

Arthroscopic Repair of Peripheral Tears

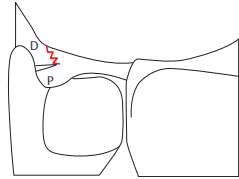
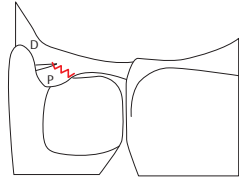
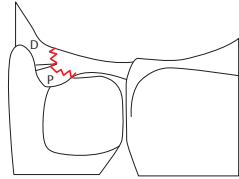
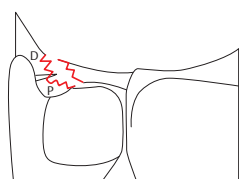
Chapter 8 of the Triangular Fibrocartilage Complex

Introduction

The triangular fibrocartilage complex (TFCC) is a fibrocartilaginous structure located between the medial surface of the distal radius and the ulnar head. The most common injury is a tear of the dorsal peripheral and medial part of the TFCC (Palmer type 1B¹ or European Wrist Arthroscopy Society (EWAS) Atzei 1²) (**Table 8.1**). This type of lesion is commonly seen in young, active

individuals and does not cause instability of the distal radioulnar joint (DRUJ). However, it often causes very annoying pain with any strenuous activities, especially sports (tennis, golf, fencing, basketball, etc.). Open repair often entails large incisions and results in stiffness, especially in pronosupination. Arthroscopy allows for better visualization and understanding of these lesions. It is easy to perform repairs of these peripheral lesions arthroscopically, resulting in less morbidity.

Table 8.1 Atzei's classification of triangular fibrocartilage (TFCC) tears

Stage	Distal component	Proximal component	Distal radioulnar joint stability	Treatment
1: Distal tear 	Tear	Intact	No	Peripheral TFCC suture
2: Foveal avulsion 	Intact	Tear	Yes	Foveal reinsertion
3: Complete tear 	Tear	Tear	Yes	Foveal reinsertion ± peripheral TFCC suture
4: Massive rupture irreparable 	Tear	Tear	Yes	Tendinous graft

Operative Technique

Patient Preparation and Setup

The procedure is performed under local/regional anesthesia. The arm is fixed firmly to the arm table, and longitudinal traction is applied to the wrist for distraction of the wrist joint.

The forearm is in supination with the ulnar styloid slightly dorsal. The TFCC lesion is therefore in a more dorsal position (i.e., opposite the 6R portal rather than the 6U portal).

Exploration

The arthroscope is introduced through the 3–4 radiocarpal portal. After routine examination of the radiocarpal joint, the arthroscope is directed toward the medial aspect of the wrist toward the TFCC. Transillumination of the skin is helpful for locating the 6R portal. A hypodermic needle is inserted to ascertain the exact position of the 6R portal, which is located ~3 or 4 mm distal to the peripheral insertion of the TFCC. A shaver is introduced through the 6R portal to excise the excess synovial tissue that is typically seen in these peripheral lesions.

Three tests are performed with a hook probe:

1. The loss of the “trampoline” effect indicates a peripheral tear of the TFCC. The hook probe is pushed directly on the ligament, and a depression of the TFCC is noted without a spontaneous return to its

original position. However, this classic test gives a false-negative more frequently than is reported in the literature. In fact, painful, small, peripheral tears of the TFCC seldom show a loss of the trampoline effect. In addition, nontraumatic degenerative central perforations of the TFCC, frequently seen after the fourth decade, also demonstrate a loss of the trampoline effect.

2. The hook probe can be slid underneath the peripheral tear of the TFCC on the dorsal side (**Fig. 8.1a, b**). The distal peripheral insertion of TFCC can sometimes have a pseudo appearance intact. Indeed, scar tissue formed by the natural healing of the body (not effective in these cases) does not allow a sufficiently strong attachment to the dorsal capsule. When the peripheral distal insertion of TFCC is intact, the probe can follow the edge of the TFCC to the lateral ligaments component dorsal capsule without creating depression. It is therefore impossible to pass under the TFCC. In chronic peripheral lesions, the scar tissue often masks the injury; however, it is very easy to pass under the TFCC by placing the probe between the TFCC and the collateral ligaments. This scarring often obscures this type of lesion (**Figs. 8.2a, b** and **8.3a, b**).
3. The hook probe is then brought to the styloid recess and the pull test is performed by passing the probe from outside in underneath the TFCC. In isolated peripheral tears of the TFCC, the foveal insertion is intact, and the pull test is negative.

