



Arthroscopic Subscapularis Repair Using 18-Gauge Spinal Needle as a Suture Passer to Eliminate Iatrogenic Tendon Damage from Modern Suturing Devices

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Abstract: Suture passing devices are frequently used for subscapularis tendon repair. However, some of these devices can further damage the tendon by creating a larger tear. Use of an 18-gauge spinal needle as a suture passer helps eliminate damage to the tendon. By using its smaller diameter, the needle prevents tendon cut-through and enhances the precision of the repair.

Introduction

Subscapularis tear is one of the causes for shoulder pain.¹⁻³ The tear can be treated with arthroscopic subscapularis repair.⁴⁻⁷ Satisfied results after arthroscopic repair of the subscapularis have been reported.⁸⁻¹¹ Common techniques regarding repair of the subscapularis require usage of suture passer devices to facilitate repair. However, use of these devices could cause potential damage to the intact tendon while performing tendon repair, especially

with retrograde suture passers.¹²⁻¹⁵ These retrograde suture passers, either shuttling type or penetrating type, could cause iatrogenic damage because of the inevitable steps of passing the instrument into the tendon.

The use of spinal needle to pass the suture can be used as an alternative for retrograde suture passer due to its low profile and ready availability. The diameter of a spinal needle is smaller compared to other retrograde suture passers, and it can be used to pass the suture with precision. The objective of this technical note is to describe the surgical technique for subscapularis repair with the use of spinal needle in subscapularis tear (Fig 1).

Surgical Technique (With Video Illustration)

The patient is placed in a lateral decubitus position. The patient's shoulder and arm are prepped and draped. The operated arm is retracted with a 3-kg weight on a suspension. The position of the shoulder is 45° of abduction and 20° forward flexion. After identification of all the bony landmarks, a posterior portal is created, and an arthroscopic examination of the shoulder is done with a 30° arthroscope viewing posteriorly inside the glenohumeral joint. After the subscapularis tear has been identified, an anterior portal is created just lateral and superior to the coracoid process.¹⁶ The soft tissue in the rotator interval is cleared with an arthroscopic shaver and by radiofrequency ablation. Once the bone bed has been reached, an arthroscopic rasp is used to prepare the bleeding bone surface for subscapularis

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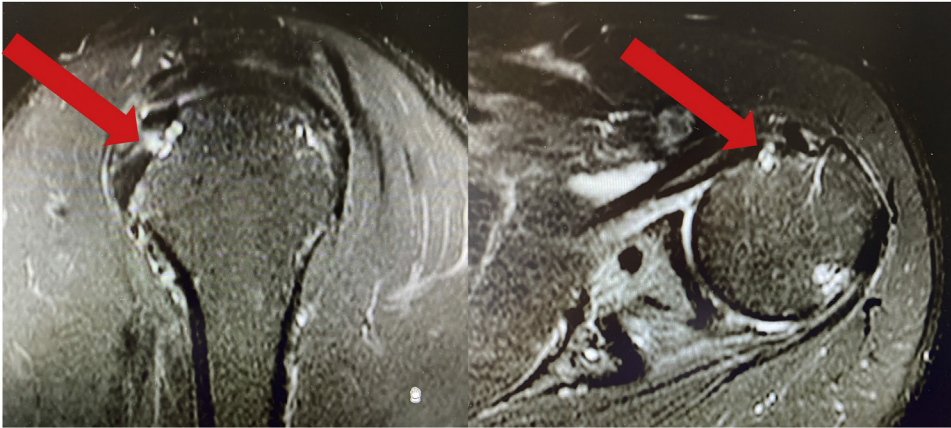


Fig 1. Sagittal and axial T2-weighted fat suppression images of the left shoulder demonstrate an upper-third supraspinatus tear (arrows).

repair. Next, a pilot hole is created by a tap at the footprint of the subscapularis. Subsequently, a double-loaded bioabsorbable anchor (Gryphon; Depuy Mitek, Raynham, MA) is inserted into the tapped hole.

The modified Mason-Allen technique is used for the subscapularis repair.¹⁷ First, an 18-gauge spinal needle is entered from the anterior portal without arthroscopic cannula (Fig 2). The needle is passed through the subscapularis tendon for the first suture (Fig 3A). Then, one of the suture limbs is shuttled through the subscapularis using Nylon no.1 (Fig 3B). This first pair of suture limbs is used for compression of the tendon, which will be tied later with a simple stitch technique. Next, the other pair of suture limbs is used for the mattress suture. The spinal needle is passed just lateral to the first suture. Then, one limb of the remaining suture pair is shuttled. After that, the spinal needle is used once again in the same manner at about 10 mm next to the previous suture superiorly for inserting the remaining limb of the suture. This will create a mattress suture (Fig 3C). Once the mattress suture limbs have been shuttled, all the suture strands are retrieved with a suture retriever through the anterior portal. We use the Chula knot, a sliding knot with high ultimate strength, to tie the suture.¹⁸ After the mattress suture has been secured, the first pair of suture limb is tied to complete the modified Mason-Allen technique (Fig 3D, Video 1). The final construct of the suture is checked from the posterior portal. Finally, the subcutaneous tissue and skin are closed in routine fashion.

Postoperative Protocol

An arm sling is applied postoperatively. Active motion of the ipsilateral elbow, wrist, and hand is allowed. Light pendulum exercise can be performed during the first few weeks. Limited active motion of the shoulder is permitted for 3 weeks postoperatively. One month after the operation, the patient is allowed to perform active-assisted range of motion exercise. Strengthening

exercise can be started at 3 months postoperatively, while the patient continues to gain full range of motion. Return to sporting activity is allowed at 6 months postoperatively.

