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A TECHNIQUE FOR ARTHROSCOPIC ALL-INSIDE SUTURING IN THE WRIST

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A technique for arthroscopic all-inside suturing in the wrist is presented. The procedure allows placement of the knot inside the joint without additional incisions. We have applied it in cases of dorsal, foveal and coronal tears of the triangular fibrocartilage. No special instrument is required apart from a Tuohy needle.

Keywords: wrist arthroscopy, triangular fibrocartilage tear, TFC tear, wrist trauma

INTRODUCTION

Tears of the triangular fibrocartilage (TFC) are a frequent cause of ulnar wrist pain. Quite often the TFC is torn at its ulnar attachment (the dorsal capsule and/or the fovea), the so-called 1B tear (Palmer, 1989). Reattachment to the dorsal capsule and/or the fovea is needed, depending on whether there is associated instability of the distal radioulnar joint (Atzei, 2009). Dorsal capsular tears have been treated by suturing the TFC proper to the dorsal capsule, placing the knot outside the joint over an external bolster or a button (Bednar and Osterman, 1994; de Araujo et al., 1996; Zachee et al., 1993). If the suture had been placed blindly there was a risk of entrapping the dorsal branch of the ulnar nerve (Tsu-Hsin Chen et al., 2006; Estrella et al., 2007), this occurring in up to 50% of the cases in a cadaveric study (McAdams and Hentz, 2002). Moreover, the button or bolster could cause skin irritation, skin necrosis and even septic arthritis (Yao et al., 2007). A mini-open approach minimized this risk; the nerve could be protected and the suture placed on top of the capsule or on the floor of the ECU sheath (Corso et al., 1997; Skie et al., 1997; Trumble et al., 1997). The knot, which needed several throws, created a new set of complications, namely irritation of the ECU tendon or the nerve itself. A second operation may be needed to remove the knot, even if resorbable material was used (Pederzini et al., 2007). To circumvent these problems, some surgeons have recommended welding instruments (Badia and Jiménez, 2006) or the use of special devices (Böhringer et al., 2002; Pederzini et al., 2007; Yao et al., 2007) for an all-inside repair. Apart from their inherent cost, they are not always available in every hospital.

We present a method for an all-in suturing in the wrist joint that leaves the knot inside, and that requires no special equipment. So far, we have had satisfactory results without complications in more than 50 cases. The technique has been applied for capsular suturing, TFC frontal tears, and reattachments to the fovea of the TFC in combination with anchors. It is illustrated in a dorsal TFC detachment.

SURGICAL TECHNIQUE

The arthroscopy is carried out (Fig 1) in the 'standard' dry fashion (del Piñal et al., 2007). Instead of water distension, the joint space is maintained by traction to all fingers from an overhead bow. An expeditious method to release the hand from traction without losing sterility is used (del Piñal et al., 2006).

Step 1

A Tuohy needle loaded with a thread is inserted proximal to the tear perforating both the capsule and the TFC proper.

Step 2

The thread is pushed into the joint, and the end (henceforth named end A) grabbed with grasper introduced from 6R. End A is now retrieved out of the joint, and secured with a mosquito forceps to avoid slippage.

At this moment end A is outside the joint, the needle is loaded with the thread, and the other end of the suture (henceforth named B) is also outside of the joint.

Step 3

The needle is now slowly withdrawn out of the joint under arthroscopic visualization, until it reaches the edge of the capsule. Once the tip of the needle is out of the joint, it is slid distally on top of the capsule perforating the dorsal capsule-ECU sheath distal to the first pass.

The outside of the capsule is easily recognized first by the scope visualization, and secondly because the surgeon will be able to move the needle without resistance.

Step 4

The surgeon now pushes in the thread through the needle until a loop is inside the joint. The loop is now grabbed