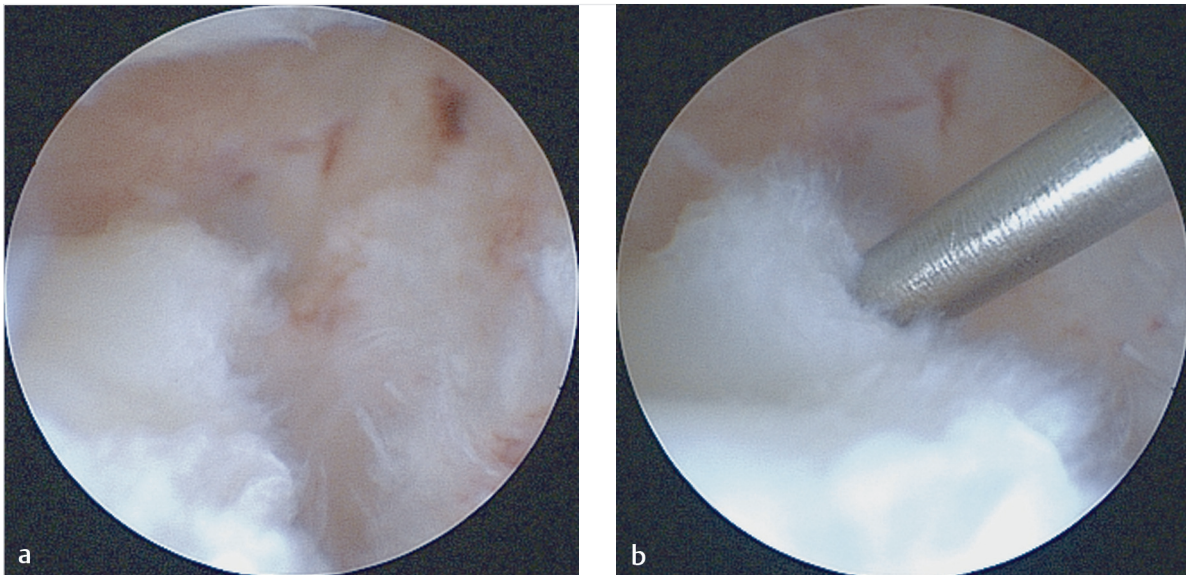


Fig. 8.1a, b

a Arthroscopic view showing a distal peripheral lesion.

b The hook probe can be easily passed underneath the triangular fibrocartilage complex (TFCC).

