

# Repair of Pronator Quadratus With Partial Muscle Split and Distal Transfer for Volar Plating of Distal Radius Fractures

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Flexor tendon injury is a rare, but serious, complication after volar plate fixation for distal radius fractures. The plate position and prominence at the watershed line are contributing factors that cause flexor tendon injury. With the standard volar approach, the pronator quadratus (PQ) is typically elevated off the radial attachment. The distal part of the plate is often visible after repair of the PQ. We describe a “PQ-splitting” technique for covering the distal edge of the plate if primary PQ repair cannot completely cover the distal part of the plate. We also report the outcome of our series. This method can potentially prevent direct gliding of flexor tendons on the distal part of the plate and prevent flexor tendon attrition on the plate prominence. (*J Hand Surg Am.* 2017;42(11):935.e1-e5. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

**Key words** Distal radius fracture, flexor tendon rupture, pronator quadratus, tendon attrition, volar plate.



**F**RACTURES OF THE DISTAL RADIUS are commonly encountered in clinical practice, and volar plate fixation for these fractures is frequently used. Flexor tendon injury is a rare, but serious complication, after volar plate fixation. Soong et al<sup>1</sup> and Kitay et al<sup>2</sup> have proposed that the plate position and prominence at the watershed line is a contributing factor that causes flexor tendon injury. With the standard volar approach, the pronator quadratus (PQ) is typically elevated off the radial attachment to

facilitate plate fixation. Plate irritation of the flexor tendons is a problem, no matter what type of volar plates are used. A PQ repair is suggested by some authors to provide potential shielding between the flexor tendons and the plate, although no comparative studies have shown lower rates of flexor tendon rupture after repair.<sup>3</sup> The PQ-sparing method is also preferred by some surgeons to minimize dissection and preserve more of the PQ function.<sup>4,5</sup> However, in both PQ elevation/repair and the sparing method, the distal part of the plate frequently cannot be covered by the PQ if the plate has to be placed more distally to improve the fixation. The flexor tendons will glide on the distal prominent part of the plate, which could possibly lead to tendon attrition or rupture. Usage of the PQ to cover the distal part of the plate during repair may be a reasonable way to protect the flexor tendons if the plate position and prominence cannot be changed. We report a “PQ-splitting” technique for covering the distal prominent part of the plate to provide a potentially protective effect if the plate has to be applied more distally on the watershed line to improve the fixation.

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**FIGURE 1:** The PQ is pulled gently to evaluate the possibility of advancement and covering the distal part of the plate.

### INDICATIONS

Distal radius fractures treated with volar plate osteosynthesis via the standard volar Henry approach with PQ elevation off the radial attachment.

### CONTRAINDICATIONS

1. Patients with impaired function of the pronator teres muscle or if the pronator teres muscle has been used for tendon transfer.
2. Distal radius and ulna fractures treated with volar plate osteosynthesis for both fractures.
3. The PQ is severely damaged.

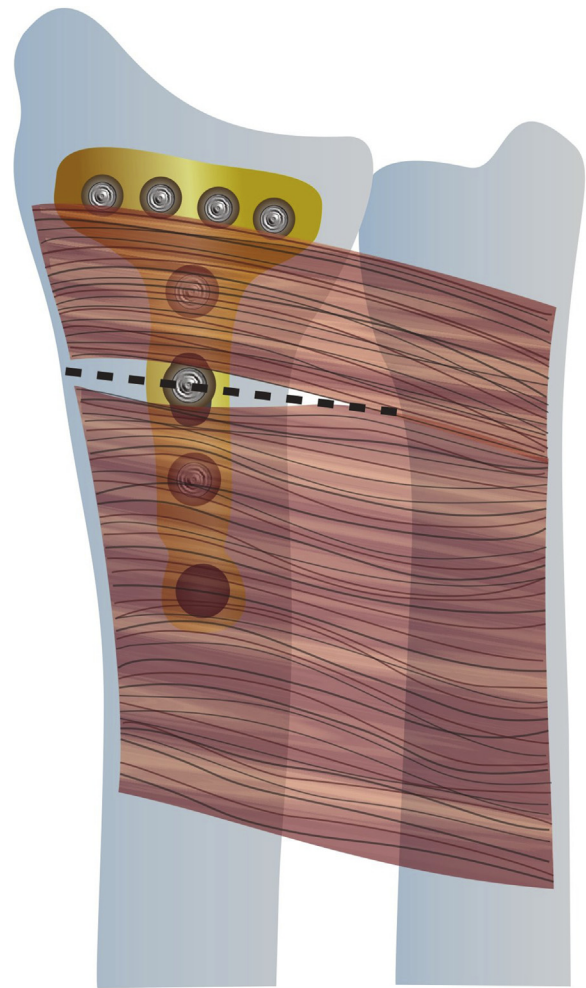
### SURGICAL TECHNIQUE

Under general anesthesia, all patients are placed in the supine position and a radiolucent hand table is used. The arm pneumatic tourniquet is used for all patients.

The incision is made radial to the flexor carpi radialis, going through the interval of the flexor carpi radialis and the radial artery. The PQ is elevated off its radial attachment. Elevating the PQ using a piece of the distal radial-sided fibrous attachment of the PQ, if possible, facilitates suture holding if PQ repair is planned after osteosynthesis. Then the fracture reduction and volar plate osteosynthesis is performed.

After osteosynthesis is done, the PQ can be gently pulled radially and distally by grasping with the tissue forceps (Fig. 1). If the PQ can cover the distal part of the plate, then we just suture the PQ along the radial aspect to cover the distal part of the plate. If the distal part of the plate cannot be covered, then PQ splitting is performed.

We split the distal PQ to make an 8- to 10-mm muscle flap that can be easily pulled distally and radially to cover the distal part of the plate (Figs. 2, 3). If the coverage is not satisfactory, more elevation of the distal PQ muscle flap off the interosseous



**FIGURE 2:** Illustration of PQ split.

membrane by using the elevator is done to achieve total coverage of the distal part of the plate. The distal PQ flap can then be advanced distally and radially and sutured to the border of brachioradialis tendon (Figs. 4, 5). The PQ proximal to the split can be repaired to the previous attachment as best possible.

### POSTOPERATIVE MANAGEMENT

We apply a below-elbow orthosis with the wrist in neutral position for 2 weeks. Weight-bearing forearm rotation exercises are restricted until external bridging of callus across the fracture lines is noted.

### PEARLS AND PITFALLS

1. Utilizing coagulation cautery in splitting the PQ facilitates hemostasis of the dissected small intramuscular vessels.
2. In our experience, elevating the distal PQ muscle flap up to the radial border of the ulna is often

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