Visi deformity after wrist fracture: Case report

Visi deformacija po zlomu distalnega radiusa: Prikaz primera

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Izvleček

Izhodišče: Zlomi koželjnice na tipičnem mestu so vsakdanje delo kirurgov, ki se ukvarjajo s poškodbami. Mnogokrat pa so pridružene zapletene in težko prepoznavne poškodbe ligamentnega aparata, ki zahtevajo ustrezno oskrbo. Neprepoznane poškodbe vodijo v težjo funkcionalno motnjo, zato je namen prispevka spomniti na redek, a zahteven zaplet po zlomu koželjnice na tipičnem mestu.

Predstavitev primera: Predstavljamo primer 20 letnega fanta z zlomom koželjnice, kjer smo sorazmerno pozno po operaciji ugotovili pridruženo hudo ligamentarno okvaro.

Zaključek: Ligamentne poškodbe, pridružene prelomom koželjnice na tipičen mestu, so resen diagnostični in zaradi posledic, tudi klinični problem. Prepoznava je mnogokrat težka in pozna. Ob nenapredku zdravljenja je potrebna natančna analiza diagnostičnih posnetkov in dobro poznavanje patoloških stanj.

Abstract

Background: Distal radius fractures (*fractura radii loco typico*) are an everyday task for a surgeon that deals with injuries. Oftentimes complicated associated injuries of the ligamentous apparatus occur, which are hard to recognise and demand appropriate care. If such injuries remain unrecognised, they lead to more serious functional disorders, which is why the purpose of this report is to point out a rare and serious complication of distal radius fracture.

Case presentation: We report the case of a 20-year-old man who suffered a fracture of the radius and developed a serious associated ligamentous disorder that was discovered relatively late.

Conclusion: Ligamentous injuries associated with distal radius fractures represent a serious diagnostic challenge and, due to their consequences, also a serious clinical challenge. They are often hard to recognise and get discovered late. If the treatment shows no improvement, diagnostic images should be carefully analysed, and the physician should be well acquainted with relevant pathological conditions.

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1 Introduction

Distal radius fractures account for 17 percent of all diagnosed fractures (1). Traditional approaches to distal radius fractures have included both surgical and nonsurgical treatments. Nonsurgical approaches include immobilisation with or without reduction, whereas surgical treatments include dorsal spanning bridge plates, percutaneous pinning, external fixation, and volar plate fixation and fragment specific plating. The nature of the fracture determines the best treatment option, and surgeons employ a multifaceted approach that takes into consideration the patient's age, nature of injury, joint involvement, and displacement among other factors. Historically, closed reduction and percutaneous pinning have been the most popular treatment methods. However, volar plate fixation is quickly becoming a popular option as it minimises tendon irritation, reduces immobilisation time, and decreases the risk of complications. The goal of any treatment is to restore mobility, reduce pain, and improve functional outcomes following rehabilitation (2). Ligamentous injuries of the wrist associated with distal radius fractures are often unrecognised. Unrecognised ligamentous injuries are associated with poor functional outcomes and may lead to long--term carpal instability or deformity (3).

This is a report on VISI (volar intercalated segmental instability) deformity in a patient that underwent a surgical procedure for radius fracture.

Figure 1: X-ray after fracture.

2 Case presentation

A 20-year-old patient was admitted after he fell off his motorcycle. He suffered an isolated injury to the right wrist, which was diagnosed as a fracture (Figure 1) and treated by open reduction and fixation with volar plate and K -wire (Figure 2). The developments in the postoperative period initially went on as planned: we removed the K-wire after 4 weeks and started with physical therapy. The patient was complaining of persistent pain, which was unusual in the treatment of these kinds of fractures. Also, there were no improvements in mobility. The radiologists described the postoperative CT images (Figure 3) as unremarkable, but the X-ray image after three months (Figure 4) showed a carpal collapse, whi-

Figure 2: X-ray after osteosynthesis.

Figure 3: X-ray of VISI deformity.

ch led us to refer the patient to a subspecialist for such conditions, where he received further care. Because of personal data protection requrements, we were not able to find out how the treatment ended.

3 Discussion

Carpal instability refers to the inability of carpal bones to retain normal alignment during anticipated motions under the impact of physiological forces (4). Two of the most common malalignment patterns are volar intercalated segmental instability (VISI) and the more common dorsal intercalated segmental instability (DISI) (5). A VISI deformity refers to an abnormal volar tilt of the lunate, typically the result of a disruption to the midcarpal stabilizers which results in flexion in the proximal row. A DISI deformity refers to an extension of the lunate relative to the capitate and radius, which is most commonly observed following a rupture of the scapholunate interosseous ligament (Figure 4). Taleisnik et al. (6) and Reagan et al. (7) propose that the lunotriquetral interosseous ligament must be disrupted for a VISI deformity to occur.

