Saving Tendons on Distal Radius Fractures: A Simple Surgical Pearl to Prevent FPL Tendon Conflict with Volar Locking Plates

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Abstract

Keywords

- distal radius fractures
- volar locking plates
- flexor pollicis longus
- tendon rupture
- complications

Injury to the flexor pollicis longus (FPL) tendon is one of the most frequent complications when fixing distal radius fractures with the volar locking plates. The author proposed a simple surgical technique providing a reliable soft tissue protection to prevent friction on the FPL with the volar locking plate, using a flap of the FCR sheath sutured to attachments of the volar capsule on the lunate buttress facet of the distal radius.

Injury to the flexor pollicis longus (FPL) tendon is one of the most frequent complications when fixing distal radius fractures with the volar locking plates,¹ when the volar locking plates were positioned at the edge or beyond the watershed line.² This complication may occur by technical mistakes and improper use of volar plates, combined with inadequate reduction in the fracture, and sharp edge of the plate or screw head.

We proposed a simple surgical technique providing a reliable soft tissue protection to prevent friction on the FPL with the volar locking plate. This technique is based on the specific anatomic structures that are constant, strong, and rarely damaged by the fracture mechanism.

Surgical Technique

The proposed technique requires opening of the flexor carpi radialis (FCR) sheath, unlike the traditional Henry surgical approach, through the interval of the FCR sheath and the radial artery bundle. The key point of this technique is the use of an FCR sheath flap to change the position of the FPL tendon and bring it away from the watershed line and away from the implants. Opening of the posterior sheath of FCR, the most medially possible, creates a proper-size flap of this tissue to reach and be sutured to the edges of the volar capsule at the bone bump of the lunate buttress facet of the distal radius. The

concept of the technique shows clearly how this flap of the FCR (blue star) posterior sheath creates a “hammock” structure that translocates the FPL (red star) from its original “sulcus” away from the volar locking plate (►Fig. 1). The FCR sheath flap is strong and reliable at this level (►Fig. 2A—green star) and easily sutured to the fibers of the volar capsule insertion on the bone prominence of the lunate buttress facet (►Fig. 2B, C). This can transposition the FPL tendon more parallel to the FCR in the same layer (►Fig. 2D) and far away from any implant. This technique provides the approximate 3- to 4-mm distance between the implant and the FPL that is sufficient to prevent friction on the FPL tendon to the volar locking plate that may be main cause of the FPL tendon ruptures (►Fig. 3).

Discussion

Volar locking plating on distal radius fractures became the gold standard option on the last decade. The excellent results at severe, unstable, nonreducible, and complexed articular fractures were obtained. This technique provides better reduction and fixation on distal radius fracture than any other treatment options for distal radius fracture. However, new complications related to this technique are now raised, although tremendous improvements on the implants and surgical techniques have been achieved.³

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Fig. 1 Schematic draw of the proposed technique.

Injury to the flexor tendons is one of the most frequent complications when fixing distal radius fractures with volar locking plates, and among those tendons, the most affected is the FPL, related to 60% of flexor tendons ruptures.¹ That fact has simple anatomic characteristics that the FPL runs closer to the volar edge of distal radius bone, called the “watershed line” than any other flexor tendons, and crosses to the articular joint in a “sulcus” concavity on the distal contour of the distal radius, between the radius styloid volar rim and bone medial prominence that is called the “volar lunate buttress facet.” This anatomic condition is particularly dangerous to damage the FPL tendon, when volar plates are positioned at the edge or beyond the watershed Line.² This situation may occur due to technical failure or inadequate selection of the volar locking

Fig. 3 Detail showing the distance created between FPL and implant. The FPL tendon (red star) is transposition to more superficial layer, closer to FCR (blue star) and the distance (double-headed white arrow) created between the implant and the FPL (~3–4 mm).

plate, or inadequate reduction in the displaced fragment of the radius. This problem may also be frequent in specific fracture conditions when the plate is placed in the very distal position to fix the volar rim of the radius. The quality of the plate implant and the proper function of the locking mechanism of the distal screws are also crucial to avoid sharp metallic edge(s) at this area, especially the protruded screw heads is a problem. A new generation of volar locking plate is designed to avoid the distal conflict of the edge of the plate to the FPL, but those plates are not yet popular.⁴

The literature proposed to prevent tendon rupture with early removal of the implant⁵ or with the flap of the pronator quadratus muscle (PQ). However, the PQ sometimes was totally disrupted by the displaced fragment(s) and impossible to create the distal flap. The PQ muscle flap may be weak and may not last.⁶

Fig. 2 (A) The FCR sheath flap is strong and reliable at this level (green star). (B) The red circles show the real aspect of the schematic technique presented on the ►Fig. 1 (red circles), representing the two points supposed to be sutured together on the technique. The flap is sutured to the fibers of the volar capsule insertion on the bone prominence of the lunate buttress facet. (C) Transposition of the FPL tendon (red star). (D) The aspect of the two tendons, FPL (red star) and FCR (blue star), positioned together in a same anatomic layer, far from any implant conflict, and reproducing the schematic drawing shown at ►Fig. 1.

Here we describe the technique using the FCR sheath floor flap to cover the edge of the implant. This technique also creates the “hammock” that removes the FPL tendon from its original position to transposition the FPL tendon to more superficial layer (parallel to the FCR tendon) to avoid any friction with the volar locking plate. It is a simple technique without complementary costs involved.

Conflict of Interest

None.

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