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Case Report

Novel Technique in the Management of Palmar-Divergent Dislocation of Scaphoid and Lunate

Ahmed Elsaftawy* and Jerzy Jablecki

St. Hedwig's Hospital, Trzebnica, Poland

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***Corresponding author**

Ahmed Elsaftawy, St. Hedwig's Hospital, Trzebnica, Poland,
Tel: 0048515155602;
Fax: 0048713121489;
Email: elsaftawyahmed@gmail.com

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Abstract

We present a case of a 38-year-old right-handed male physical worker with traumatic divergent dislocation of both the scaphoid and lunate bones. He was referred to our ward five days post-accident. After open reduction, he was treated with a novel technique of free tendon reconstruction of the scapholunate ligament complex and internal fixation with K-wires through the dorsal approach. At a 18-month-follow up the patient was pain-free, had a good wrist function with no evidence of avascular necrosis of the scaphoid nor lunate, and was satisfied with the general result.

Introduction

Divergent simultaneous dislocations of both the scaphoid and the lunate are very rare, and as little as dozen cases have been described in the available literature. Most of these papers suggest management limited to closed reduction and percutaneous K-wire fixation. Only few authors recommend open reduction followed by ligament reconstruction and internal or external fixation with the aim of restoring the anatomical position of the carpal articulations and angulations. The proposed novel method of free tendon reconstruction of the scapholunate ligament complex involves the formation of a stable axial lever for the scaphoid and the lunate which restores the anatomical pattern of the scapholunate ligament as well as prevent the dynamic rotatory subluxation of the scaphoid [1-3].

The aim of this paper was to present the novel method of free tendon reconstruction of the scapholunate ligament complex, which proves particularly useful on scapholunate ligament dissociation with rotatory subluxation of the scaphoid.

Case report

We present a case of a 38-year-old right-handed male physical worker who presented to the emergency department five days after the injury - a fall from a tractor. He was admitted as a neglected dislocation of the scaphoid and the lunate of the left wrist (Figure 1). The patient was qualified to open reduction and internal fixation. The cutaneous approach over the 3rd metacarpal exposed the 4th extensor tendon compartment; next, the capsulotomy was performed through the dorsal intercarpal and radiocarpal ligaments, and the distal Posterior Interosseous Nerve (PIN) was resected (Figure 2). Once the open reduction was achieved, the rotatory subluxation of the scaphoid was observed. Given the extent of damage to the scapholunate ligament, its primary repair was unviable. Hence, perpendicular tunnels were created in the scaphoid and the lunate through which a free graft from the palmaris longus was introduced. Special care was given to making the lunate part of the graft twice as long as the scaphoid one. Next, the bones were fixed with three K-wires introduced percutaneously with neutrally aligned carpal bones, and the tendon graft was interlaced and sutured at the intersection. The aforementioned lunate part of the tendon was then distally anchored to the dorsal distal surface of the scaphoid in order to prevent its rotatory subluxation (Figure 3). The wrist was immobilized in a forearm spica cast for 6 weeks, after which the cast and the K-wires were removed. The patient failed to turn up for scheduled follow-ups. He reported 6 and 18 months postoperatively and explained that the absence from follow-ups and lack of rehabilitation was due to a job abroad. The X-rays showed no evidence of avascular necrosis of the scaphoid or the lunate, and no signs of dorsal nor volar intercalated segmental instability (Figure 4). The patient resumed his normal activities with a pain-free wrist, although his range of motion was good.

Discussion

We find it controversial which specific ligaments must be injured to cause scapholunate instability. Several studies have shown that disruption of the scapholunate interosseous ligament changes the carpal motion. That's why the new trend is to define these injuries as an injury to the whole scapholunate ligament complex, and not only to the scapholunate ligament itself. It's also

Figure 1: Palmer-divergent dislocation of the scaphoid and the lunate (arrows).

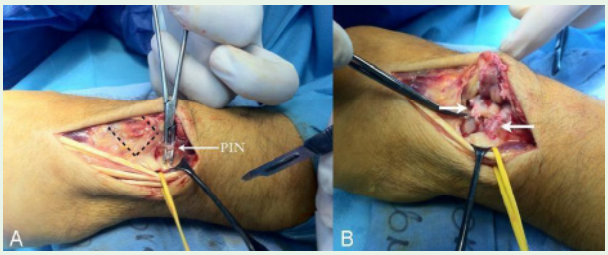

Figure 2: A: The 4th extensor tendons compartment exposed, capsulotomy was performed through the dorsal intercarpal and dorsal radiocarpal ligaments (black dotted line), the distal posterior interosseous nerve (PIN) visualized (arrow), B: totally ruptured scapholunate interosseous ligament (white arrows) with scaphoid in flexion.