Linscheid et al. (8) in their article believed that traumatic or congenital laxity of the palmarradiocarpal ligament was the key for the development of the "palmarflexed intercalated segment instability". So we have a combination of injuries of intrinsic and extrinsic wrist stabilizers. Mayfield et al. (9) have a "progressive perilunar instability" theory. So, injury to the lunotriqetral ligament occurs in stage III, following rupture of the scapholunate ligament (stage I) and lunocapitate ligament (stage II).

In the presented case, we did not suspect the presence of an associated

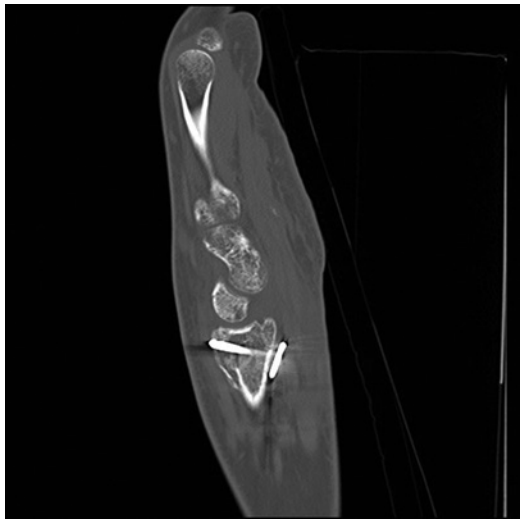

Figure 4: CT scan for our patient with VISI deformity.

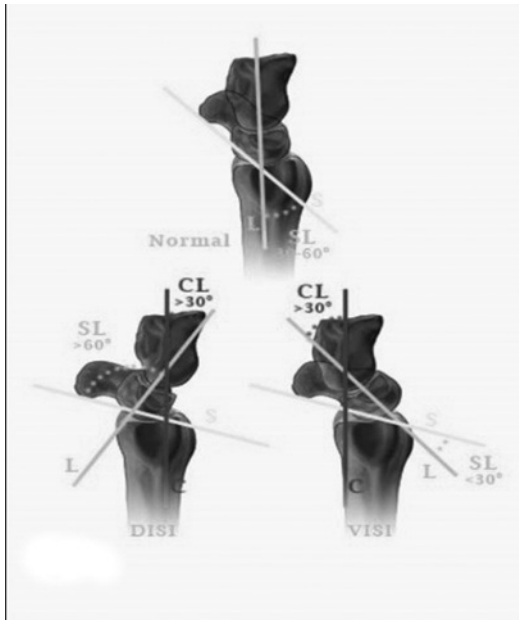

Figure 5: Lateral projection of the carpal bones in normal position, and with DISI and VISI deformity.

ligamentous injury. We did not notice it in the initial images. We detected it relatively late and consequently referred the patient to a subspecialist. Sufficient criteria for diagnosing a VISI deformity are presented in Figure 5.

There are different treatment options for VISI. They include ligament repair or reconstruction and partial or more extensive arthrodesis (10). If the injury is acute, direct repair is an option. Shin et al. (11) reviewed 57 patients with isolated lunotriquetral injuries. These authors state that ligament reconstruction or repair seems superior to arthrodesis in terms of pain relief, strength and mobility. Wagner et al. (12) state that the surgical treatment for chronic lunotriquetral injuries includes reconstruction and arthrodesis and that partial arthrodesis is superior method to soft tissue reconstruction (13). Muminagic et al. (14) state that the surgical treatment of acute injury is best performed within 3 weeks of the primary injury. These findings additionally confirm the importance of an early diagnosis of ligamentous instabilities.

4 Conclusion

Ligamentous injuries associated with distal radius fractures represent a serious problem. They are often hard to detect and get discovered late. The basic conditions for their timely detection include physician's familiarity with the pathology of wrist instability and an accurate interpretation of X-ray images.

The capitolunate (CL) and scapholunate (SL) angles can help distinguish between DISI and VISI patterns in a standard lateral radiographic projection. The SL angle is the angle created by a line drawn tangential to the volar border of the scaphoid (S) and another line bisecting the lunate that is drawn perpen-

dicular to its long axis (L). The CL angle is the angle created by a vertical line drawn through the capitate bone along its long axis (C) and another line bisecting the lunate that is drawn perpendicular to its long axis (L). In normal alignment, the SL angle is between 30 ° and 60 °, and the long axis of the capitate and lunate is linear (CL = 0). In DISI, both the SL and CL angles are increased (SL > 60 °, CL > 30 °). In VISI, the SL angle is decreased (SL < 30 °), and the CL angle is increased (CL > 30 °).

The patient gives his consent to the publication of the article.

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