Advantages, disadvantages, pearls, and pitfalls are described in Table 1.



Fig 2. A left shoulder in a lateral decubitus position in a patient with subscapularis tendon tear. The sutures from an inserted bioabsorbable anchor, seated at the repair site, are resting at the anterior portal. An 18-gauge spinal needle is entered in the same anterior portal. A 30° arthroscope is used to visualize the entry of the needle from inside the glenohumeral joint. Note that the use of arthroscopic cannula is not required.

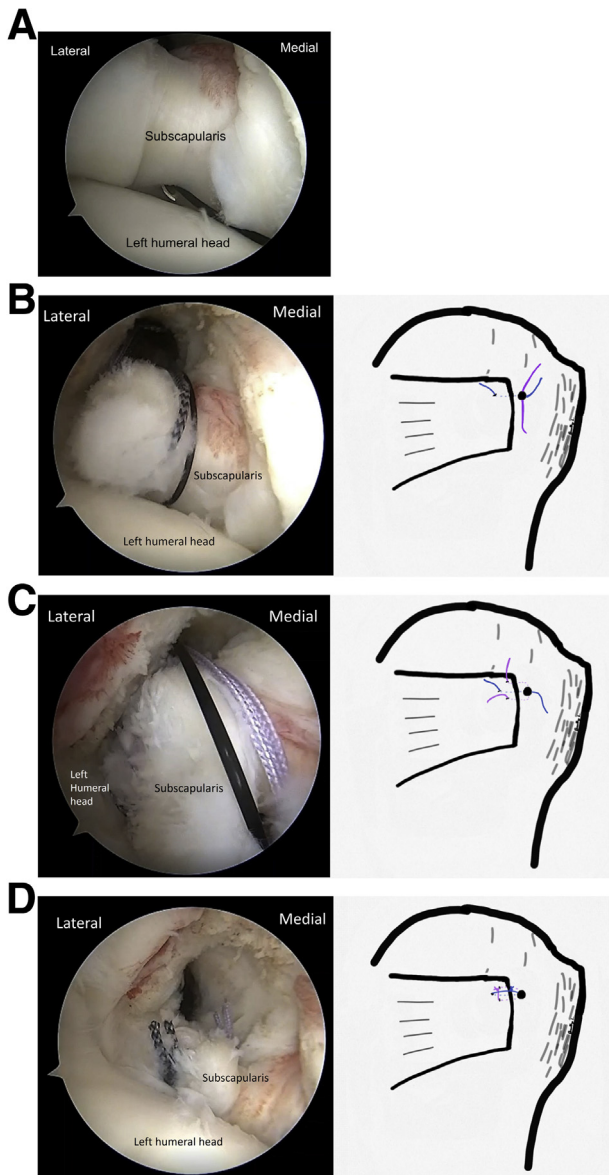


Fig 3. Arthroscopic views of the glenohumeral joint of the left shoulder in a patient with subscapularis tendon tear, viewing from the posterior portal. (A) The spinal needle is used to pass a suture through the subscapularis tendon. (B) The suture is being shuttled. The suture limb from one of the suture pair will enter the subscapularis tendon. This will be used for simple stitch suture. (C) The suture shuttling for the mattress suture. (D) Final construct of the subscapularis repair.

Discussion

Several surgical techniques and configurations have been described, either by using an antegrade or retrograde suture passing device to aid subscapularis repair.^{5,6,15,19-21} The use of spinal needle for subscapularis repair helps to prevent further injury to the tendon. When comparing the modern retrograde suture passing devices available in the market, the diameter of the spinal needle is the smallest (Fig 4). The small diameter helps improve the precision of

Table 1. Advantages, Disadvantages, Pearls, and Pitfalls of the Technique

Advantages:

- Decreased diameter of penetrating hole in tendon (smallest compared to the smallest retrograde suture passer)
- Prevention of tendon cut through which may lead to fixation failure
- Increased piercing precision because needle tip is smaller and sharper than modern antegrade suturing device or suture passer
- Inexpensive

Limitations:

- The spinal needle is relatively weak, and it can be bent easily.
- Difficult to suture lower one-third of subscapularis tendon

Pearls:

- Anterior portal should be in line with the subscapularis tendon edge
- The spinal needle insertion does not require the use of arthroscopic cannula
- Passing of the sutures should be done meticulously to prevent further damage to the tendon

Pitfalls:

- Imprecise location of the anterior portal can lead to difficulty in repairing the subscapularis tendon.

suture placement when repairing the tendon. Most importantly, the subscapularis tendon is less likely to be injured by the small tip of the spinal needle in the repairing process. Even so, the surgeon should perform the steps meticulously to prevent further damage to the



Fig 4. Examples of the available retrograde suture passers. The 18-gauge spinal needle has the smallest diameter.

tendon. Additionally, the spinal needle is widely available and is less expensive when compared to the other suture passing devices.

When repairing the subscapularis tendon with a spinal needle, the anterior portal must be in line with the edge of the tendon. The well-positioned anterior portal is crucial since this facilitates the access of the spinal needle. Since the spinal needle is not stiff, it is difficult to readjust the position of the spinal needle tip in desired position, as the needle can be easily bent. Also, the spinal needle may be slightly more challenging to use in the repair of the lower part of the subscapularis tendon.

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