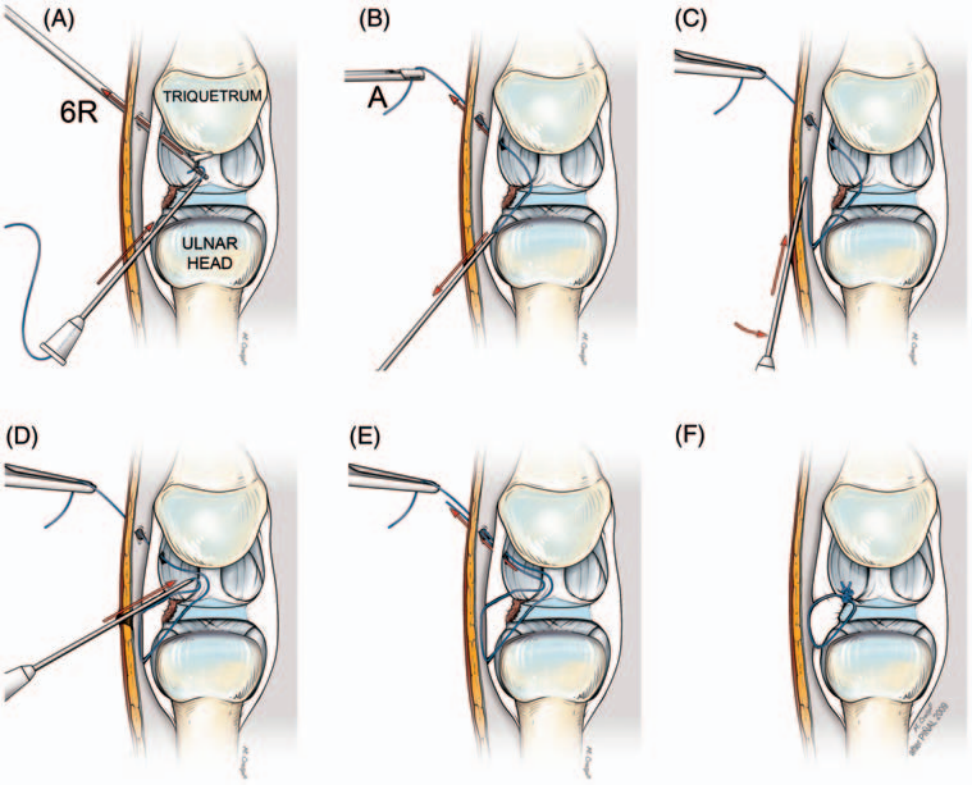

Fig 1 A–F: All-inside repair technique applied for a dorsal TFC tear. See text for details.

with a grasper introduced from 6R, and pulled outside the joint, until 'end B' of the thread is also out.

Both suture ends (A and B) will now be outside the joint through 6R portal, and the 'loop' of the stitch is now passing through the TFC anterior to the tear, around the capsule, outside the joint, and again penetrates into the joint.

Step 5

The surgeon makes one of the available sliding knots, and pushes it in with a knot pusher. Two or three additional throws can be added as required. The ends are cut flush to the knot with a basket forceps or one of the available scissors.

Hints

One of the problems one may encounter is that each end of the thread comes out of the joint through the same portal, but leaving some tissue interposed. In this circumstance, tying the knot is not recommended because it will not sit properly in the joint. Furthermore, there lies the risk of entrapping a nerve branch, or a tendon, which may have become entangled. This can be solved by introducing a shoulder suture hook from 6R (or any portal), hooking both threads close to the TFC and pulling them out of the joint, now through the same path (Fig 2). If available, a Transporter® (Ref 014617, ACUFEX, Smith and Nephew Inc., Andover, MA, USA) can instead be used. The instrument is inserted into the joint and after snaring both threads they will come out of the joint along the same path. A sliding knot is placed and will now pass without difficulty to the joint.

DISCUSSION

The procedure we have presented above can be applied, or modified according to the scenario, to any situation where the knot is to be placed inside the joint. The dry technique (del Piñal et al., 2007) is recommended as tissue infiltration will hinder smooth passage of the grasper in and out of the joint along the same path. With the dry technique the inside of the joint can many times be seen from the skin, allowing accurate introduction of the grasper in and out.

We have used different suture materials in our surgery depending on the structure to be sutured. Unbraided material such as 2-0 polydioxanone or nylon will pass easily through the Tuohy needle. For threads of larger calibre or braided ones (such as FiberWire®) that are more difficult to pass through the Tuohy needle, which is

