

Technical Note

Intraoperative Arthroscopic Suture Anchor Reloading

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Abstract: The success of an arthroscopic procedure depends considerably on the successful and secure tying of arthroscopic knots, which reapproximate and stabilize avulsed or torn soft tissues to their original bed. Failure to perform appropriate knot tying may jeopardize the success of the operation. We describe a simple and reliable technique for intraoperative arthroscopic replacement of the suture through the eyelet of an already-inserted bone anchor. This technique allows for replacement of a fretted suture or a loose knot with a new suture, offering the opportunity to repeat the knot tying procedure with a new intact suture. **Key Words:** Anchor—Complication—Knot—Shoulder.

Arthroscopic shoulder techniques emulate open surgical methods. In arthroscopic shoulder surgery, this has been made possible with the introduction of bone anchors threaded with sutures.¹ The success of any arthroscopic procedure relies on the surgeon's ability to tie knots and to advance them through arthroscopic cannulas to the injured or avulsed soft tissues.

Arthroscopic suture handling and knot tying are essential skills that the shoulder surgeon should master before proceeding to arthroscopic shoulder reconstruction.² Many anchor designs and various different knots are in use, but with all of them, 2 complications are common: suture fretting or breakage and loss of knot tension. These complications may occur even to the more experienced surgeons, jeopardizing the se-

curity of the repair and thus the success of the operation. In such cases, the suture may be left untouched or a new anchor has to be inserted, which adds time, difficulty, and cost to the operation. We describe a simple technique for replacing the suture of an anchor after its implantation into the bone.

THE TECHNIQUE

Following implantation of a bone anchor, if knot tying has not been successful or if 1 suture limb is fretted, the anchor can be reloaded with a new suture and knot tying can be repeated. The technique of arthroscopic suture replacement in the glenohumeral joint is performed as follows:

1. The posterior, anterosuperior (AS), and antero-inferior (AI) portals are established and cannulas of appropriate size are inserted. The AS portal is used as a viewing portal and the other 2 as working portals. A bone anchor loaded with a No. 2 Ethibond suture (Ethicon, Somerville, NJ), a braided nonabsorbable polyester suture, is already inserted and the decision is made to replace the old suture with a new one if the knot is loose or 1 suture limb is worn out. A special device, the Suture Passer manufactured by Mitek (Mitek Surgical, Westwood, MA) is used.

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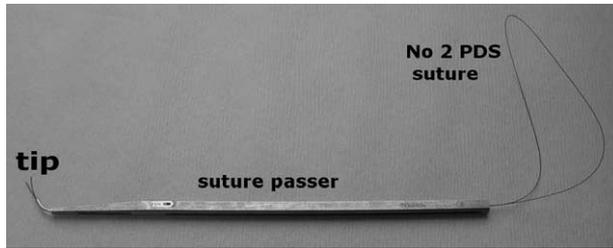


FIGURE 1. The Suture Passer instrument is a prerequisite for successfully performing the technique. A No. 2-0 PDS suture is passed through the cannulated shaft of the instrument and its 2 free ends exit at the tip of the suture passer.

This device consists of a cannulated handle and an exchangeable, cannulated end with a beveled, upturned tip (Fig 1). The 2 free ends of a No. 2-0 PDS suture (Ethicon) are passed through the hind part of the handle, emerging at the tip of the instrument. The instrument is then inserted into the joint through the AI portal and its pointed tip is passed through the filaments of the No. 2 Ethibond suture with mild rotating movements. The tip first separates the filaments of the suture creating an opening and the shaft of the instrument is pushed through it. The beveled tip of the instrument should be used parallel to the filaments of the suture limb to avoid damaging it (Fig 2). The suture limb is always perforated close to the anchor eyelet. When the knot is loose, the limb not passing through the soft tissues is chosen, whereas in case of suture fretting the respective suture limb is chosen.

2. The 2 free ends of the PDS suture, emerging through the tip of the suture passer (Fig 3), are pulled with an arthroscopic forceps and brought outside the joint through the posterior portal.

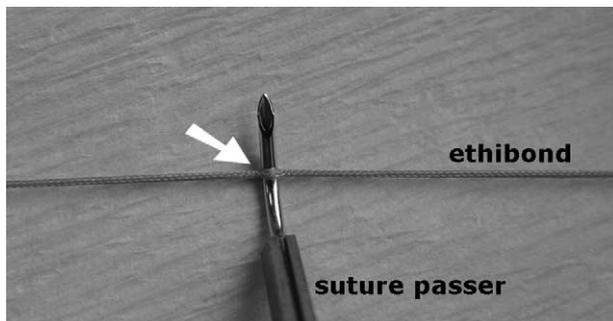


FIGURE 2. The suture passer is passed through the filaments of the Ethibond suture. The white arrow indicates the site of suture perforation.

