Acta Scientific Orthopaedics (ISSN: 2581-8635)

Volume 6 Issue 5 May 2023

Clinical Case Report

Chronic Perilunate Dislocation: Open Reduction 19 Months after Trauma

Alexander S Zolotov*

Department of Orthopedic Surgery, Far Eastern Federal University, Medical Center, Russia

***Corresponding Author:** Alexander S Zolotov, Department of Orthopedic Surgery, Far Eastern Federal University, Medical Center, Russia.

Received: January 23, 2023

Published: April 26, 2023

Abstract

We report a clinical presentation of chronic perilunate dislocations in which two-stage treatment was performed with the preliminary gradual distraction of the wrist joint using an external fixation device at the first stage and open reduction at the second stage. This case was unique because the treatment was started only 19 months after the injury.

Keywords: Chronic; Dislocations; Perilunate; Wrist; External Device

Introduction

The treatment of chronic perilunate dislocations is a difficult task for the hand surgeon. To solve this problem there are several solutions in the arsenal of hand surgeons: open reduction of dislocation, removal of the lunate bone, proximal row carpectomy, arthrodesis, and arthroplasty. Open reduction of dislocation looks very attractive: the surgeon restores the normal anatomy of the wrist and "does not burn bridges" for other possible surgical procedures in case of failure. However, open reduction in late cases is a difficult and traumatic operation with the risk of serious complications, due to significant soft tissue shortening, bones displacement, and collapse. Nowadays among surgeons there is no agreement regarding the time limit for open reduction. Recommendations from different surgeons are highly variable: 2 months after trauma, 3 months, about 9 months [1-3]. Furthermore, there is no consensus regarding the technique of the operation itself - an acute reduction in one stage or reduction of dislocation in two stages?

In our clinical case, the treatment of perilunate dislocation was started only 19 months after the injury and was processed in two stages.

Clinical Case

Male, 39 years old, complained of severe pain, stiffness in the left (non-dominate) wrist joint, and mild numbness on the volar surface of the thumb, index, and middle fingers. The wrist joint was damaged after falling on the open palm 19 months ago. The general surgeon in a local clinic (small town) examined and treated our patient for 19 months. The treatment of "severe wrist joint contusion" included immobilization with the aid of orthosis, physiotherapy, and massage.

Symptoms did not improve; he was referred to our hospital. Only 19 months after trauma, the chronic perilunanate dislocation was revealed (Figure 1). At that time, physical examination showed that the wrist joint was swollen; the motion was painful and limited: flexion - 10 degrees, extension - 10 degrees. The grip strength was 11 kg (on the healthy side, 58 kg). The wrist joint function was equal to 20 points according to the Mayo score system. Hypoesthesia was revealed on the palm in the median nerve zone (thumb, index, and middle fingers). According to the long period after trauma, the treatment was carried out in two stages.

At the first stage, the Ilizarov apparatus was applied for the preliminary gradual distraction of the wrist joint. The first K-wire 1.5 mm in diameter was inserted at the level of the middle third of the forearm through the radius and ulna, the second K-wire 1.5 mm in diameter was inserted only through the radius, with a cross in relation to the first K-wire. Two K-wires 1.5 mm in diameter were inserted at the metacarpal bones, also with a cross. The first K-wire was inserted through 2 and 3 metacarpal bones, the second K-wire through 4 and 5 metacarpal bones. Two rings (140 mm in diameter) were used for the assembly of the frame. The rings are connected by three rods. In the following days, distraction was performed using nuts on the rods. The rate of distraction was 1 mm per day. After 3 weeks, a significant gap between the carpal bones was

1A

1B

Figure 1: Lateral (A, left) and anteroposterior (B, right) radiographs of the chronic perilunate dislocation, 19 months after trauma.