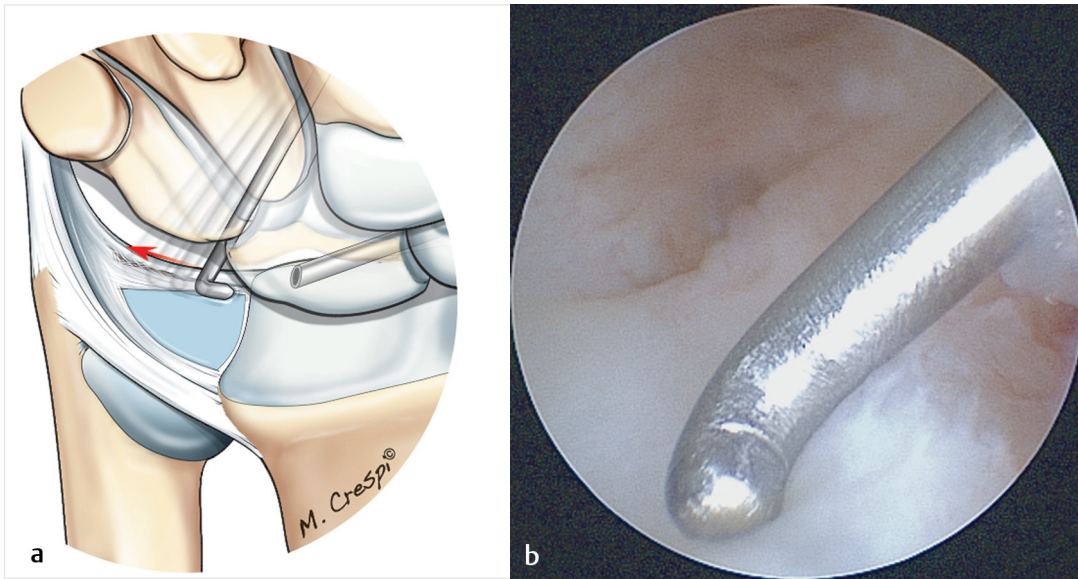


Fig. 8.2a, b

a Drawing showing an altered (pseudonormal) appearance of the triangular fibrocartilage complex, the lesion being covered by fibrous tissue. Red arrow simulates the movement of the probe on the TFCC.
b Arthroscopic view showing the same.

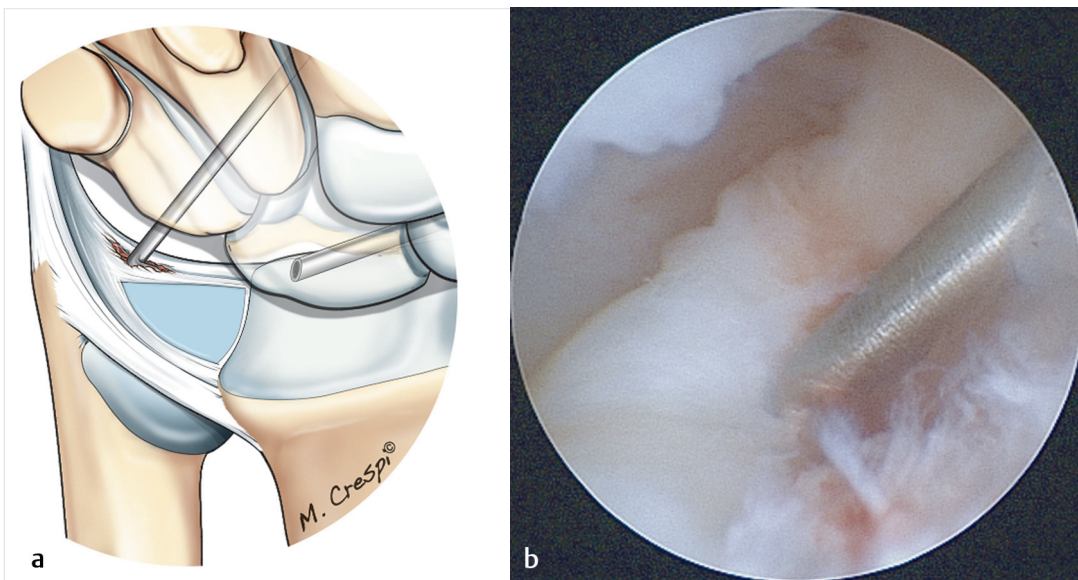


Fig. 8.3a, b

a Drawing showing the probe in the tear zone.
b Arthroscopic view showing the probe on the lesion.



Fig. 8.4 Operative view showing the location for the correct position of the distal radioulnar joint portal using a needle.

