has rarely been reported [8]. In this manuscript conduct a case clinical report for older patient to fix the rotator cuff repair of shoulder by Patch augmentation technique.

II. A CASE REPORT

A. *Chief Patient Complaint*

61-year-old male patient with developmental delay since childhood. He present in date 25 Feb 2021 to clinic complaining of bilateral shoulder pain for a few month and more recently getting worse, pain more towards the left shoulder, aggravated by overhead activity, and turning and moving while asleep Pain relieved at rest Patient did not do any physical therapy before. Left shoulder is much worse compared to the right. His previous history or Cerebral Palsy (CP) in the past with some right-sided weakness which is long-standing and not really changed or deteriorated much. Having some associated mild stiffness in both shoulders. The complaint neither radiculopathy no neurology.

B. *History of Present Illness*

Bilateral shoulder pain been present for a few months more recently getting worse

1) *Physical Examination*

a) Full active range of motion in both shoulders extremely slightly uncomfortable, Full active forward flexion and Full active abduction.

b) Right shoulder internal rotation reduced only to buttock region revealed, but this is long-standing and left shoulder level of T11. The External rotation 30 degrees actively bilateral

c) Scarf test positive, impingement bilaterally Positive and scapular list bilaterally Positive. Weakness and pain in supra and infraspinatus testing both sides.

2) *Investigation/ laboratory:* An MRI scan done of both shoulders these show rotator cuff tear with some retraction ACJ OA, impingement, and bursitis and biceps tendinitis.

3) *Diagnosis*

a) *Provisional* M75.4 Impingement syndrome of shoulder

b) *Provisional* S46.0 Injury of muscle(s) and tendon(s) of the rotator cuff of shoulder

4) *Medications:* Oral and topical non-steroidal anti-inflammatory drugs (NSAIDs)

C. *Treatment Management*

1) The patient is quite keen and happy to proceed after discussed his statue.

2) Discussed with patient about the benefits of surgery using Patch augmentation and highlighting the risks of infection bleeding stiffness ongoing pain recurrence of pain eurovascular injury anesthetic risks repair failure.

3) The confirmation about the stressed the importance of physical therapy and adhering to the brace after operation.

4) Performed MRI of left shoulder

5) Follow up patient after MRI

D. *Surgery Procedure Description*

Patient in the beach chair position all bony prominences assessed and padded prior to procedure cervical spine immobilized and secured and confirmed with anesthesia. Routine prep done with chlorhexidine prep sticks .Routine draping performed with shoulder arthroscopic drapes. Routine arthroscopic portals were used anteriorly and posteriorly to start with Intra-articular assessment. Synovitis seen in partial synovectomy performed superior labrum was frayed but intact no obvious tear seen. This was debrided using a shaver and vaporizer. Anterior inferior and posterior labrum intact. Biceps tendon did not show degenerative changes a small synovitis which was debrided. Sub acromial decompression performed next Extensive bursitis seen and bursectomy performed Acromial spur seen at the very tight subacromial space and hence acromioplasty performed Supraspinatus tear identified and prepared. The estimated amount of blood loss is minimal.

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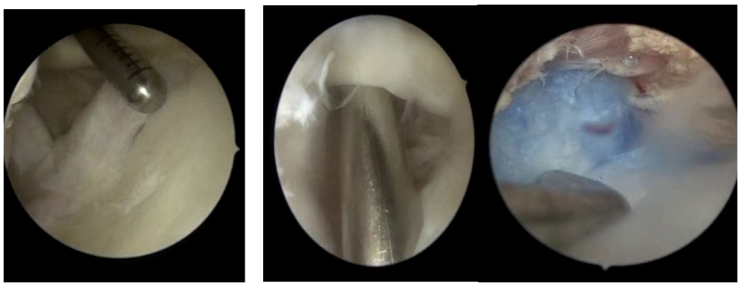


