

The Use of a Tendon Protector Sheath for Prevention of First Extensor Compartment Tendon Adhesions after Radial Column Plating for Distal Radius Fracture: A Case Report

Charles R Reiter¹, Wesley Lemons¹, James R Satalich¹, David Cinats²

Learning Point of the Article:

A TenoGlide Tendon Protector Sheet may be used to prevent tendon entrapment of the first extensor compartment after radial column plating for a distal radius fracture.

Abstract

Introduction: Although volar locking plates are the most commonly used implant method for open reduction and internal fixation (ORIF) of distal radius fractures, complex fractures may require the use of fragment-specific fixation. Radial column plates are placed adjacent to the tendons of the first extensor compartment and may lead to tendon entrapment. This case report demonstrates the use of TenoGlide Tendon Protector Sheet to prevent the formation of tendon adhesions after ORIF of a distal radius fracture.

Case Report: A healthy 35-year-old female suffered a distal radius fracture after a fall from a horse. The patient underwent ORIF with a volar locking and radial column plate, but subsequently developed limited thumb extension postoperatively. Reoperation for hardware removal and tenolysis was performed with a TenoGlide Tendon Protector Sheet placed between the first extensor compartment tendons and adjacent bone. Patient regained full thumb extension by the final follow-up 3 months postoperatively.

Conclusion: Bone-tendon adhesions of the first extensor compartment in the wrist are a possible complication of radial column plating for fixation of distal radius fractures. The TenoGlide Tendon Protector Sheet is effective in preventing first extensor compartment entrapment after radial column plating for distal radius fractures.

Keywords: Distal radius fracture, radial column plate, tendon entrapment.

Introduction

Fractures of the distal radius are common orthopedic injuries, accounting for 17.5% of all fractures [1, 2]. These fractures typically occur after a fall with an outstretched hand but can be seen in more complex polytrauma as well [1]. Although some distal radius fractures can be managed non-operatively, surgical intervention is often required [3, 4]. Most distal radius fractures can be stabilized with a volar locking plate; however, more complex fracture patterns may require fragment-specific fixation

with radial column, intermediate column, or ulnar column fixation [4, 5]. The radial styloid plate, or radial column plate, involves a more lateral approach to visualize the lateral aspect of the radius and radial styloid. This approach requires opening of the tendon sheath of the first and second extensor compartments in the wrist. As a result, the radial styloid plate is implanted near the tendons of the extensor pollicis longus (EPL), extensor pollicis brevis (EPB), and abductor pollicis longus (APL) [6, 7]. The proximity of these tendons to the plate increases the risk of

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Dr. Charles R Reiter



Dr. Wesley Lemons



Dr. James R Satalich



Dr. David Cinats

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¹Department of Orthopaedic Surgery, Virginia Commonwealth University Health System, Richmond, Virginia, United States,

²Department of Orthopaedic Surgery, Fraser Orthopaedic Institute, New Westminster, British Columbia, Canada.

Address of Correspondence:

Dr. David Cinats,
Fraser Orthopaedic Institute, 403-233 Nelson's Cres, New Westminster, British Columbia - V3L 0E4, Canada.
E-mail: davidcinats@gmail.com

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Figure 1: Pre-operative lateral (left) and anteroposterior (right) left wrist X-rays.

post-operative tendon stenosis or entrapment, which may require subsequent intervention to clear adhesions [8].

We present a case of symptomatic first extensor compartment tendon entrapment after ORIF with dual volar locking and radial column plating for a distal radius fracture that was subsequently treated with TenoGlide Tendon Protector Sheet. TenoGlide is a collagen matrix sheath that acts as a barrier between nerves or tendons and surrounding tissue to prevent the formation of adhesions. This report aims to demonstrate the risks around radial column plating and the potential benefits of scar barriers, such as TenoGlide at preventing tendon adhesions around the wrist.

Case Report

The patient was a healthy 35-year-old schoolteacher who presented with left shoulder, elbow, and wrist fractures after a fall from a horse. The patient had no pertinent past medical history and no prior orthopedic surgeries. Imaging of the left upper extremity revealed a comminuted proximal humerus fracture, terrible triad elbow fracture dislocation, and distal

radius fracture with carpal tunnel syndrome (Fig. 1). All three injuries were treated during a single procedure. Open reduction and internal fixation (ORIF) was performed on the left shoulder and elbow first, followed by ORIF of the wrist (Fig. 2).

