

# Dextrose Prolotherapy for Supraspinatus Partial Tear: A Case Report



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## ABSTRACT

**Introduction:** Rotator cuff (RC) tears account for about 20% of RC disorders and presents with severe shoulder pain that can significantly impact activities of daily life.

**Case report:** A 34-year-old male with a history of chronic right shoulder pain presents with tenderness at the lateral shoulder, positive subacromial impingement tests, painful end range of motion and pain score of 6. Ultrasound shows a partial supraspinatus tear at the bursal side. The patient was treated with 15% dextrose to the supraspinatus tendon intrasubstance 3 times, for 4 weeks.

**Result:** Significant pain improvement after the first treatment (VAS 1), with pain-free full range of motion until 4 weeks after treatment and sonographic evidence of supraspinatus tendon healing.

**Discussion:** Dextrose concentrations higher than 12.5% produce an osmotic gradient which stimulates the accumulation of growth factors and inflammatory cells, which in turn can initiate the

wound healing process. In this case we can find that the healing process translates to good clinical outcome by ultrasound imaging.

**Conclusion:** Dextrose prolotherapy can be used as an option for supraspinatus tendon partial tear with good results.

**Key words:** rotator cuff, prolotherapy, dextrose

## INTRODUCTION

Rotator cuff (RC) disorders are the most common causes of shoulder pain with a lifetime prevalence approaching 70%. [1] These include tendinopathy, calcific tendinitis, bursitis, and bursal reactions with RC tears accounting for about 20% of cases being the most severe cases. [2,3] Individuals with RC tears present with severe shoulder pain, weakness of shoulder flexion, abduction or external rotation, that can significantly impact activities of daily life.

The pathophysiology of RC disorders is related to mechanical loads passing through the joint and supporting structures. These forces can induce tendon injuries - collagen fibers uncrimp by 2% tendon stretch; microscopic rupture begins at 4% to 8% stretch, macroscopic tears occur beyond 8% stretch, and complete rupture is likely beyond 12%. [4] Even at a lower load, repetitive loading causes microscopic injuries that disrupts individual collagen fibers reducing tendon cross-sectional area making it more susceptible to injury. [5]

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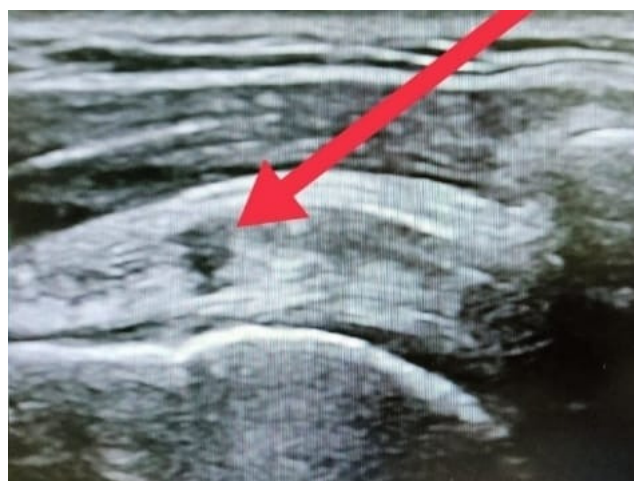
The accurate diagnosis of RC disorders is important to determine treatment strategy, especially differentiating tears from other types of tendinopathies. When compared to other imaging modalities, shoulder ultrasound has the advantages of being inexpensive, conducted in real-time, and convenient to operate.[6] The diagnostic sensitivity and specificity of shoulder ultrasound on tear detection has a range of 46% to 95% and 50% to 95%, respectively. The variabilities are highly correlated with the level of experience of the operator and patterns of the RC tears.[7]