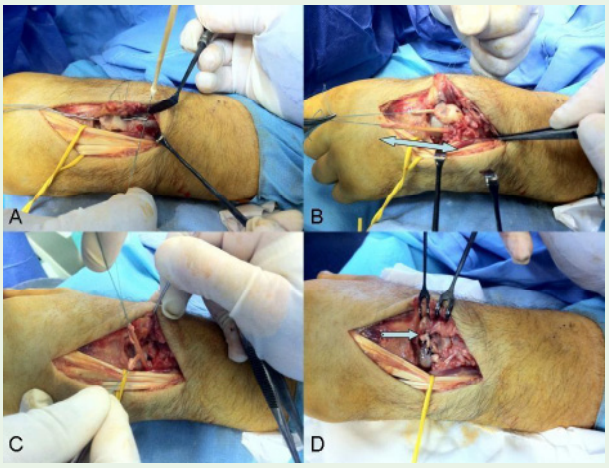

Figure 3: A: After debridement, a free palmaris longus tendon graft ready to put in through a new created bone tunnels, B: a placed perpendicular tendon graft, note the longer long segment of the graft through the tunnel at the lunate (double-ended arrow), C: tendon graft intersection, D: the final view of free tendon reconstruction – distal part of the longer segment of the graft is anchored to the dorsal distal scaphoid.

Figure 4: Wrist in neutral PA and lateral view positions (A and B), and in clenched fist (C and D).

clear that each case of scapholunate instability is unique. It can be a combination of lesions of the scapholunate ligament itself and two secondary stabilizers of the scapholunate ligament complex. The scapholunate tear can be incomplete - with the dorsal part intact - or even absent, when the secondary stabilizers lesion is more clinically significant. That's why the trend is to talk about scapholunate complex instability.

There is no clear guidance for the treatment of palmar-divergent dislocations of the scaphoid and the lunate because of their rarity. This opens the way to use different methods of treatment, including closed reduction and percutaneous fixation, open reduction – with or without ligaments sutures – and internal or percutaneous fixation, or open reduction with free tendon reconstruction of the scapholunate ligament complex. Even in early treatment with a good position of carpal bones in the sole cast, healing of the ligament system without losing reduction is difficult [1,2]. That's why in our opinion closed reduction with percutaneous fixation could not provide good anatomical alignment. Also trying to repair the interosseous ligaments on both sides of the lunate has not yet been proven to heal the ligamentous system. Therefore, this mechanism has to be reconstructed. In case of open reduction there was also no conclusive evidence for a surgical approach. Both volar and dorsal or double approach procedures have been described. The proposed new method has proven to be a good choice. Dorsal approach allowed evaluating the quality of the–scapholunate ligament and its healing potential. On the other hand, it allows reconstructing scapholunate ligament complex if there is a weak potential of primary healing. It also provides the best way to achieve the correct anatomical reduction of the carpal bones. This new way of free tendon reconstruction of the scapholunate ligament complex [3] limits the tendency of rotatory subluxation of the scaphoid. The created bone tunnels have shown no signs of avascular necrosis of scaphoid or lunate. They are essential to ensure a proper correlation between the scaphoid and lunate. Taleisnik, et al. have described the large number of such cases– six patients– in 1982 [4]. While Idrissi and Galiua [5] recommended ligament repair of the scapholunate and lunotriquetral ligaments, they described a similar case treated by closed reduction and percutaneous Kirschner wire fixation with good results but DISI deformity at the one year follow-up has developed. Komura et al. [6] also recommended suturing the carpal interosseous ligaments, in our case it was impossible to achieve. Kang, et al. [7] described a case of a patient who was treated after 3 weeks of trauma by means of open reduction and percutaneous fixation with good results. He did not stabilize the lunotriquetral, though. We recommend this technique for treating complete scapholunate dislocation injuries as well as in the treatment of the scapholunate dissociation with dynamic rotatory subluxation of scaphoid.

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