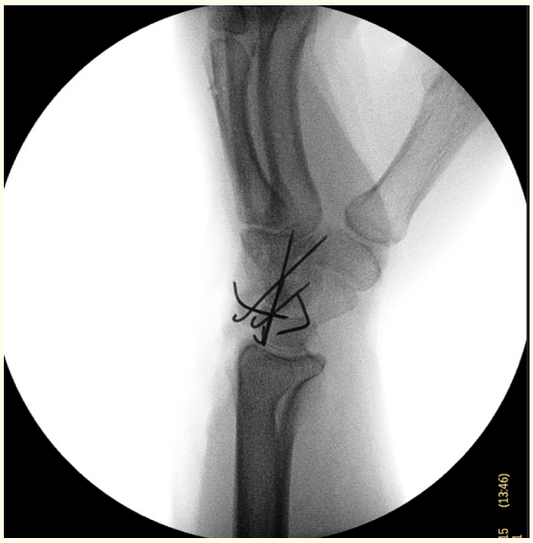
achieved: on the lateral radiograph, the interval between the distal pole of the capitate bone and the articular surface of the radius was equivalent to the width of the lunate bone in the position of dislocation (Figure 2).

2A

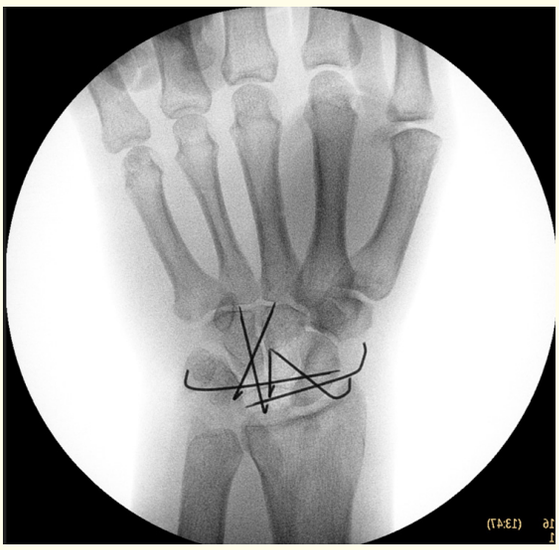
2B

Figure 2: Photo (A) and radiographs (B, C) after 3 weeks distraction.

At the second stage, the Ilizarov apparatus was disassembled and open reduction was performed. The operation was performed through the dorsal longitudinal access. After opening the joint capsule, the scars covering the articular surfaces of the capitate, lunate and radial bones were removed. The lunate bone was reduced and fixed in the correct position with K-wires 1 mm in diameter. One K-wire was inserted through the lunate and capitate bones, one K-wire through the lunate and hamate, one K-wire through the scaphoid and lunate, one K-wire through the scaphoid and capitate, one K-wire through the triquetrum and scaphoid, one K-wire through the triquetrum and hamate (Figure 3). Due to preliminary distraction and sufficient mobility of the carpal bones, the process of scar removal and lunate reduction was not traumatic.



3A



3B

Figure 3: Lateral (A, left) and anteroposterior (B, right) radiographs after external fixator's dissembling, open reduction and internal fixation.

In the postoperative period, immobilization was carried out using a cast splint, which was replaced with a circular cast two weeks later (after sutures removal). 3 months after surgery, a circular cast was removed, removable orthosis and gymnastics were recommended for a month. 4 months after the open reduction the wrist pain had been relieved and the sensitivity in the fingers had been restored. The patient returned to his work (manager). On radiographs 6 months after surgery, the lunate position was correct (Figure 4). The range of motion after hardware removal (just on the operating table) was 40 degrees. One year later the range of motion was 95 degrees (flexion 40 degrees, extension 55 degrees), the grip strength was 37 kg, and mild pain was noted after heavy use. Evaluation of the functional result according to the Mayo score system was equal to 70 points. Evaluation of postoperative x-rays revealed anatomic reduction. Normal SL gaps and LT less than 2 mm were observed. However, the carpal height ratio according to Nattrass., *et al*. [4]. was reduced to 1,45 compared to the opposite side (1,59). The dynamic of the carpal height ratio was as follows: 1,32 - before treatment; 1,56- immediately after ORIF; 1,45-6 months after ORIF; 1,45-18 months after ORIF. Furthermore, 18 months after ORIF the X-ray revealed signs of arthritis in the wrist joint (Figure 5).