Increasing evidence on the effectiveness of prolotherapy in musculoskeletal conditions,[8-9] specifically in RC, whereby Doo-Hyung, et al. reported improvement in pain, disability, isometric strength, and shoulder motion[9] from 3 to 8 sessions of prolotherapy in their cohort of chronic, non-traumatic refractory RC disease. Helene, et al.[10] conducted a randomized controlled study that showed that long-term pain improvement and better patient satisfaction with prolotherapy. A recent study demonstrated improvements in shoulder functional scores, ie, Western Ontario Rotator Cuff index (WORC) and Shoulder Pain and Disability Index (SPADI) as well as shoulder range of motion and pain scores in chronic RC tendinopathy at 6 and 12 weeks post prolotherapy compared to physiotherapy alone.[11] Prolotherapy or regenerative intervention therapy is the injection of growth factors or growth factor production stimulants to promote regeneration of normal cells and tissue.[12] Exposure of human cells to extracellular dextrose as low as 0.5% induced production of platelet-derived growth factor,[13] transforming growth factor b,[14,15] epidermal growth factor,[16] basic fibroblast growth factor,[17] insulin-like growth factor,[18] and connective tissue growth factor[15] that are major players of tendon, ligament, and cartilage growth. Dextrose 12.5% is the minimum concentration as a stimulus for inflammatory cascade that results in a vigorous growth effect.[17]

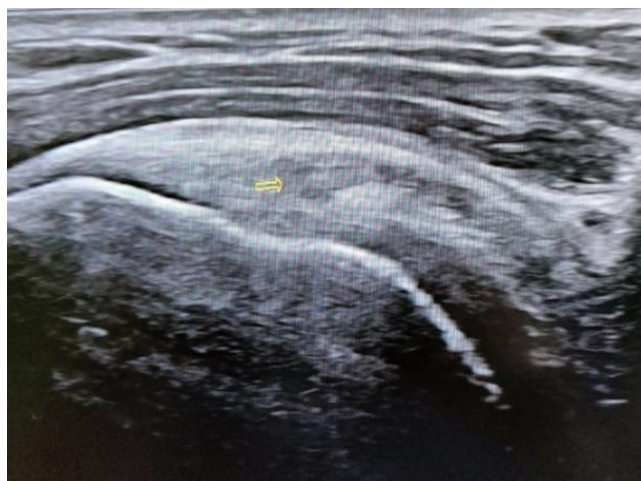
## CASE PRESENTATION

A 34-year-old male presented with a 3-month history of right shoulder pain with no preceding history of trauma. His work as a software programmer necessitates prolonged sitting time daily. Conservative management with physical

therapy (ultrasound therapy, TENS, exercise) and non-steroidal anti-inflammatory drug (NSAID) did not alleviate his symptoms. His pain intensity score 6 out of 10, worsened with overhead arm movements. There were no neurological signs ie, numbness, abnormal sensation, or weakness. Physical examination revealed tenderness at the lateral shoulder, end range pain on shoulder flexion and abduction with full range of motion, positive subacromial impingement test, and supraspinatus tendinopathy signs were elicited. Sensorimotor exam was normal. Sonographic examination revealed partial tear of the right supraspinatus on the bursa side without enlargement of subacromial subdeltoid bursa (Figure 1). Long head of biceps tendon and the glenohumeral joint were normal with no other ligamentous injury noted. Dextrose prolotherapy was administered in the supraspinatus tendon using 3 cc of 15% dextrose and 1% lidocaine mixture. The patient received three sessions of prolotherapy over 4 weeks. The needle was introduced in a plane over the long axis of the supraspinatus from caudal to cranial aiming towards the intrasubstance supraspinatus tendon lesion. Pain score improved following the third prolotherapy (VAS 1), with full range of pain-free motion and resolution of previously positive impingement tests. Pain score remained 1 at 4 weeks follow-up, with full range of motion and pain free return to work. Sonographic evidence of supraspinatus partial tear improvement is shown in Figure 2, noting the presence of a small hypoechoic gap within the supraspinatus tendon that has largely resolved.



