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Case Report

# Proximal Raw Carpectomy Associated with External Fixation and Biological Arthroplasty: Description of a Case with Severe Arthritis Following Perilunar and Transcaphoid Dislocation

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## Abstract

Proximal raw carpectomy is a common procedure used in wrist arthritis; a prerequisite for its surgical indication is integrity of cartilage surface of the capitate head and lunate fossa.

We describe a case where proximal raw carpectomy and biological arthroplasty have been associated to the use of external fixation in a patient with severe radio and midcarpal arthritis with long-term satisfactory results.

**Keywords:** Wrist Arthritis; Carpectomy; Biological Arthroplasty; External Fixation

## Abbreviations

PRC: Proximal Raw Carpectomy; ROM: Range of Motion

## Introduction

Prevalence of wrist arthritis is about 1-3% in the general population [1].

Two main surgical procedures are used for preserving wrist function: proximal raw carpectomy (PRC) and scaphoid excision followed by four-corner arthrodesis [2].

PRC is a motion-preserving procedure, first described by Stamm in 1944 [3], and it's been shown to reduce pain and improve function.

The integrity of cartilage surface of the capitate head and the lunate fossa is a prerequisite for its surgical indication.

The combination of carpectomy with a capsular flap interposition arthroplasty has been described to extend the indications also in advanced stages of arthritis [4-8].

The Authors describe a case where carpectomy and biological arthroplasty have been associated to the use of external fixation.

## Case Report

A 57 year old man presented to our attention with severe perilunate and periscaphoid arthritis, fragmentation of the proximal pole of the scaphoid, flattening of the lunate and malunion of the sigmoid notch fracture (Figure 1). He complained of severe pain with great limitation of pronation-supination and flexion-extension of the wrist. The patient gave his informed consent prior to being included into the study. Three months before he reported a trans-scaphoid perilunate dissociation with intra-articular fracture of the sigmoid notch treated at another institution by open reduction, external fixation, pinning and scapho-lunate repair.

We performed a proximal row carpectomy with covering of the capitate head and lunate fossa with a capsular flap together with distraction external fixation (Figure 2).

The approach was dorsal with a curvilinear 8 cm incision. A proximally based radial retinacular flap including the dorsal interosseous ligament freed from the triquetrum was prepared. Due to

**Figure 1:** Preoperative X-ray image of a 57 yrs male at 3 months after stabilization and ligament repair of a trans-scaphoid perilunate dislocation. A severe perilunate and periscaphoid arthritis is evident with fragmentation of the proximal pole of the scaphoid and avascular necrosis with flattening of the lunate.

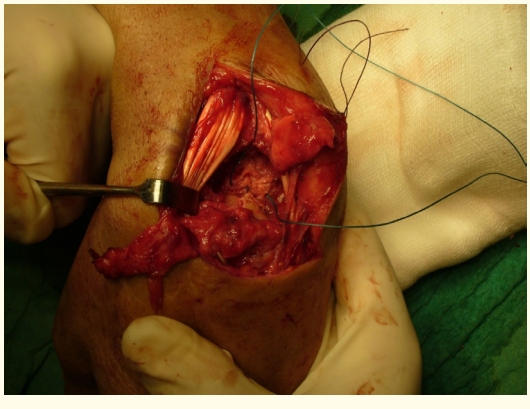

**Figure 2:** Surgical image showing (arrow) volar capsule after removal of the proximal row.

scarring related to the previous surgical procedure we could not identify the dorsal radio-triquetrum ligament usable for lunate fossa covering. The proximal row was removed piecemeal.

Subsequently, the head of the capitate and the lunate fossa were prepared and covered the first with a distally based capsular flap and the former with the retinacular flap. Both flaps were anchored to the volar capsule (Figure 3).

An external fixator (Stylo; MIKAI ITALY) was applied in distraction placing the hinge to the maximal isometric point of the new radio-capitate joint (Figure 4).

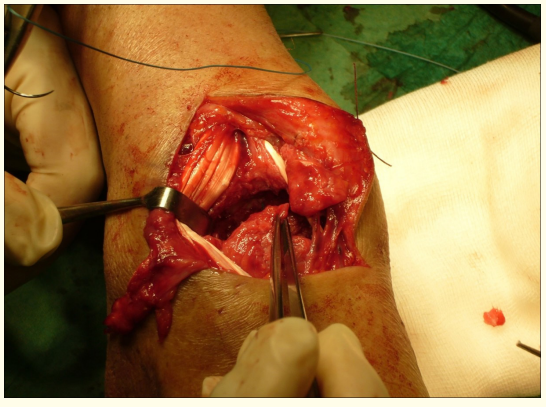

**Figure 3:** Distal based capsular flap including the interosseous dorsal ligament for the capitate and proximal based capsular flap for the lunate fossa.