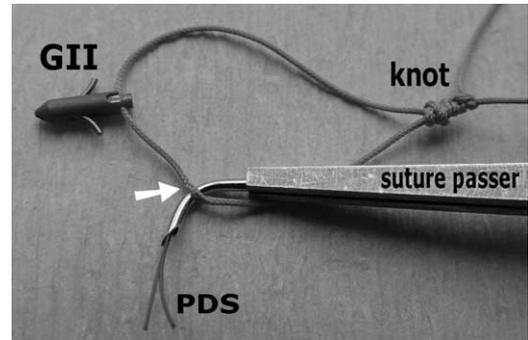


FIGURE 3. A Mitek GII anchor is shown with a loose hangman's knot. The suture passer penetrates the filaments of the braided Ethibond suture. The white arrow indicates the site of suture perforation.

While applying tension to the sutures the suture passer is withdrawn (Fig 4).

3. A new No. 2 Ethibond suture is threaded through the loop formed by the opposite, non-penetrating end of the PDS suture at the AI portal.
4. The new Ethibond suture is pulled into the joint by pulling the 2 free ends of the PDS suture through the posterior portal cannula (Fig 5) and passes through the opening created in the old Ethibond suture limb (Fig 6). Using a crochet hook, the 2 strands of the new suture are pulled separately out of the joint through the posterior portal, so that the 2 limbs of the new suture are located at either side of the opening created at the old suture limb (Fig 7).
5. The limb of the old suture, which is loaded with the new suture, is cut close to the knot (Fig 8) or between the eyelet and the site of fretting, and

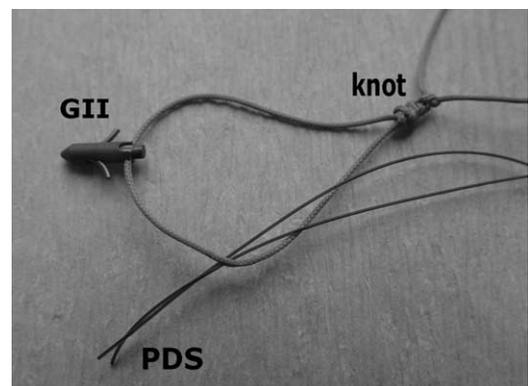


FIGURE 4. The suture passer is withdrawn, leaving the PDS suture passing through the Ethibond suture opening.

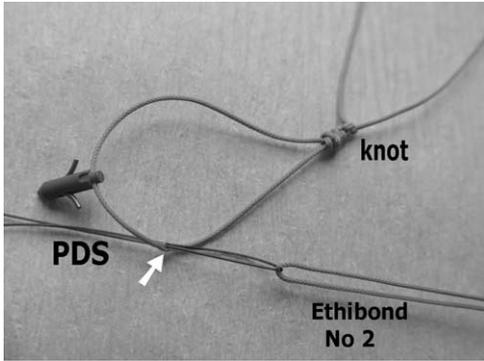


FIGURE 5. The free ends of the PDS suture are pulled, carrying with them the new Ethibond suture, which passes through the loop formed by opposite, continuous end of the PDS.

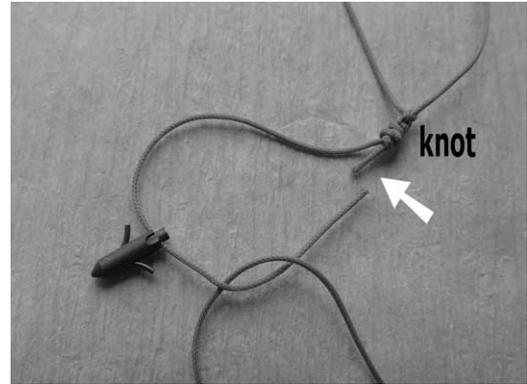


FIGURE 8. The old suture limb is cut close to the knot (white arrow).

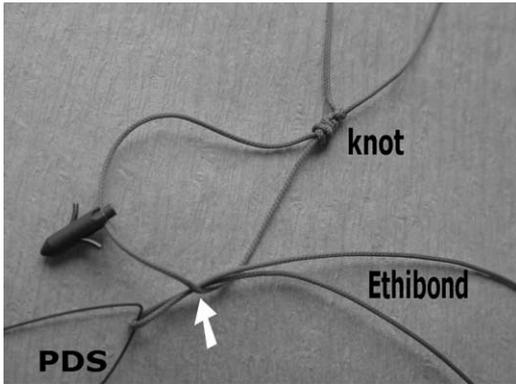


FIGURE 6. The new Ethibond suture is passed through the opening (white arrow) of the limb of the old Ethibond suture.