4A

4B

Figure 4: Lateral (A, left) and anteroposterior (B, right) radiographs, 6 months after open reduction and internal fixation.

5A

5B

Figure 5: Lateral (A, left) and anteroposterior (B, right) radiographs, 18 months after open reduction and internal fixation, 12 months after hardware removal

Complications

There were no complications, such as pin tract infection, lunate re-displacement, and wrist joint instability. However, it was not possible to avoid the development of degenerative post-traumatic wrist joint arthritis.

Discussion

Joint dislocations in the upper extremities lead to gross disruption of the anatomy and significant functional impairment. The timely reduction of an acute dislocation can restore the joint's normal anatomy and function. Unfortunately, in the treatment of chronic perilunate dislocations, the restoration of anatomy and function is a difficult not always feasible task. An open reduction of a chronic perilunate dislocation is a complex and traumatic operation. This is due to a significant displacement and collapse of the wrist bones, scar degeneration of the damaged ligaments and articular capsule and shortening of soft tissues. Rough manipulations during surgery can cause additional trauma to the articular cartilage and disturb the already compromised blood supply to the lunate. If the lunate is in a dislocated position for a long time,

osteoporosis inevitably occurs not only in it but also in the adjacent carpal bones. Bones become fragile; this bone's condition also complicates the reduction of the lunate dislocation. Ashkeanzi [5] observed an iatrogenic fracture of the head of the capitate and a fracture of the posterior horn of the lunate when acute (in one stage) lunate reduction was performed in chronic cases (8 weeks and more after trauma). In addition, the acute elimination of severe deformity in old cases is associated with a risk of neurological disorders, primarily from the median nerve.

That is why the idea of a two-stage treatment of a chronic perilunate dislocation with the preliminary gradual extension of the wrist joint using external fixation devices was born [5-7]. Gradual preliminary distraction of the wrist joint can help to reduce old deformity and prepare "free space" to return the lunate bone to its correct anatomical position.

For the first stage of treatment, Ashkanazi [5] mounted a skeletal traction system. One K-wire was inserted through the metacarpal bones, the second (for counter-traction) through the olecranon process. Traction was carried out for 2-4 days. The preliminary distraction of the wrist joint made it possible to perform a non-traumatic open reduction of the perilunate dislocation in seven patients with an interval from trauma date to surgery of more than 8 weeks.

Sousa., *et al*. [6]. used the two-stage method for the treatment of three patients with a chronic perilunate dislocation (6-9 weeks after trauma). Ilizarov apparatus (1 case) and Portsmouth apparatus (2 cases) were used for the preliminary distraction at the first stage. The rate of distraction was 1-2 mm per day, duration of distraction was 7-8 days. Preliminary distraction significantly facilitated the performing of the second stage of treatment (open reduction). In all cases, good results were achieved.

Garg., *et al*. [7]. reported the result of treatment of 16 patients with chronic perilunate dislocation. The time interval between trauma and start of treatment ranged from 3 to 7 months (average 4.5 months). The authors used a rod-type of an external fixator. The rate of distraction was 1 mm per day, duration of distraction was 2-4 weeks. The authors obtained excellent results (Mayo score system) in 9 cases, good results in 5 cases, and satisfactory only in 2 cases (due to the developing complication - CRPS).

In our case, the period between the date of trauma and the start of the treatment was more significant. This was due to a gross diagnostic error. For the distraction of the wrist joint at the first stage of treatment, we used Ilizarov's apparatus in a simple type of assembly. The rate of distraction (1 mm per day) and its duration (3 weeks) was approximately the same as in other studies [6,7].

In the process of distraction, we did not notice an increase in the neurological symptoms from the median nerve. This can be explained by the slow rate of distraction. Additionally, in the process of distraction, the position of the lunate bone gradually changed. The lunate shifted to the dorsal side away from the median nerve, and, probably, conflict with the median nerve was decreased. The change in the location of the lunate in the sagittal plane during distraction is clearly seen when comparing figure 1A and figure 2B.

