

# ARTHROSCOPIC DIRECT REPAIR FOR RADIAL TEAR OF THE TRIANGULAR FIBROCARILAGE COMPLEX

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## ABSTRACT

Although various repair techniques for Palmer type 1B lesions of the triangular fibrocartilage complex (TFCC) have been introduced, arthroscopic repair techniques for Palmer type 1D lesions are still being honed. Until recently, inside-out techniques have commonly been used to repair radial tears of the TFCC. However, that technique has the disadvantages of a requirement for an extra skin incision, pain resulting from prominent subcutaneous suture knot stacks, and peripheral nerve injury. We describe an all-arthroscopic direct-repair technique using a suture hook with 2–0 polydioxanone that is relatively simple and safe and is thus a useful alternative for radial tears of the TFCC.

*Keywords:* Triangular Fibrocartilage Complex; Palmer Type 1D Lesion; Radial Tear; Arthroscopic Repair.

## INTRODUCTION

Triangular fibrocartilage complex (TFCC) injuries are known to be a primary cause of pain on the ulnar side of the wrist and of distal radioulnar joint instability.<sup>1</sup> Wrist arthroscopy has become a standard tool in the diagnosis and treatment of these injuries, thanks to advances in technique. There have been many reports of encouraging results for arthroscopic repair of peripheral tears of the TFCC.<sup>1–5</sup>

Various repair techniques for Palmer type 1B lesions, which are peripheral tears of the TFCC from its insertion of the distal ulna, have been introduced by numerous investigators. However, arthroscopic repair techniques for Palmer type 1D lesions, which are peripheral tears of the TFCC from the radial

attachment, are still being honed.<sup>4</sup> Until recently, the inside-out technique has been commonly used for radial tear of the TFCC.<sup>1,3</sup> However, the disadvantages of this technique are the requirement for an extra skin incision, pain resulting from prominent subcutaneous suture knot stacks, and peripheral nerve injury. Thus, we have developed an all-arthroscopic direct-repair technique using a suture hook with 2–0 polydioxanone (PDS) for a radial tear of the TFCC.

## SURGICAL TECHNIQUE

Using a wrist arthroscopy tower with 10 lb of longitudinal traction placed on the index and long fingers to distract the



**Fig. 1** A small curved or straight suture hook (Linvatec, Largo, FL) is used for arthroscopic direct-repair technique of radial tears of the triangular fibrocartilage complex.

radiocarpal joint, the surgeon performs standard diagnostic arthroscopy to evaluate the location and configuration of the TFCC lesion. Standard 3–4 and 6R or 6U portals are only used for diagnostic arthroscopy and repair of radial tear of the TFCC. The all-arthroscopic direct-repair technique requires a small curved or straight suture hook (Linvatec, Largo, FL), 2–0 PDS (Ethicon, Somerville, NJ), arthroscopic retriever, and knot pusher (Fig. 1).

In the case described here, we observed a radial tear located 2 to 3 mm medial to the radial attachment of the TFCC (Fig. 2).

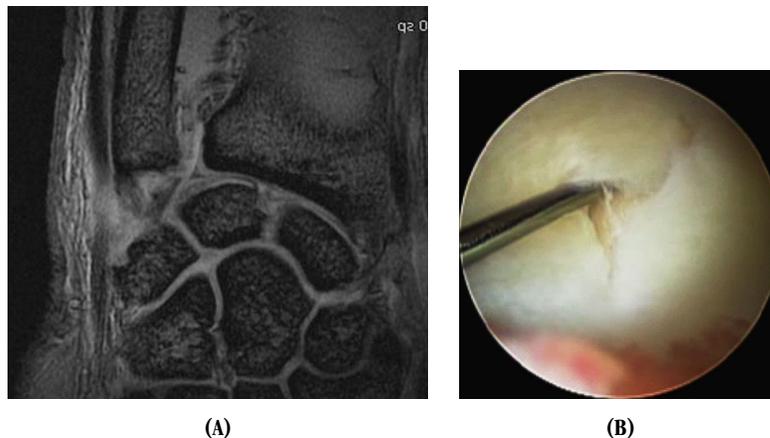
We identified the TFCC tear by probing, and then debrided the rim of the tear site using a 3.5 mm full-radius motorised shaver to stimulate tissue healing at the repair site. The rim of the sigmoid notch was also debrided. With the arthroscope engaging through the 3–4 portal, we used a small curved or straight suture hook with 2–0 PDS. We then inserted a suture hook via the 6R or 6U portal, perpendicular to the lesion, and passed it through both sides of the lesion. The 2–0 PDS was then passed up through the suture hook by spinning the wheel on the suture hook passer. After carefully backing the suture hook out of the skin, we pulled both limbs of the suture out with the suture retriever, and then used a sliding knot to tie the suture through the 6R portal. If needed, this step can be repeated, depending on the tear size and configuration (Fig. 3).

After the operation, a long arm cast was applied with the arm in supination and left in place for four weeks. After removal of the cast, active and passive range of motion exercises for the wrist were started. The patient was permitted to engage in unrestricted activity and to return to work at three months after surgery.