Fig 1. Before and during surgery

III. FOOTPRINT PREPARED

Double row anchor repair done with medial row helicoid anchor with tape and lateral row footprint anchor. Adequate repair and closure of the footprint achieved. Tendon quality was quite poor with some fraying and thinning of the tendon and hence decision made to reinforce with a biosynthetic scaffold to give the best result and Outcome and Regenstein Smith & Nephew graft used to lay over supraspinatus tendon repair and secured with tendon staples and bone staples. Good coverage and good repair and closure achieved. Graft was not used very high failure rate due to pullout tendon quality poor, hence decision made to proceed with graft reinforcement. ACI showed degenerative changes with a very tight reduced joint space with bone-on-bone changes. Decision made to proceed with a suture excision and half a centimeter from the clavicular side and half centimeter from the acromial side was excised. Shoulder thoroughly washed out

1) *Surgery Closure:* 3-0 Ethilon interrupted sutures, Dressings applied, Compression bandaging applied, Shoulder abduction pillow brace applied
2) *Postoperative Instructions:* Ice and Cryo/Cuff, Wart, Routine neurovascular assessment , Patient to stay in shoulder abduction pillow brace for 4 weeks prior to starting rotator cuff repair protocol, 2 further doses of IV antibiotics.
3) Review and follow up after surgery

a) OPD clinic 1 week for wound check
b) OPD clinic 2 weeks for wound check and removal of sutures
c) Physical therapy to be patient and start as per rotator cuff repair protocol

IV. MRI OF LEFT SHOULDER

1) *Technique*: Multiplanar, multisequence imaging of the left shoulder without IV contrast.
2) *Comparison*: Compared to previous study dated 25 February 2021
3) *Findings:* Status post rotator cuff repair Significant degenerative changes of AC joint associated with inferior acromial spur encroaching upon the supraspinatus tendon. Extensive bursal surface tear of the supraspinatus tendon, with tendinopathy of remaining fibers. Preserved muscle bulk. Extensive tendinopathy with interstitial tear of the infraspinatus tendon. Endinopathy of the teres minor tendon. Extensive tear involves the superior labrum with extension into the long head of biceps, the tear extends anteriorly and posteriorly to involve anterior and posterior labrum. Subcortical cystic changes are noted at the inferior pole of the alenoid. Subcortical cystic changes are noted at the inferior pole of the glenoid. Normal bone marrow signal pattern of the visualized bones. No joint effusion.



Fig 2 .Shoulder MRI Pri- Repaired



Fig 3 .Shoulder MRI Post- Repaired

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4) *Follow up of Patient (First visit) Date: 25 March 2021* After two **2** weeks from surgery the Left shoulder: the arthroscopic subacromial decompression with, Bursectomy , Acromioplasty, Rotator cuff repair , Reinforcement with bio synthetic graft fleece , ACI excision , Patient is doing fine.
5) *After follow up:* Clean wound and intact distal neurovascular

The Diagnosis is Provisional Z48.9 Surgical follow-up care, unspecified

Treatment management in this period are postoperative dressing removal of suture and
Physical therapy as rotator cuff repair protocol medication.

6) Follow Up of Patient (second visit) Date: 25 Apr 2021
After six (6) weeks. The Patient is coming for a follow-up he is complaining of mild pain mainly at sleeping time he is complaining of the shoulder as well regarding his range of motion is getting better but still there is some restriction.

7) *After Follow Up*
a) Forward flexion actively 110 passively 130
b) Abduction 100 degrees actively 120 passively
c) External rotation 10 degrees
d) Internal rotation to L5

The diagnosis:
- Provisional M75.4 Impingement syndrome of shoulder
- Provisional 248.9 Surgical follow-up care, unspecified
- Provisional S46.0 Injury of muscle(s) and tendon(s) of the rotator cuff of shoulder

8) *Treatment Management:* Recommended Physical therapy and Medication
Finally in last follow up of patient in 24 June 2021 and after examined showed the left shoulder forward elevation actively 130 passively 150, tenderness periscapular area, rotator cuff strength 4/5 and distal neurovascular intact. The patient Saied that he got good functional range of motion but s still is having weak muscle and per scapular pain.