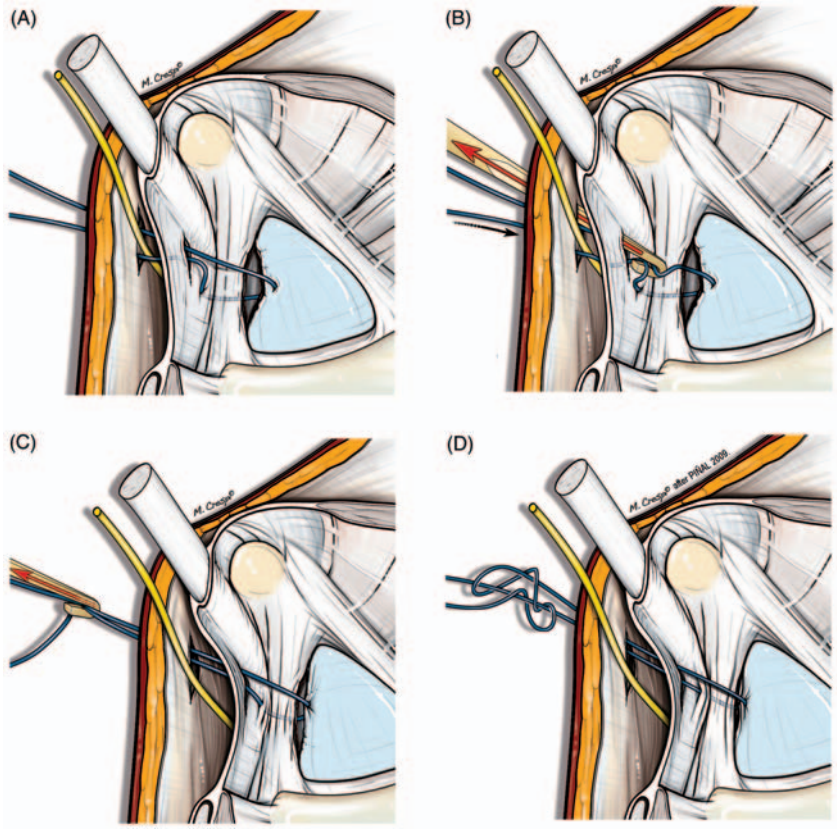

Fig 2 A–D: Method to retrieve the suture through the same path. See text for details.

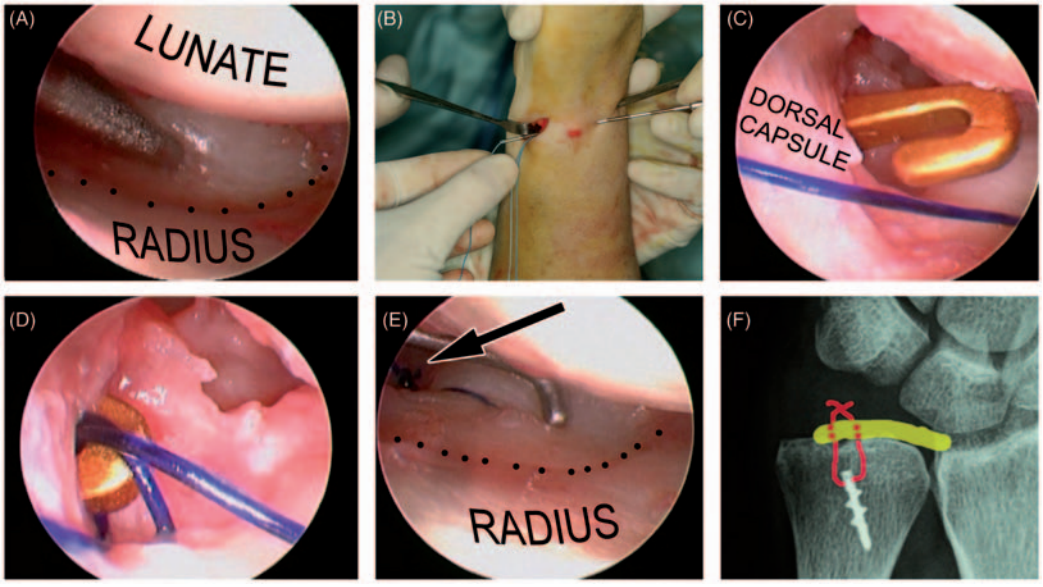

Fig 3 Technique for reattachment of the TFC at the fovea. A suture anchor is placed in the fovea of the ulna using the mini-open method of Atzei (2009). Both suture ends will now be out of the joint. The surgeon introduces a Tuohy needle at about 4–5 portal, pierces the TFC and exists ulnarly, near the fovea (A). The needle is then fed with one of the thread's ends of the bone anchor (B). The needle is retrieved, all the way out, having now the suture end out of the joint dorsally. The manoeuvre with the Tuohy needle is repeated, so as to have both suture ends out of the joint dorsally, although rarely through exactly the same channel. In order to have both suture ends through the same path, permitting a gliding knot, the shoulder suture hook is introduced through 6R (or any other portal) (C), retrieving both suture ends from the joint (D). Finally, a sliding knot is made outside the joint and slid in with the (shoulder) knot pusher. Traction is relieved during the knotting process in order to allow the TFC to sit in the fovea (arrow indicates the knot) (E and F).

