Video Article

Arthroscopic double row partial articular supraspinatus tendon avulsion bridge repair technique for shoulder: A transtendinous approach

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ABSTRACT

Partial articular supraspinatus tendon avulsion (PASTA) lesions, a subset of partial rotator cuff tears, pose a surgical challenge, disrupting the integrity of the supraspinatus tendon. Transtendinous repair is the preferred choice in young individuals for limiting tear progression and preserving intact, high-quality cuff tissue, thus preventing tendon shortening, as compared to the tear completion and repair technique. Our approach leverages these advantages, specifically those indicated for Ellman's Grade 3 tears and cases where conservative treatments have failed. In our technique, we employ progressive dilation, anchor drill sleeve insertion to facilitate medial row anchor placement, followed by percutaneous spinal needles for suture shuttling, and finally locking sliding knots for compressive medial row repair, followed by lateral row fixation for additional stability. This method accelerates rehabilitation and restores optimal shoulder function.

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OUTLINE OF THE CLINICAL PROBLEM

The prevalence of articular surface tears is twofold higher compared to bursal surface tears, which may be attributed to the compromised vascularity and disarray of collagen fibers along the articular side of the supraspinatus tendon [1]. Even minor trauma is sufficient in older individuals due to the presence of degenerative muscle tissue and fatty infiltration. However, the regenerative potential of such tears is limited due to compromised vascularity [2]. In the case of chronic tears, a typical progression is observed, starting with tendinosis and advancing to partial-thickness tears, ultimately culminating in a complete tear of the supraspinatus tendon [3]. In contrast, PASTA lesions in younger individuals are often linked to repetitive overhead abduction activities that result in continuous extreme stress and eccentric tensile forces on the affected area. They are very painful and have good healing potential if repaired since vascularity is retained at the torn edges [4].

SURGICAL INDICATIONS

1. Tendon repair is necessary when the tear of the supraspinatus tendon exceeds 50% or when there is more than 6 mm of footprint exposure of the supraspinatus tendon (Ellman grade 3), rather than simple debridement of the footprint alone.

2. Failure of conservative management (Ellman grade 1 and 2).

Note: Considering the aforementioned guidelines, it is crucial for treatment strategies to be individualized, considering factors such as the patient's activity level, age, and duration of symptoms, in order to achieve optimal outcomes [5].

SURGICAL CONTRAINDICATIONS

1. Full-thickness tear of the supraspinatus tendon.
2. Intrasubstance or bursal-sided tear of the supraspinatus tendon
3. Degenerative tears with poor quality tissue.

TREATMENT OPTIONS

Symptoms associated with partial articular-sided supraspinatus tendon avulsion (PASTA) are often attributed to factors such as pectoral muscle tightness, shoulder capsule tightness, altered movement patterns, and scapular malpositioning rather than solely to the tear itself. In these instances, physical therapy, nonsteroidal antiinflammatory drugs (NSAIDs), steroid injections, and dynamic stabilization of the scapula and shoulder joint have demonstrated effective pain relief and improved
that can enhance the healing process [8].

Tying of the suture limbs using locking sliding knots to promote improved bone-to-tendon contact.

Fig. 3. Tying of the suture limbs using locking sliding knots to promote improved bone-to-tendon contact.

...vades a conducive environment by creating a foundation of normal tissue... muscle weakness. Consequently, conservative treatment remains the primary approach for tears measuring less than 50% [6].

Among the commonly practiced procedures, three surgical options are frequently employed: 1) Debridement of the footprint alone 2) transtendinous repair (TTR); and 3) completion of tear and subsequent repair (TCR). However, it should be noted that debridement alone does not impede the progression of the tear, so for tears exceeding 50%, transtendinous repair (TTR) and completion of the tear followed by repair (TCR) are commonly recommended modalities [7].

The author recommends utilizing the repair after completion (TCR) technique for elderly patients while advocating for the transtendinous approach in younger patients. This distinction is based on the preserved vascularity typically observed in younger individuals and the need for clearance of degenerative and fatty muscle tissue in older patients with degenerative tears. The tendon takedown procedure during repair provides a conducive environment by creating a foundation of normal tissue that can enhance the healing process [8–10].

OUTCOME OF THE TECHNIQUES

The overall outcome relates to the decrease in the chances of progression of the tear in the supraspinatus tendon and the improvement of healing, which leads to improved functional status for the patient. The meta-analysis done by Yohei et al. showed that the methods of the trans-tendon technique and repair after completion of the tear showed no difference in the clinical outcome in short- and midterm follow-ups. Also, the retear rates varied from 10% to 90% based on the studies analyzed [5]. However, the meta-analysis done by Sun L et al. that showed trans-tendon technique yields better outcomes [9]. The results of long-term outcomes in patients using the transtendinous technique of shoulder arthroscopy have limited data from reviews and meta-analyses to support the overall clinical outcome for the patient. Our patients showed the University of California-Los Angeles (UCLA) shoulder rating scale improvements and returned to sports successfully at the 12-month follow-up, consistent with studies done by Sun L et al. [9].

COMPLICATIONS

The arthroscopic transtendinous approach for repairing PASTA lesions is designed to maintain the integrity of the bursal side of the supraspinatus muscle tendon and to alleviate the symptoms associated [11]. However, it is important to note that during the insertion of anchors for the medial rows, unsuccessful attempts at percutaneous spinal needle insertion can potentially result in damage to the integrity of the bursal surface of the supraspinatus tendon as well as the musculotendinous junction, and failure to do the early postoperative rehabilitation could result in adhesive capsulitis [5].

CONCLUSION AND FUTURE PERSPECTIVES

Expertise is essential for the transtendinous repair technique due to its limited scope for footprint clearance and narrow field of vision. However, mastering this technique is beneficial in preserving the intact fibers of the supraspinatus tendon. In conclusion, proficiency in this technique is crucial for the successful preservation of the supraspinatus tendon's integrity. Addressing the limited use of anchors for medial footprint attachment and methods to identify over-tensioning in transtendinous repair might improve the overall clinical outcome in young athletes and should be stressed more in future studies.

Ethical approval

No ethical committee approval is required as our presented technique is a modification of an established current technique.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jisako.2024.02.014.
References