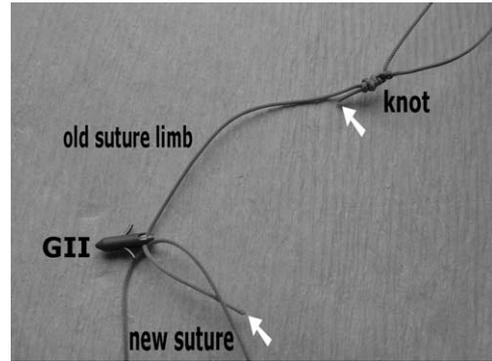


FIGURE 9. The other limb of the old Ethibond suture is pulled. The white arrows show the 2 ends of the old Ethibond suture limb.

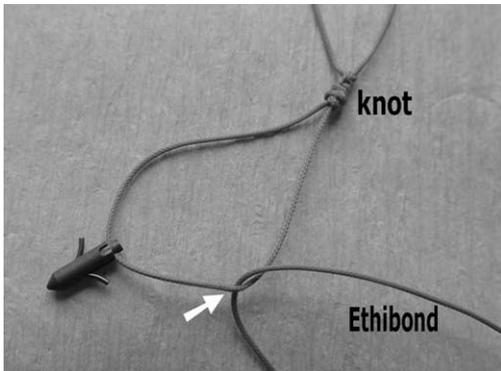


FIGURE 7. A crochet hook is used to retrieve the 2 limbs of the new Ethibond suture so that 1 suture limb is placed at either side of the old suture limb opening.

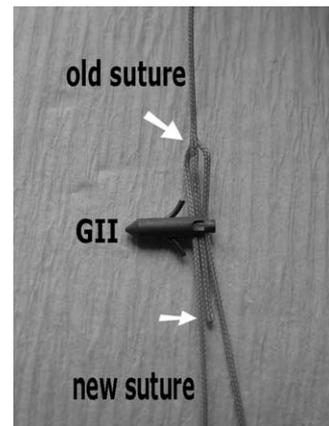


FIGURE 10. The new Ethibond suture limbs pass through the eyelet of the anchor. The lower white arrow shows the cut end of the old suture limb.

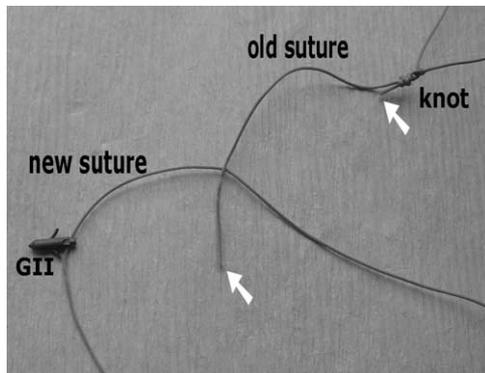


FIGURE 11. One limb of the new suture is grasped with a crochet hook and delivered outside the joint while the other limb follows. The white arrows show the cut ends of the old suture limbs. Anchor reloading with a new suture is now completed.

its other limb is withdrawn through the AI portal.

6. The new suture is pulled this way through the eyelet of the anchor (Fig 9), which is now reloaded with a new, intact suture (Fig 10). Only 1 limb of the new suture is brought out through the AI cannula. The old suture is pulling the new suture limb through the soft tissue (Fig 11).
7. If the soft tissue is torn during this procedure, repeated suture passing through the soft tissue and appropriate knot tying is performed.

DISCUSSION

Knot tying is an essential part of all arthroscopic procedures using suture anchors. In all arthroscopic operations involving sutures and knot tying, 2 complications are possible: suture abrasion and creation of a loose knot.²

Suture abrasion can occur during suture handling at

the cannula exit or at the anchor eyelet. If abrasion is significant, early or late loss of knot security may result. Suture breakage occurs when tissues are sutured under excessive tension or if an inappropriately high tying load is applied by the surgeon. Additionally, premature locking or incomplete securing of the knot may result in a loose and insufficient knot. When 1 suture limb is broken, the arthroscopic knot can still be completed using a grasper attached to the broken suture limb, acting as a new post. New half-hitches can now be delivered into the joint to complete the knot.³

By using the technique described, reloading of a suture anchor is possible. Advantages of this technique are that it is easy and straightforward to perform, it can salvage the procedure, and is applicable in operations in both the glenohumeral joint and the subacromial space. Disadvantages of this technique are the need to use the Suture Passer instrument to perforate the old anchor suture and confinement of its use to anchors with wide eyelets. This technique has been used with success in anchors with a larger size eyelet, such as the Mitek GII, but it can only be performed when the bone anchor is loaded with multifilament sutures.

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