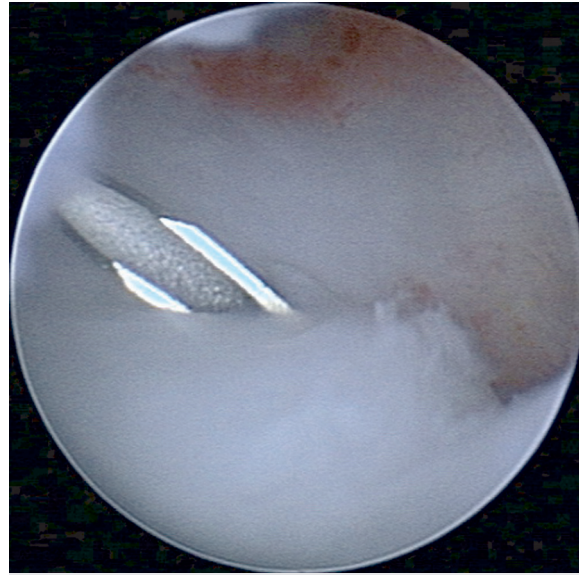


Fig. 8.5 The needle in a good position, as seen in this view, after crossing the dorsal capsule and the dorsal portion of the triangular fibrocartilage complex.

Creation of a Distal Radioulnar Joint Portal

To repair the TFCC, the suture must pass between the capsule and the TFCC. For this reason, a DRUJ portal is created approximately 1 cm proximal to the 6R portal lateral to the extensor carpi ulnaris (ECU). A needle is directed obliquely upward to confirm the location of the portal under direct arthroscopic control. The needle must exit the TFCC at an appropriate point (Figs. 8.4 and 8.5). A small transverse incision is made.

A hemostat is used to gently spread the tissue and avoid damage to the extensor tendons. The jaws of the hemostat forceps are gently opened, and the tissue is spread until the dorsal capsule is reached (Fig. 8.6).

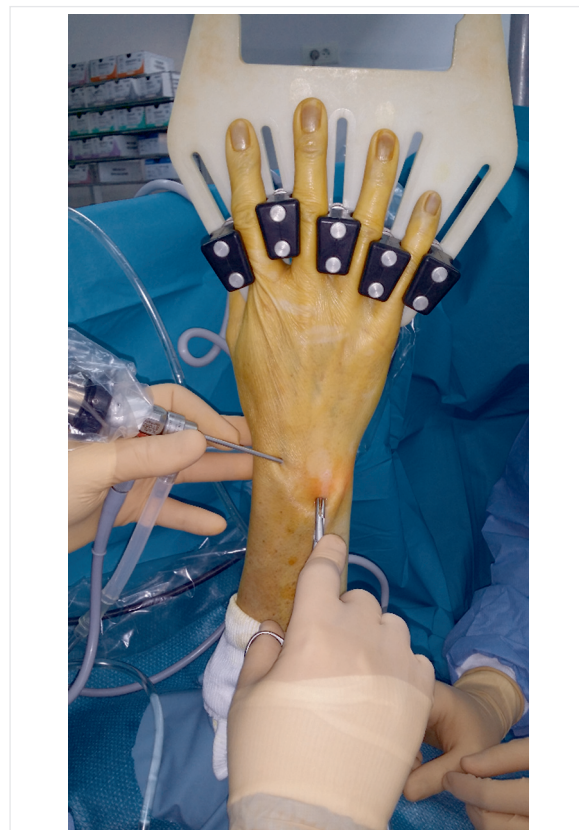


Fig. 8.6 Operative view showing the use of “mosquito” forceps, allowing a safe passage between the fifth and sixth extensor compartments.