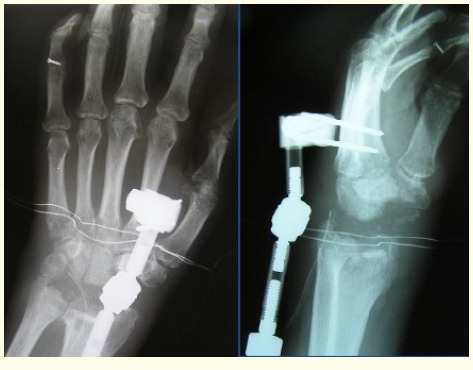

**Figure 4:** Postoperative X-ray after proximal row carpectomy and external fixation.

At 7 days post-op the hinge was opened and the wrist was passively mobilized by the physical therapist progressively. At 15 days active assisted ROM (range of motion) was allowed. At 21 days the hinge was left free and movement were allowed in all planes. The external fixator was removed at 6 weeks (Figure 5). Initial ROM was 35° extension, 45° flexion, 10° radial deviation, 20° ulnar deviation. Physical therapy was encouraged till 6 moths post-op.

Clinical result at three years were really unexpected: flexion 70°, extension 70°, radial deviation 15°, ulnar deviation 30°, pronation complete and supination -30°.

Strength resulted 75% respect the controlateral side. Pain was absent (Figure 6).

**Figure 5:** X-ray 6 weeks after carpectomy with removal of the external fixator.

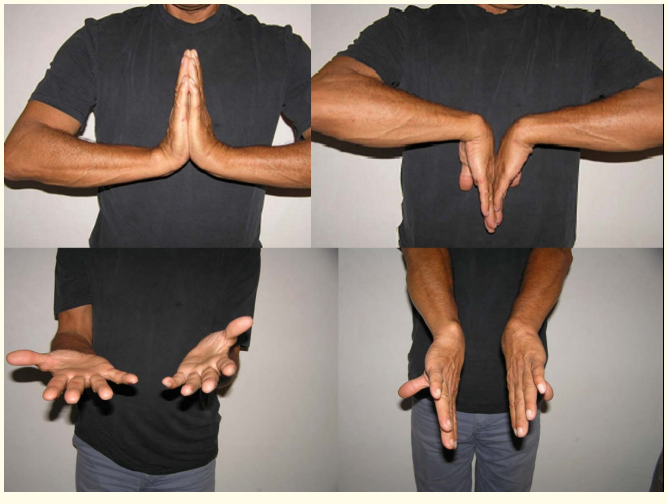

**Figure 6:** Clinical result after 3 years.

During the following years, the patient continued his daily activities with no restrictions and without pain.

At our latest follow-up at 15 years, the patient continued to be free from pain and clinical examination revealed only a moderate restriction in flexion (75°) and x-rays showed progression of the osteoarthritic process as expected (Figure 7).

**Figure 7a:** Clinical result at 15 years.

**Figure 7b:** Radiological result at 15 years.

## Discussion

In the presence of a severe damage in the cartilage of the proximal pole of capitate and in the lunate fossa of the radius, PRC is usually followed by bad results [9], due to the worsening of the arthritic process.

In these cases, when pain is disabling, the procedures that are mostly indicated are wrist arthrodesis, if the patient wants to privilege strength, otherwise wrist arthroplasty, if movement is the final desiderated outcome.

Different alternative surgical procedures have been proposed in association with PRC when there is a damage of the proximal surface of the capitate.

In 1996, Salomon., *et al*. [10] proposed, in those cases of severe damage of proximal pole of capitate, the use of a capsular flap, offering an alternative to the surgeon instead of arthrodesis.

Later in 2009 capsular interpositional arthroplasty has been described by Kwon., *et al*. [5] in those case of severe cartilage degeneration of proximal capitates and/or lunate facet; they achieved a mean of 71.9° of flexion-extension arc and 66.8% of grip strength respect the controlateral side. Ilyas., *et al*. [6] in 2010 described a modification of proximal row carpectomy with dorsal capsular flap for cases with severe midcarpal arthritis.

In our case, the contemporary use of capsular flap and external fixation, contributed to the extremely unexpected results both in terms of pain, arc of movement and strength.

The use of an external fixator in distraction allows to stabilize the new radio-capitate joint, protect the biological arthroplasty and permits an early articular joint motion.

In the presence of a young, active and particularly motivated patient, the described procedure could be a valid alternative to major surgical treatments.

## Conclusions

We describe a case of a man with severe perilunate and periscaphoid arthritis, fragmentation of the proximal pole of the scaphoid, flattening of the lunate and malunion of the sigmoid notch fracture treated successfully with carpectomy, capsular flap and the use of an external fixator in distraction.

At 15 years from the surgery, the patient is pain free and has only a moderate restriction in flexion.

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