A modified volar Henry approach to the distal radius was utilized in which the incision was made between the radial artery and the flexor carpi radialis tendon. The high-energy nature of the multilevel injury to the left upper extremity resulted in a highly unstable distal radius fracture pattern with a significant amount of metaphyseal radial column comminution. The decision was made to proceed with fragment-specific fixation, and a radial column plate was placed underneath the first extensor compartment in addition to a volar locking plate (Fig. 3). The patient did not experience any perioperative complications and was discharged with a volar wrist splint.

At 4 months postoperatively, the patient had recovered a full range of motion (ROM) of the left shoulder, elbow, and fingers, but was limited to 50% of full extension of the left thumb (Fig. 4). It was suspected that the thumb extension was limited by the radial column plate. The patient elected to proceed with the removal of the radial column plate and tenolysis of the first extensor tendons. The previous incision was used to remove the volar locking plate. The EPB and APL – were observed directly

adjacent to the radial column plate and were mobilized to facilitate the removal of the plate. Exploration of the first extensor compartment tendons beyond the footprint of the plate demonstrated adhesions to the surrounding bone and soft tissues. Complete tenolysis of the EPB and APL was then performed. To prevent further scarring of the tendons, a 2.5 cm by

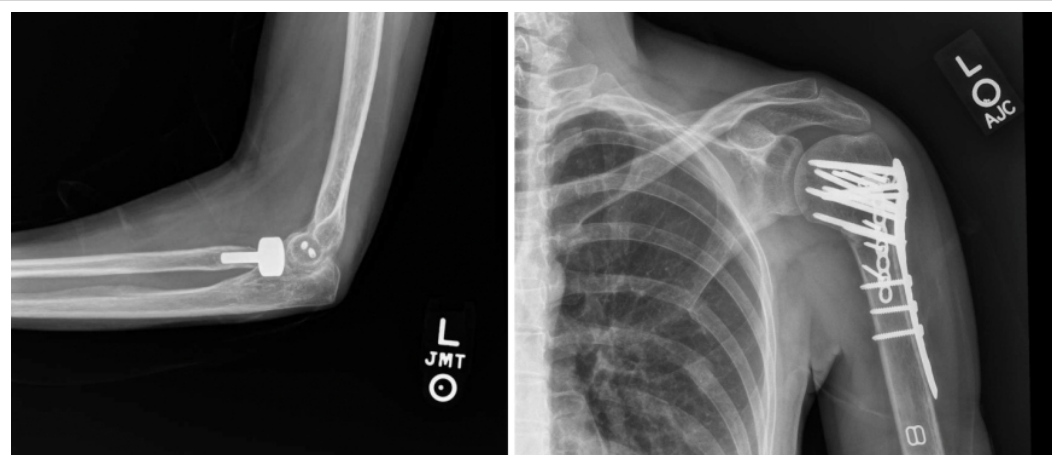


Figure 2: Post-operative lateral left elbow (left) and anteroposterior left shoulder (right) X-rays.



Figure 3: Post-operative left wrist X-ray. Status post internal fixation with a radial column plate and volar locking plate.

2.5 cm segment of TenoGlide Tendon Protector Sheet was placed between the first extensor compartment tendons and bone (Fig. 5). TenoGlide is a porous matrix of cross-linked highly purified Type I collagen and glycosaminoglycan that aims to reduce scar tissue formation between tendons and adjacent tissue. The patient was started on an early, active mobilization program. At the 2-week follow-up, the patient already reported substantial improvement in thumb function. Thumb extension was measured at 75% of the predicted. At a final 3-month follow-up, the patient demonstrated continued improvement of thumb ROM with hyperextension of the interphalangeal joint and full extension of the metacarpophalangeal joint.



Figure 4: Four-month post-operative thumb extension (left) and thumb extension following subsequent tenolysis and TenoGlide placement (right).