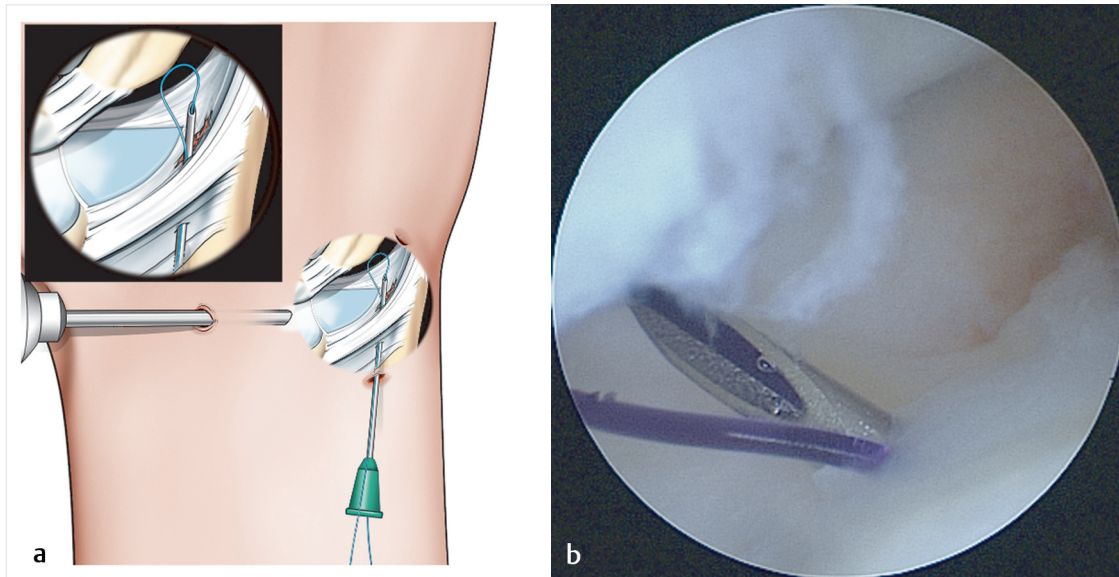


Fig. 8.7a, b

a Drawing showing the passage of the loop in the most radial portion of the triangular fibrocartilage complex.
b Arthroscopic view showing the passage of the loop in the intra-articular radial side of the lesion.

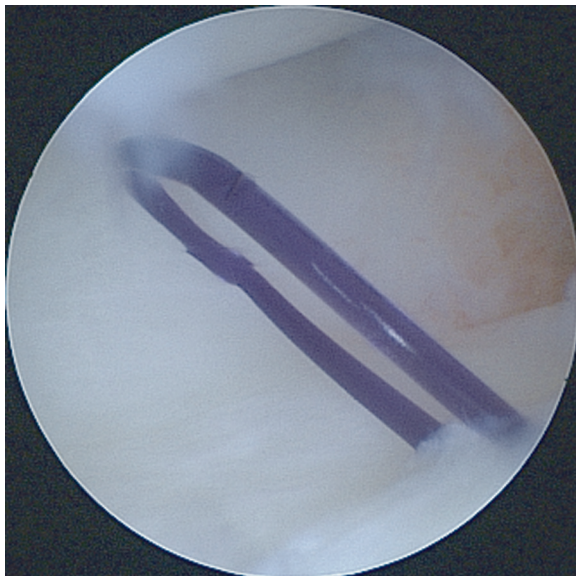


Fig. 8.8 Arthroscopic view showing the loop in place after removing the needle.

Performing the Suture

A resorbable monofilament suture is used, either 4-0 or 3-0 polydioxanone sutures (PDS) (Ethicon, Somerville, New Jersey, USA) depending on the size of the wrist. A

suture loop is placed in a 21-gauge hypodermic needle, and a straight suture is placed in another 21-gauge needle. First, the loop is passed via the DRUJ portal through the capsule and then forward and through the TFCC on the radial side of the tear (**Fig. 8.7a, b**). The needle is withdrawn, leaving the suture loop in place within the joint (**Fig. 8.8**). The second single suture is then passed through the capsule and at the medial portion of the TFCC, if possible through the foveal insertion, in order to strengthen the suture (**Fig. 8.9a-c**).

Using a fine hemostat forceps, both sutures are brought out through the 6R portal (**Figs. 8.10** and **8.11**).

On the outside, the single suture is passed through the loop (**Fig. 8.12a, b**), and then the loop is pulled out of the DRUJ portal. In this manner, the single suture is pulled back across the TFCC and the articular capsule to make a single intra-articular horizontal mattress suture, closing the peripheral TFCC tears (**Fig. 8.13a-c**). Both strands of the absorbable suture are then brought out together through the DRUJ portal.

Securing the Final Suture

After removing the traction the wrist is placed in extension and ulnar deviation, the suture is placed under tension, and a surgeon's knot is made between the two strands. The knot is then buried subcutaneously (**Fig. 8.14a-c**). The portals are left open to heal by scar formation.