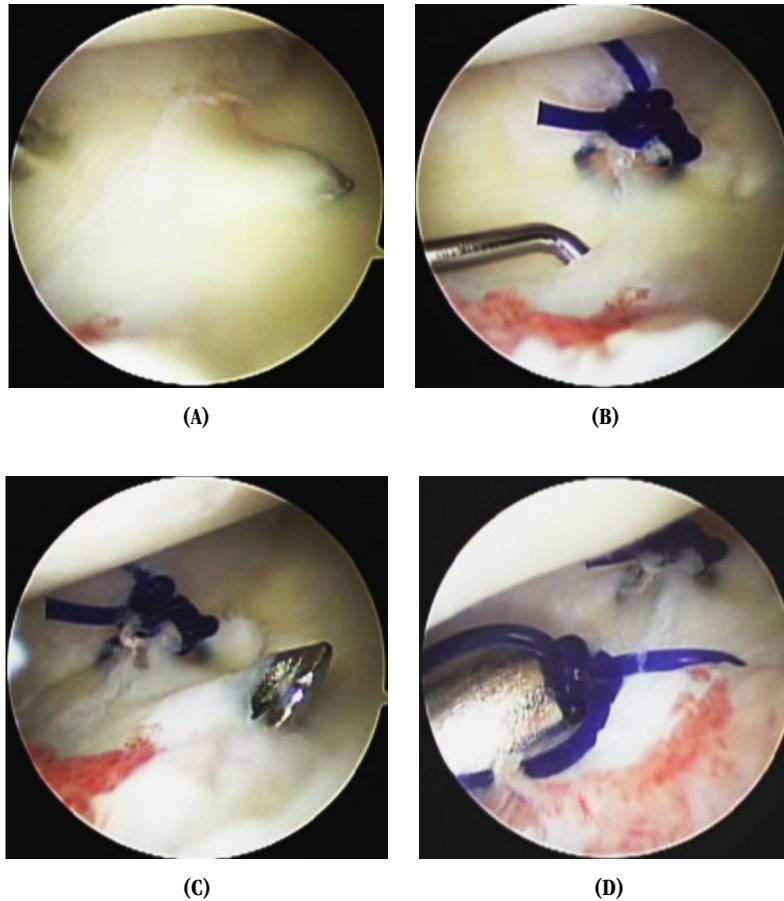
## DISCUSSION

Palmer<sup>6</sup> classified traumatic tears of the TFCC into four sub-types according to location. Repair of Palmer type 1B, 1C, and 1D tears has been advocated as a treatment alternative because of the peripheral vascularity of the ulnar, volar, and radial margins and their important roles in wrist stability.<sup>2,6,7</sup>

Palmer type 1D lesions are rare injuries involving tears from the radial attachment.<sup>6</sup> Various repair methods used for



**Fig. 2** Radial tear located 2 to 3 mm medial to the radial attachment of the triangular fibrocartilage complex: (A) magnetic resonance image findings and (B) arthroscopic findings.



**Fig. 3** (A)–(D) A small suture hook via the 6R portal is inserted perpendicular to the lesion and passed through both sides of the lesion. The 2–0 polydioxanone is then passed up through the suture hook and the suture is tied through the 6R portal.

Palmer type 1B lesions at the ulnar insertion produce good clinical results, confirming the healing potential in this region. However, the treatment of Palmer type 1D lesions is controversial. Some authors have reported that radial-side peripheral tears cannot heal because there is no blood supply for the TFCC entering from the radial attachment.<sup>5,7–9</sup> Others have reported good clinical results and complete healing over the long term after radial TFCC repair.<sup>1,2,5,10</sup> Cooney *et al.*<sup>10</sup> reported that 22 (95.6%) of 23 patients with radial tears of the TFCC undergoing open repair had satisfactory clinical outcomes. Shih *et al.*<sup>1</sup> reported that patients with Palmer type 1D lesions had the same results as those with Palmer type 1B lesions. Trumble *et al.*<sup>5</sup> demonstrated that six (75%) of eight patients had intact TFCC repairs in follow-up studies. They assumed that the combination of vascular ingrowth and synovial fluid provided enough nutritional support to allow the TFCC to heal in these patients.

Palmer type 1B lesions can be easily and satisfactorily treated by several convenient arthroscopic repair techniques, whereas reattachment of the articular disc in Palmer type 1D lesions is very tricky.<sup>3</sup> Although the inside-out technique is commonly used to repair these lesions, it is difficult to reattach the articular disc by a suture, because it is necessary to guide the suture transosseously. Fellingner *et al.*<sup>3</sup> reported using the inside-out technique with the T-Fix device (Smith and Nephew, Andover, MA) for the treatment of radial tears of the TFCC. They noted that this procedure can restore the tension of the disc and its function as a force transmitter between forearm and hand. However, the disadvantages of the technique are an extra skin incision, pain resulting from prominent subcutaneous suture knot stacks, and peripheral nerve injury. The all-arthroscopic repair technique for Palmer type 1D lesions has previously been reported only by Trumble.<sup>4</sup> He introduced the new technique using a mini PushLock anchor (Arthrex, Naples,

FL). The technique can be facilitated by using a mini suture lasso and small arthroscopic cannulas to assist in passing the anchor into the sigmoid notch.

We had encountered a radial tear with 2 to 3 mm of the TFCC remaining along the rim of the sigmoid notch in patient with no bony avulsion, so we devised an all-arthroscopic direct-repair technique that uses a suture hook with 2–0 PDS. Our technique has several advantages. First, it is relatively simple compared with the previously reported technique. Second, it requires no additional skin incision and decreases of the risk of neurovascular damage. Third, it is inexpensive and carries no risk of complications from the suture device material. It does have one drawback, however: it cannot be used in radial tears with bony avulsion of the sigmoid notch. To prove this repair technique to be effective, further study will be required.

In conclusion, the all-arthroscopic direct-repair technique for radial tears of the TFCC is relatively simple and safe and has the advantages of using vertical mattress sutures and of decreased risk of morbidity from an extra skin incision or irritating subcutaneous suture knot stacks. Therefore, we recommend this technique as a useful alternative for repairing radial tears of the TFCC.

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