Two-stage treatment of chronic perilunate dislocation looks safer compared to an open reduction in one stage in respect of developed avascular necrosis of the lunate. Weir revealed such complication inpatient, who was operatively treated in one stage after 6 months delay [8]. Three cases (out of 7) presented by Dhillon., *et al*. [9]. with neglected volar lunate dislocations with 10-22 weeks of delay, developed avascular necrosis of the lunate after open reduction in one stage. These three patients had functional scores equal to 60 points. Our patient gained a functional score equal to 70 points in spite of the period between the date of injury and the start of treatment was significantly longer.

The important question remains debatable in the context of treatment of a chronic perilunate dislocation - to restore the internal ligaments of the wrist joint after reduction or not? Garg., *et al*. [7]. performed reconstruction of intraarticular ligaments of the wrist joint after open reduction of the dislocation. However, Abdel Hakim., *et al.* [3], during treatment of 19 patients with chronic perilunate dislocations, found coarse and rather dense scars in the joint. According to the authors' opinion, the "old" scars after trauma and "new" scars after open reduction and internal fixation provide sufficient stability of the wrist joint without reconstruction of the intraarticular ligaments. No patients in the authors' study had widening of the scapholunate space after surgery. In the treatment of our patient, we also did not restore intraarticular ligaments.

Unfortunately, nowadays there is no universal method for the treatment of chronic perilunate dislocation, which provides predictable, good functional results, especially in late cases. In such cases to receive an ideal result is not realistic. While there is no consensus among surgeons about the advisability of open reduction of chronic perilunate dislocation in late cases, information about attempts of ORIF (details of surgical technique, advantages-disadvantages, functional results, X-ray changes), has practical and theoretical significance. Today it is not absolutely clear what method of treatment is optimal in late cases - reconstruction or salvage procedure. In general, our patient was satisfied with the result of the treatment. He was relieved of pain and neurological disorders, a fair range of motion and grip strength was restored, and he returned to his work. On the other hand, the process of the treatment

was long and complicated, and the anatomical joint restoration did not prevent wrist joint arthritis.

Conclusion

Thus, the two-stage treatment of chronic perilunate dislocation in our patient allowed the relief of pain and significantly improved function. Technically an open reduction of dislocation with the preliminary distraction of the wrist joint using an external fixation device was possible even 19 months after the injury. However, the question about the time limit for open reduction remains open.

Bibliography

1. Takami H., *et al*. "Open reduction of chronic lunate and perilunate dislocations". *Archives of Orthopaedic and Trauma Surgery* 115.2 (1996): 104-107.

2. Inoue G and Shionoya K. "Late treatment of unreduced perilunate dislocations". *Journal of Hand Surgery European Volume* 24.2 (1999): 221-225.

3. Abdel Hakim A., *et al*. "Functional Outcome of Open Reduction of Chronic Perilunate Injuries". *Journal of Hand Surgery American Volume* 37.9 (2012): 1852-1860.

4. Nattrass GR., *et al*. "An alternative method for determination of the carpal height ratio". *Journal of Bone and Joint Surgery* 76A.1 (1994): 88-94.

5. Ashkanazi AI. "Reduction of old perilunate dislocations of the carpal bones". *Khirurgiia* 38 (1962): 106-111.

6. Sousa HP., *et al*. "Preoperative progressive distraction in old transcapho-perilunate dislocations". *Journal of Hand Surgery European Volume* 20.5 (1995): 603-605.

7. Garg B., *et al*. "Staged reduction of neglected transscaphoid perilunate fracture dislocation: A report of 16 cases". *Journal of Orthopaedic Surgery and Research* 7 (2012): 19.

8. Weir IG. "The late reduction of carpal dislocations". *Journal of Hand Surgery British* 17 (1992): 137-139.

9. Dhillon MS., *et al*. "Functional outcome of neglected perilunate dislocations treated with open reduction and internal fixation". *Indian Journal of Orthopaedics* 45.5 (2011): 427-431.