Fig. 8.9a–c

- a** Drawing showing the positioning of the second wire.
- b** View showing the operative position of the needle for the passage of the second suture. In this case, a clamp was used to spread the space between compartments 5 and 6 so as to avoid the risk of catching an extensor tendon with the needle.
- c** Intra-articular view showing the output of the second needle with the second suture, close to the first, after passing through the dorsal capsule and TFCC.

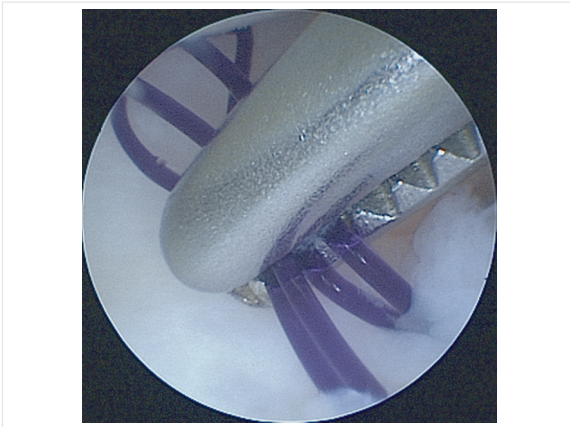
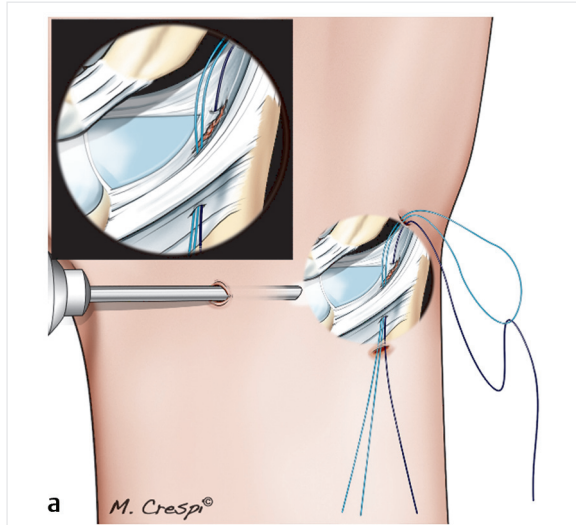


Fig. 8.10 Arthroscopic view showing the recovery of two sutures at the same time.



a



Fig. 8.11 Operative view showing retrieval of the sutures from the 6R portal.



b

Fig. 8.12a, b

a Drawing showing the passage of the second suture through the loop of the first.

b Surgical view of the passage of a single suture in the loop outside of the wrist.

