Ligaments Reconstruction for Posttraumatic Ulnar Translocation of the Carpus: A Case Report

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Abstract

Keywords

- ligament reconstruction
- ulnar translocation
- carpus
- wrist
- posttraumatic

Background Posttraumatic ulnar translocation of the carpus, a result of radiocarpal ligament tear is a relatively rare condition that may lead to persistent wrist pain and loss of function.

Case Description We report a case of radiocarpal ligament tear of which we reconstruct it with a vascularized interosseous membrane with 13 years of follow-up.

Literature Review Many treatment options have been proposed for the posttraumatic ulnar translocation, ranging from open repair to partial wrist fusion. However, the long term results have been disappointing.

Clinical Relevance Though this technique of reconstruction is technically demanding, it shows promising long term clinical outcome.

Posttraumatic ulnar translocations of the carpus, with or without other ligament injuries, are rare conditions and are easily missed. Although many surgical treatments have been described, the long-term results have been disappointing, with many resulted in recurrence and radiocarpal arthritis that later required arthrodesis.^{1,2} We described a case of posttraumatic ulnar translocation of the carpus treated with reconstruction of the volar radiocarpal ligament using a pedicled vascularized interosseous membrane, which is a modification of the reconstruction of scapholunate ligament.³

Case Report

In March 2002, a 24-year-old man sustained a right wrist injury in a motorcycle accident. He complained of pain with decreased range of motion (ROM) on his right wrist. As plain radiographs indicated almost normal (►Fig. 1), the patient was dismissed with a wrist splint for 2 weeks. At 4 weeks after injury, the patient complained of an increase in pain, swelling, and wrist deformity. Physical examination revealed an ulnarly translated hand with a very limited wrist ROM.

Posteroanterior radiograph revealed type 1 ulnar translocation⁴ (►Fig. 2). The ulnar translocation index based on Chamay et al⁵ was 0.44 (normal range: 0.28 ± 0.03).

Under axillary block with the application of a tourniquet, a volar incision on the radial aspect of the wrist explored the disruption of radiocarpal ligaments that indicated a gap between the scaphoid and the radial styloid (►Fig. 3). A longitudinal dorsal incision on the forearm was made along the interval between the extensor digiti minimi and the extensor carpi ulnaris to visualize the interosseous membrane, and the posterior interosseous neurovascular bundle was mobilized. A flap of approximately 4×2 cm in size was then raised at the middle third of the forearm after ligating the anterior interosseous artery (AIA) at the proximal edge of the flap. Under loupe magnification, the AIA was then dissected from a dorsal approach, through a longitudinal incision on the interosseous membrane up to the distal pivot point represented by the anastomotic branch to the posterior interosseous artery (PIA), that is, 2 cm proximal to the distal radioulnar joint.⁶ The anterior interosseous nerve was carefully preserved. The tourniquet was then deflated to check the vascularity of the interosseous membrane (►Fig. 4).

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Fig. 1 Posteroanterior radiograph of the wrist immediately after trauma indicates almost normal, but the radioscaphoid gap increased slightly.

Under fluoroscopic guidance, the carpus was temporally fixed to the radius in an anatomical position with Kirschner wires. The flap was then brought to the recipient site through a subcutaneous tunnel on the radial aspect of the distal forearm (►Fig. 5). It could then be secured to the radial styloid and scaphoid using four titanium anchors under maximal tension. The free edges of the flap were sutured to the residual ligaments (►Fig. 6). The interosseous membrane is repaired with 3–0 polydioxanone running sutures.

A long arm cast was applied to keep the wrist and forearm in the neutral position, followed by the wrist splint at 4 weeks. After the removal of Kirschner wires at 6 weeks after the surgery, gentle ROM exercise began. Strengthening exercise was started at 3 months after the reconstruction.

At 13 years follow-up, the patient did not claim any pain on the right wrist. There was no limitation in both daily and sport activities. The wrist demonstrated flexion of 80 degrees, extension of 60 degrees, radial deviation of 20 degrees, and ulnar deviation of 35 degrees. The DASH (Disabilities of the

Fig. 2 Posteroanterior radiograph taken 1 month after injury shows obvious ulnar translation of the wrist.

Fig. 3 Surgical exploration indicates the gap between radial styloid and the scaphoid.

Arm, Shoulder and Hand) score was 4.2. Posteroanterior radiograph revealed no recurrence of ulnar translation with the Chamay index of 0.30. No significant radiocarpal joint arthritis with only a slight narrowing of scaphoradial interval was noted (►Fig. 7).

Discussion

Posttraumatic ulnar translocation of the carpus is rare and easily missed.^{1,2,7} Patients are often presented late with

Fig. 4 The flap of interosseous membrane supplied reverse flow by the anterior interosseous artery before its transfer to the recipient site.

Fig. 5 The flap anchored to the radial styloid and scaphoid.

symptoms and conservative treatment in most cases resulted in failure.

Volar radiocarpal ligaments, that is, the radioscapholunate and the long/short radiolunate ligaments, were responsible to prevent ulnar translocation of the carpus.⁸ Attempts to either repair or reconstruct these ligaments have been advocated after the realignment of the wrist.^{1,2} However, the middle- to long-term results were disappointing with variable clinical outcomes with either recurrence of ulnar translocation of the carpus or radiocarpal arthrosis radiologically. Rayhack et al reported that two among seven cases of delayed ligamentous repair or reconstruction for posttraumatic ulnar

Fig. 6 Postoperative radiographs with temporary stabilization with Kirchner wires.

Fig. 7 Posteroanterior and lateral radiograph at the final follow-up showing no obvious ulnar translation and a slight narrowing of scaphoradial interval.

translocation of the carpus underwent wrist arthrodesis in less than 13 months.² Four had recurrence of the ulnar translocation and one developed progressive degenerative changes on the radiocarpal joint, although three cases had good clinical results with nearly normal grip strength and return to normal activities at 7, 11, and 37 months after the repair, respectively. Berschback et al also reported at a mean of follow-up of 6.5 years (8 months to 10 years) that 9 of their 10 cases had recurrence of ulnar translocation of the carpus after the repair of the volar carpal ligaments within 2 months after the injury.¹ Seven cases who were available for clinical assessment revealed an average DASH score of 6 and a modified Mayo Wrist Score of 76. Thus, radiolunate fusion has been advocated for the treatment for ulnar carpal translocation.^{2,9}

In our case, we choose reconstruction of the volar carpal ligaments using vascularized interosseous membrane as its mechanical properties were similar to the ligament.¹⁰ Furthermore, the addition of vascularity of the interosseous membrane may hasten the incorporation of membrane to the carpal bone/native ligament remnant.

Although the reconstruction technique of the radiocarpal ligaments using the interosseous membrane was technically demanding with microsurgical skills, the clinical outcome of the present case was promising both functionally and radiographically. No recurrence of ulnar translocation of the carpus was noted at 13 years of follow-up. Moreover, as the interosseous membrane was taken from the injured limb, regional block instead of general anesthesia could be used. No significant donor-site morbidity was observed.

Note

This work was performed at the Department of Plastic and Reconstructive Microsurgery, Careggi University Hospital, Florence, Italy.

Conflict of Interest

None.

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