**Figure 1.** Ultrasound image of the right supraspinatus. Red arrow indicating the intrasubstance partial tear on the bursal side prior to first prolotherapy

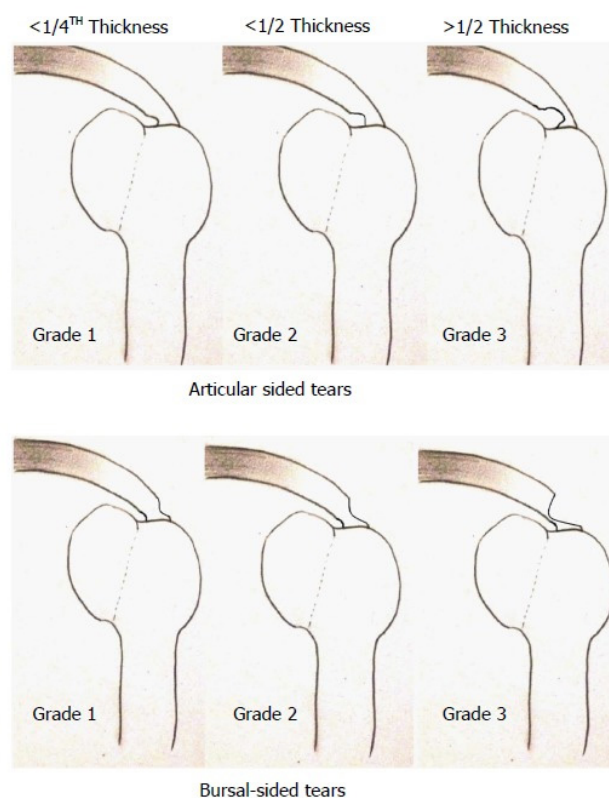


**Figure 2.** Ultrasound image at 4 weeks post prolotherapy showing improvement of the partial supraspinatus tear with decreasing hypoechoic gap (red arrowhead) after 3 prolotherapy sessions

## DISCUSSION

We report a typical successful prolotherapy treatment for one of the commonest causes of shoulder pain, ie, RC tears, with a sonographic documentation of healing within 4 weeks of commencing the intervention. Shoulder pain in RC pathology is exacerbated by persistent subacromial space compression due to weakness of supporting structures such as tendons and RC muscles that can become irritated and inflamed, leading to compression of the subacromial bursa.[19] RC tears can be classified as per Ellman's description of RC tears based on location of articular-sided tears and bursal-sided tears which are further staged according to their depths (Figure 3).[20] Over the course of time, partial tendon tear may enlarge and propagate into full-thickness tears developing distinctive chronic pathological changes due to muscle retraction, fatty infiltration, and muscle atrophy. These lead to a reduction in tendon elasticity and viability.[21]

In daily practice, various physical modalities are used to relieve pain, promoting return to normal joint motion and function. Non-steroidal anti-inflammatory drugs (NSAIDs) combined with physical therapy have been shown to be more effective than using NSAIDs alone. However, the best reported efficacy of prolotherapy in comparison to conservative management, ie, physical modalities and anti-inflammatory medications, is in the management of



**Figure 3.** Rotator Cuff Tear Classification

tendinosis. Thus, prolotherapy can be an attractive treatment option in many shoulder pathologies.[22] Prolotherapy injection for RC tendinopathy has been shown to achieve significant improvements in pain and range of motion following arthroscopic RC repair, at both three-month period and in long term follow-up indicating that the effect of prolotherapy injections were sustainable,[22] similar long-term benefits of prolotherapy were also reported by other studies.[8]

This case illustrates significant improvements of partial supraspinatus tear following prolotherapy, even in the case of extensive tear more than half thickness of the supraspinatus. The sonographically documented healing was also mirrored in improving clinical outcome measure by pain score, range of motion, and functional return to work. Non-adverse events were not reported with dextrose prolotherapy in this case as in many preceding cases.[23]

## CONCLUSION

RC tears present with severe shoulder pain, weakness of shoulder flexion, abduction or external rotation,

that can significantly impact activities of daily life. Prolotherapy is the injection of growth factors or growth factor production stimulants to promote regeneration of normal cells and tissue. This present

case report depicts the use of Dextrose prolotherapy as an option for supraspinatus tendon partial tear management with good results, facilitating earlier return to function and no reported adverse effects.

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