V. DISCUSSIONS

Patch augmentation is a technically challenging procedure that necessitates patience and organization on the part of the surgeon. While a number of surgical procedures for arthroscopic patch augmentation for rotator cuff repair have been published, the senior author has devised the following patch augmentation technique. The technique described here is utilized to augment fully reparable poster superior rotator cuff injuries. This technique is not suggested for rips that are fully irreversible or partially repairable [(9)].
Surgical repair is done while sitting on a beach chair. A conventional 30° arthroscopy, numerous 7-mm cannulas, one 10-mm cannula, and anterograde and retrograde suture passage devices are all required for the surgery. Standard triple loaded 5.5-mm screw-in suture anchors and 5.5-mm knotless suture anchors were used as suture anchors. A 3.0-mm thick acellular dermal matrix allograft was utilized [(10)].
Finally, a number 2 high tensile strength suture with several strands is utilized. The technique begins with an intraarticular examination and treatment of any subscapularis or biceps lesions found. The scope is redirected subacromially once the intraarticular treatment is done. Working portals are placed 3 to 4 cm from the acromion's anterolateral and posterolateral corners, with a lateral portal placed midway between them. Anterolateral and posterolateral portals have seven-millimeter cannulas, whereas the lateral portal has a 10-mm cannula [(11)]
The removal of bursal tissue and adhesions in the anterior, posterior, and lateral gutters is part of a full subacromial bursectomy. The rotator cuff must often be mobilized, including releases between the rotator cuff and labrum, as well as releases at the base of the scapular spine and the coracoid. [(12)]
Typically an intraarticular release of the rotator cuff interval as well as subacromial release of the coracohumeral ligament with preservation of the lateral Margin of the rotator cuff interval is preferred. Once the rotator cuff has been mobilized and it has been determined that a complete repair is possible, the repair with augmentation is initiated.

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Because these are typically large retracted tears (and oftentimes revision procedures), a mediatized single row repair is most commonly performed. A row of triple loaded 5.5-mm anchors is placed along the medial aspect of the greater tuberosity. Usually three anchors are required. The most anterior two sutures from the anterior anchor and most posterior two sutures from the posterior anchor are placed in a simple fashion. In a straightforward manner, the most anterior two sutures from the anterior anchor and the most posterior two sutures from the posterior anchor are inserted [(13)].

In a mattress way, the last suture from the anterior anchor is put posterior to the previously passed sutures from this anchor. In a mattress way, the last stitch from the posterior anchor is put anterior to the previously passed sutures from this anchor. The three sutures from the middle anchor are inserted between the anterior and posterior mattress stitches in a straightforward manner [(14)]. Finally, three number 2 high strength sutures are placed in a mattress fashion through rotator cuff tissue, one anterior, one middle, and one posterior, with the anterior and posterior stitches placed at the most anterior and posterior aspects of the tear, medial to the previously passed anchor stitches. The rotator cuff repair is subsequently completed by tying the simple sutures from the anchors [(15)].