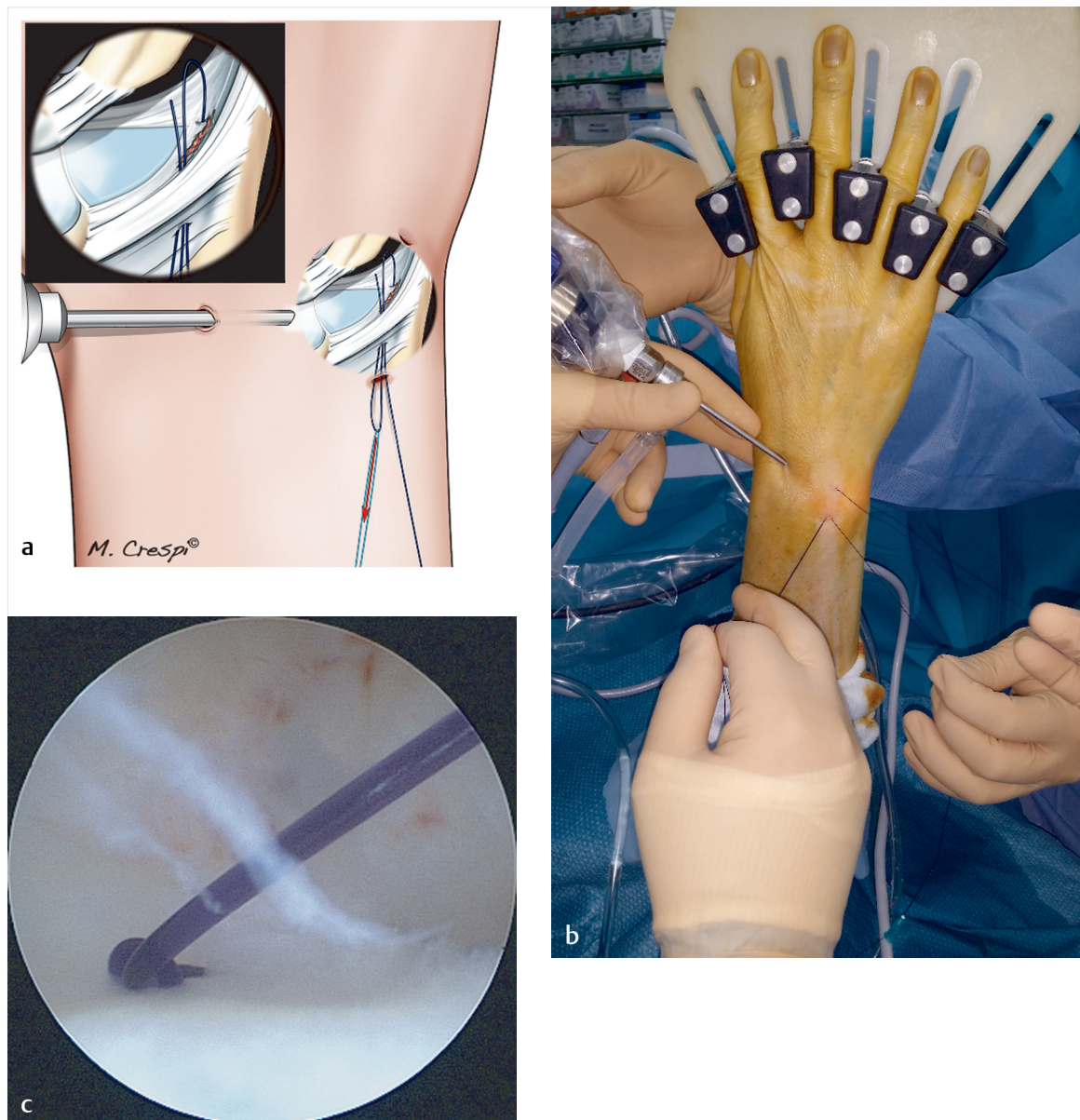


Fig. 8.13a–c

- a** Drawing showing the passage of single suture thread at the radial part of the peripheral avulsion using the loop.
- b** Surgical view showing the principle gestures to accomplish at this level of procedure. The assistant must securely hold the proximal part of the second suture and unleash the distal portion so that it is driven by the loop of the first suture to bridge the TFCC injury.
- c** View showing the intra-articular portion of the single wire loop at the radial portion of the lesion.

Postoperative Care

The wrist is immobilized in extension and ulnar deviation in a below-the-elbow plaster cast for a period of 6 weeks. Rehabilitation is started at the sixth week. The suture usually resorbs within 3 to 6 months. It can sometimes cause temporary irritation, and the patient should be informed of this.

Conclusion

This simple technique for repairing peripheral tears of the TFCC does not require an intra-articular knot, the tension of which is often difficult to adjust, leading to potential irritation. The outcomes with this technique are very good, and most patients recover a functional and painless wrist without any loss of movement.