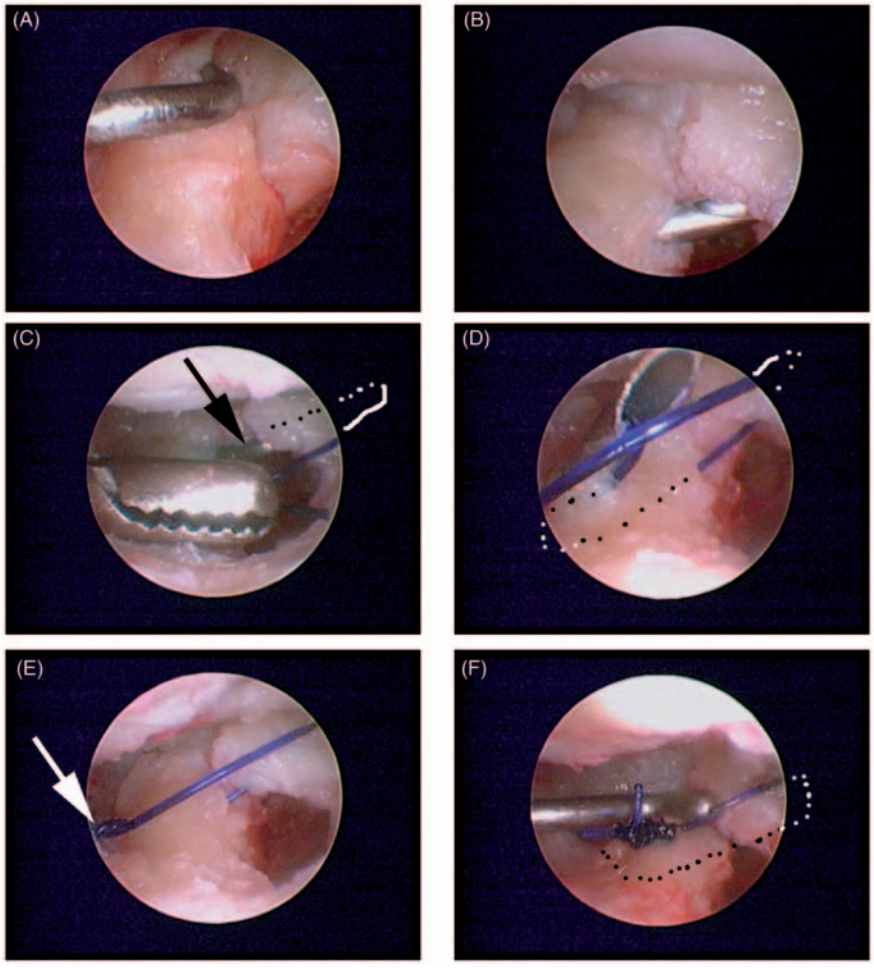

Fig 4 Suture placement in a frontal tear of the TFC at the fovea. (A) The tear is being explored. The probe is in 6R in a left wrist. (B) A loaded Tuohy needle is passing from the posterior part through the frontal tear to perforate the anterior portion. (C) A grasper is now pulling the end of the suture inserted with the needle (arrow) to be pulled out through 6R portal (in this case). (D) The loaded needle is now perforating the posterior part of the tear. The suture end will be pulled out of the joint with a grasper, as in C. (E) Both suture ends are now being knotted outside and the gliding knot is now being pushed (white arrow). (F) Final result.

1.3 mm diameter, we use a Rodiera® needle. Both Tuohy and Rodiera needles are readily available from anaesthetists' supplies. The latter is also an epidural needle but of a slightly larger calibre (1.5 mm). It is important to insert the needle always with the bevel parallel to the course of the extensor tendons (i.e., vertical). As the tendon is under tension (because of the traction) the bevel of the needle will act as a sharp knife if inserted perpendicular to the tendon fibres. However, if inserted parallel it will only pierce the tendon. By the same token, the smaller Tuohy needle is preferred, if at all possible.