Discussion

This report describes a case of EPB and APL entrapment after radial styloid plating for a distal radius fracture that was treated with tenolysis and a TenoGlide Tendon Protector Sheet for subsequent adhesion barrier protection. Peritendinous adhesions are a possible complication after many orthopedic surgeries. Such adhesions are thought to form as a result of inflammatory processes after tissue injury, which can be due to the initial trauma, as well as surgical procedures [9]. Tendon adhesions have been identified as one of the most common complications in the management of distal radius fractures [10, 11, 12]. The first extensor compartment adhesions observed in this case were likely due to manipulation and retraction of the EPL and APB tendons when fixating with the radial column plate.

The TenoGlide Tendon Protector sheet has shown efficacy in animal models [13], but currently, no clinical studies have evaluated its use for preventing tendon adhesions in human subjects. The use of TenoGlide has been documented in prior orthopedic studies with favorable clinical outcomes [14, 15, 16]. Rioux-Forker and Shin [17] previously presented a case in which TenoGlide was used to create a barrier between EPL tendon and an adjacent bony defect. Our presented case further demonstrates the utility of TenoGlide in barrier protection to prevent bony adhesions. There are alternative scar barriers that have the potential to reduce tendon stenosis, including seprafilm, a hyaluronic acid and carboxymethyl cellulose membrane, and waterborne biodegradable polyurethane films. Finally, research has been directed at barrier protection sheets that are loaded with anti-adhesion pharmacologic agents such as ibuprofen or celecoxib [9].

This study is limited largely by the case report design. It is possible that the prevention of tendon stenosis would have occurred without the use of a scar barrier; however, it is well established that multiple surgical procedures and revision surgery further increases scar tissue formation. In this case, the tendon protector sheet was utilized to prevent potential recalcitrant tendon stenosis during revision surgery in an individual with a known propensity for adhesion formation.

Conclusion

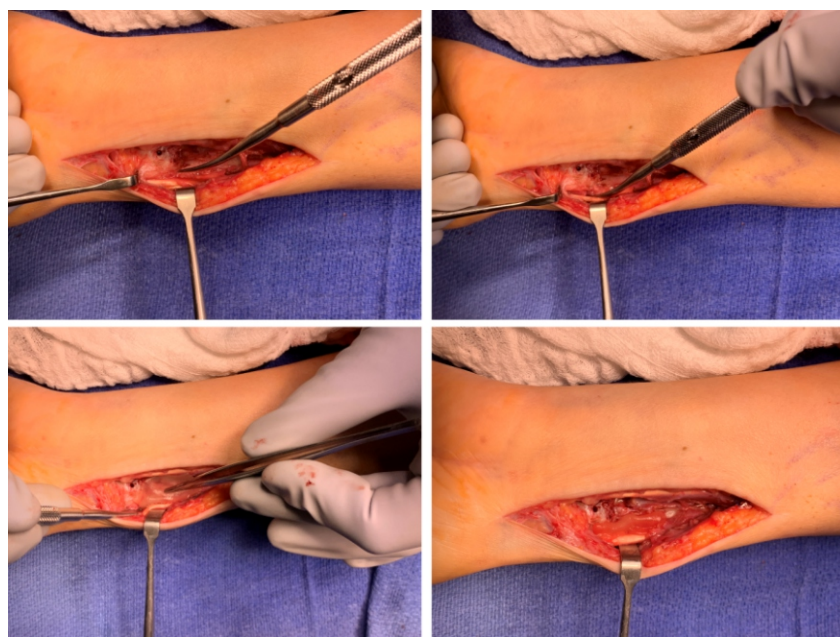


Figure 5: Subsequent reoperation with first extensor compartment tenolysis and TenoGlide placement.

plating. These adhesions can lead to deficits in thumb extension postoperatively and may require subsequent tenolysis to regain full ROM. TenoGlide, a collagen matrix sheet, can be used as a form of barrier protection between the first extensor compartment tendons and adjacent bone to prevent tendon entrapment due to tendon-to-bone adhesions and possibly avoid secondary surgeries to remove implants or perform tenolysis.

Clinical Message

The TenoGlide Tendon Protector Sheet can be used to prevent first extensor compartment tendon adhesions after radial column plating for distal radius fractures.

Adhesions of the first extensor compartment in the wrist may develop after distal radius fractures fixed with radial styloid

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

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