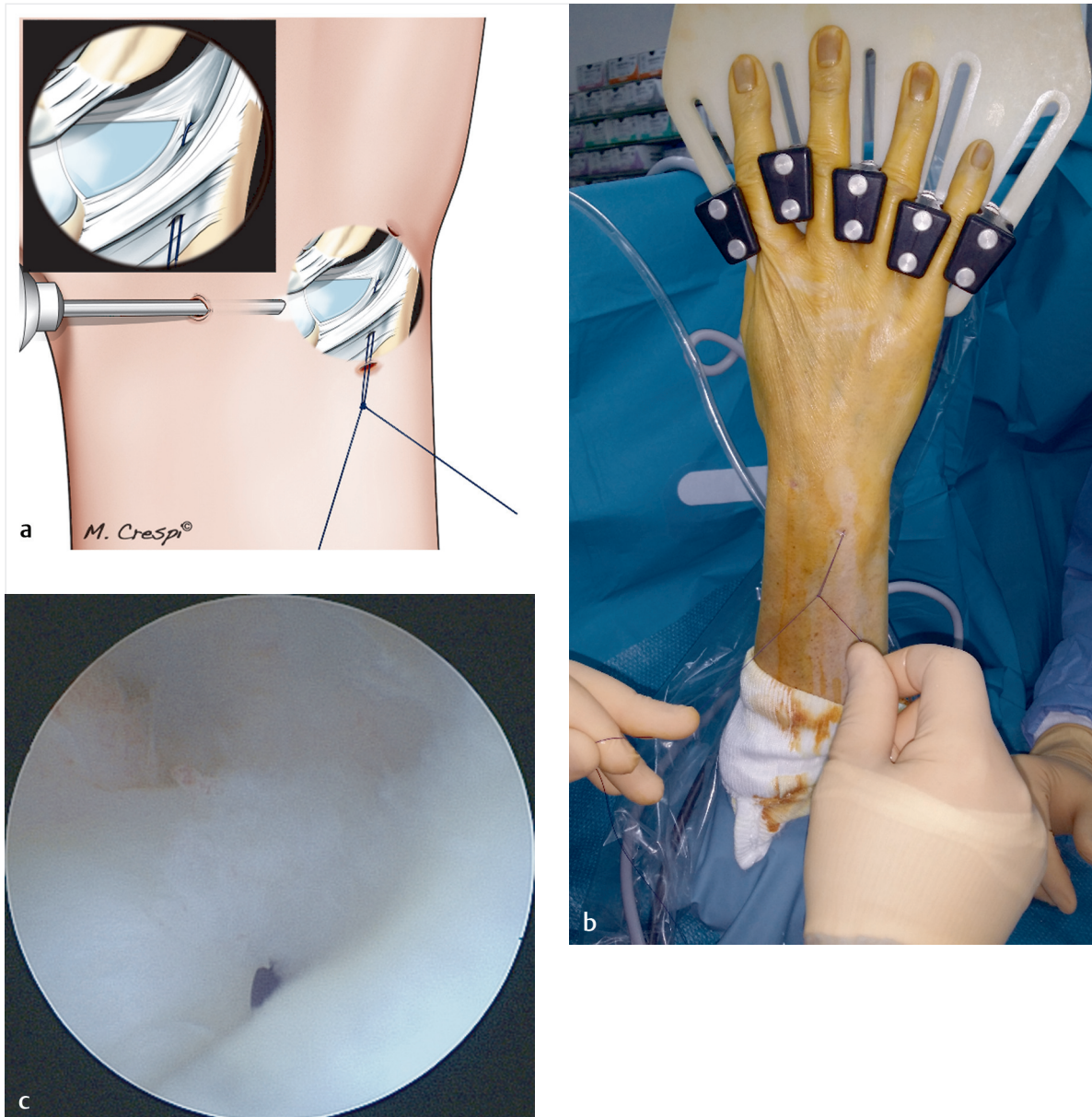


Fig. 8.14a–c

a Drawing showing the completion of the final node.

b Surgical view showing the technique of suturing. It is actually easier to make this suture after releasing the hand of the traction system and after putting the wrist in extension and ulnar deviation.

c Intra-articular view showing the final appearance of the lesion of the peripheral suture.

References

1. Palmer AK. Triangular fibrocartilage complex lesions: a classification. *J Hand Surg Am* 1989;14(4):594–606
2. Atzei A. New trends in arthroscopic management of type 1-B TFCC injuries with DRUJ instability. *J Hand Surg Eur Vol* 2009;34(5):582–591