Intravenous needles or intramuscular needles are not recommended for the all-inside technique we propose here. First of all, the inner core of the point is sharp, and in step 4 the thread can be cut, as there is some pulling required before end B is outside the joint. More importantly, however, they are too sharp, and besides cutting too much, they provide no 'feel' when the surgeon has to creep with the tip of the needle on the dorsal capsule in step 3. The epidural needle is much blunter, and the surgeon will notice when the capsule has been passed and 'feels' the tip of the needle when sliding on top of the hard surface of the capsule. It is critical that the surgeon stays immediately on top of the outer surface of the capsule when moving the needle distally. If the needle has been withdrawn too much there will be a risk of entangling a tendon or a nerve branch when reintroducing the needle into the joint. If this were to happen, the suture should be removed and the process repeated.

The technique we present here bears no difficulty for an arthroscopist. We have used this procedure for TFC reattachment to the dorsal capsule, in combination with bone anchors for foveal reinsertion of the TFC (Atzei, 2009), and for the rarer coronal TFC tears (Figs 3 and 4). It should be underscored that the dry technique facilitates some of the steps of the procedure.

Conflict of interest

None declared.

References

Atzei A. New trends in arthroscopic management of type 1-B TFCC injuries with DRUJ instability. J Hand Surg Eur. 2009, 34: 582–91.

Badia A, Jiménez A. Arthroscopic repair of peripheral triangular fibrocartilage complex tears with suture welding: a technical report. J Hand Surg Am. 2006, 31: 1303–7.

Bednar JM, Osterman AL. The role of arthroscopy in the treatment of traumatic triangular fibrocartilage injuries. Hand Clin. 1994, 10: 605–14.

Böhringer G, Schädel-Höpfner M, Petermann J, Gotzen L. A method for all-inside arthroscopic repair of Palmer 1B triangular fibrocartilage complex tears. Arthroscopy. 2002, 18: 211–13.

Corso SJ, Savoie FH, Geissler WB, Whipple TL, Jiminez W, Jenkins N. Arthroscopic repair of peripheral avulsions of the triangular fibrocartilage complex of the wrist: a multicenter study. Arthroscopy. 1997, 13: 78–84.

de Araujo W, Poehling GG, Kuzma GR. New Tuohy needle technique for triangular fibrocartilage complex repair: preliminary studies. Arthroscopy. 1996, 12: 699–703.

del Piñal F, García-Bernal FJ, Delgado J, Sanmartín M, Regalado J, Cerezal L. Correction of malunited intra-articular distal radius fractures with an inside-out osteotomy technique. J Hand Surg Am. 2006, 31: 1029–34.

del Piñal F, García-Bernal FJ, Pisani D, Regalado J, Ayala H, Studer A. Dry arthroscopy of the wrist: surgical technique. J Hand Surg Am. 2007, 32: 119–23.

Estrella EP, Hung LK, Ho PC, Tse WL. Arthroscopic repair of triangular fibrocartilage complex tears. Arthroscopy. 2007, 23: 729–37.

McAdams TR, Hentz VR. Injury to the dorsal sensory branch of the ulnar nerve in the arthroscopic repair of ulnar-sided triangular fibrocartilage tears using an inside-out technique: a cadaver study. J Hand Surg Am. 2002, 27: 840–4.

Palmer AK. Triangular fibrocartilage complex lesions: a classification. J Hand Surg Am. 1989, 14: 594–606.

Pederzini LA, Tosi M, Prandini M, Botticella C. All-inside suture technique for Palmer class 1B triangular fibrocartilage repair. Arthroscopy. 2007, 23: 1130.e1–4.

Skie MC, Mekhail AO, Deitrich DR, Ebraheim NE. Operative technique for inside-out repair of the triangular fibrocartilage complex. J Hand Surg Am. 1997, 22: 814–17.

Trumble TE, Gilbert M, Vedder N. Isolated tears of the triangular fibrocartilage: management by early arthroscopic repair. J Hand Surg Am. 1997, 22: 57–65.

Tsu-Hsin Chen E, Wei JD, Huang VW. Injury of the dorsal sensory branch of the ulnar nerve as a complication of arthroscopic repair of the triangular fibrocartilage. J Hand Surg Br. 2006, 31: 530–2.

Yao J, Dantuluri P, Osterman AL. A novel technique of all-inside arthroscopic triangular fibrocartilage complex repair. Arthroscopy. 2007, 23: 1357.e1–4.

Zachee B, De Smet L, Fabry G. Arthroscopic suturing of TFCC lesions. Arthroscopy. 1993, 9: 242–3.

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