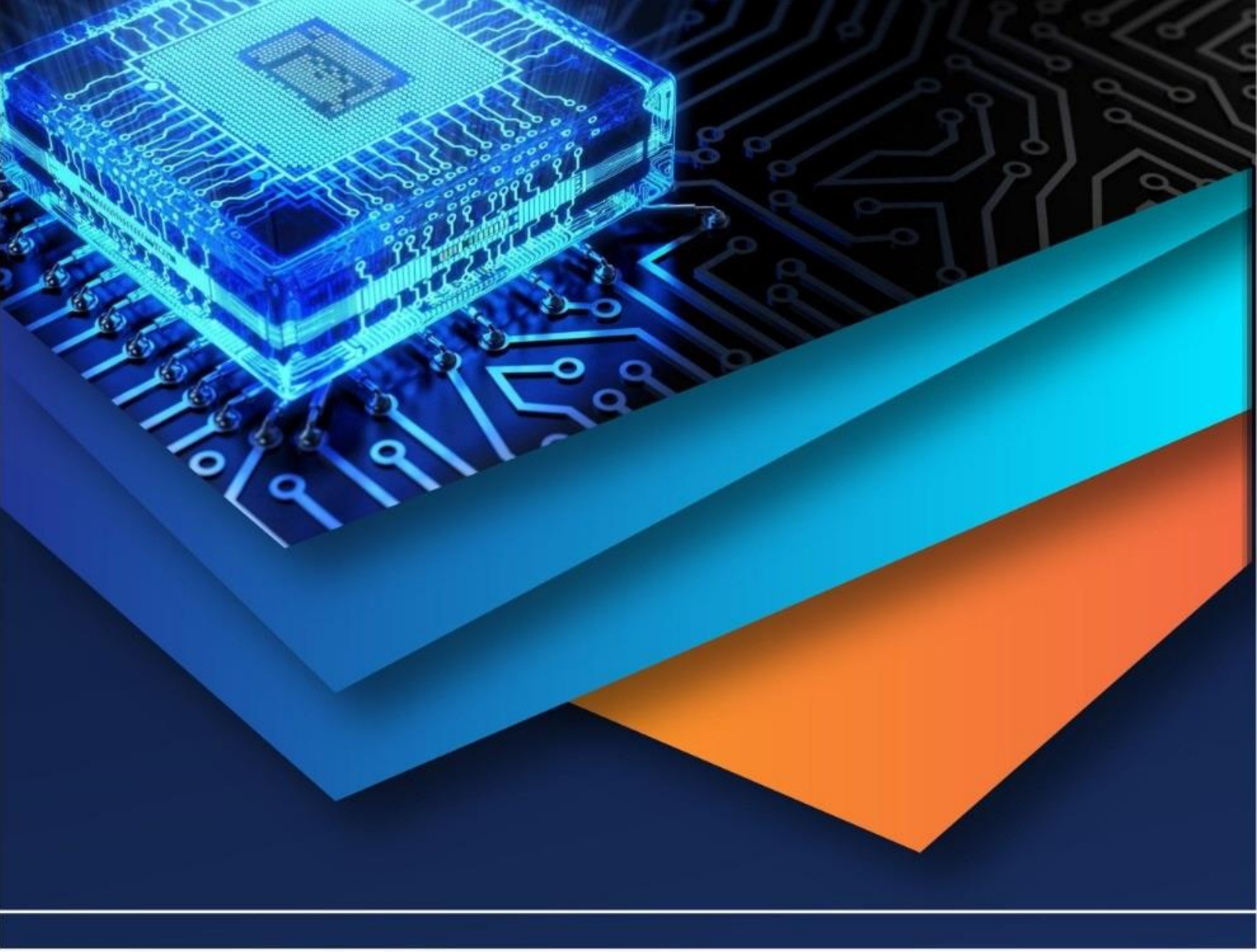
VI. CONCLUSION

Large rotator cuff lesions have poorer clinical results than partial and minor abnormalities, especially if the lesion is longstanding and there is intrinsic tendon degradation. The tendon loses flexibility after a chronic and severe rotator cuff tear because it is replaced with stiffer, mechanically inferior scar tissue. The objective of the restoration is to restore the natural biology and biomechanics of the native rotator cuff footprint through robust tendon-to-bone mending. A weakly reducible tendon results in a weak repair, resulting in decreased strength and range of motion. As a result, there is an increasing need to develop novel techniques and materials to enhance the mechanical healing of bigger rips in order to achieve improved function and minimize the disruptive pressures sustained by the repaired tissues. Adjuvant factors to promote biologic healing, mechanical scaffolds that reinforce repairs and stimulate fibroblast migration and ingrowth, and other forms of mechanical scaffolds that bridge the regions of tendon defect can all be used to produce successful patch augmentation of the repaired structures.

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