Acute Pisiform Dislocation in Association with Terrible Triad Injury of the Elbow

Luxação Aguda do Pisiforme Associada a Tríade Terrível do Cotovelo

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ABSTRACT

Dislocation of the pisiform is a rare injury, with only few cases reported in the literature. This condition, in association with terrible triad injury of the elbow, is an even more rare occurrence. We report a case of a 51-years-old right-handed female patient who suffered from a dislocation of the left pisiform in association with terrible triad injury of the elbow, after a ground level fall. It was performed a reinsertion of the coronoid process and radial collateral ligaments with anchors, radial head arthroplasty, and closed reduction and internal fixation of the pisiform with Kirschner wire. At the end of follow-up, the patient had satisfactory range of movement of the wrist and elbow, and no residual pain. This rare injury to the wrist is demanding in diagnostics and treatment. However, with a correct diagnosis and appropriate treatment, an excellent clinical outcome can be achieved.

KEYWORDS: Elbow Joint/injuries; Joint Dislocations; Pisiform Bone/injuries; Wrist Injuries

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Received/*Recebido*: 01/11/2019 - Accepted/*Aceite*: 16/12/2019 - Published/*Publicado*: 31/12/2019

RESUMO

A luxação do pisiforme é uma lesão rara, estando apenas alguns casos descritos na literatura. Esta lesão, associada a uma tríade terrível do cotovelo, é ainda mais rara. Descrevemos o caso de uma doente do género feminino, de 51 anos, dextra, que sofreu uma luxação do pisiforme esquerdo associada a uma tríade terrível do cotovelo, após uma queda da própria altura. Foi realizada uma reinserção do processo coronoide e dos ligamentos colaterais radiais com âncoras, artroplastia da tacícula radial, e redução fechada e fixação interna do pisiforme com fio de Kirschner. No final do follow-up a doente apresentava um arco de movimento satisfatório do punho e cotovelo, sem dor residual. Esta rara lesão do punho é exigente do ponto de vista diagnóstico e de tratamento. Contudo, com um diagnóstico correto e tratamento adequado, pode ser obtido um excelente resultado clínico.

PALAVRAS-CHAVE: *Articulação do Cotovelo/lesões; Luxações Articulares; Pisiforme/lesões; Traumatismos do Punho*

INTRODUCTION

The pisiform is a sesamoid bone, located within the flexor carpi ulnaris (FCU) tendon, in the proximal row of the carpal bones.[1]

Traumatic dislocation of the pisiform has only been rarely described after its initial description in 1899 by van der Donck, and since that time, Schädel-Höpfner in his review in 2003 reported only 25 radiologically confirmed cases.[2] Its rarity is because of the sturdiness of the ligamentous complex which stabilizes the pisiform to the carpus.[3] Dislocation of the pisiform in association with terrible triad injury of the elbow is an even more rare condition, with no other cases reported in the literature to our knowledge.

The present report documents a rare case of a patient with a dislocation of the pisiform in association with terrible triad injury of the elbow, the diagnostic work up, and the successful treatment with reinsertion of the coronoid process and radial collateral ligaments with anchors, radial head arthroplasty, and closed reduction and internal fixation of the pisiform with Kirschner wire.

In the paper we will focus mainly on the pisiform dislocation due to its rarity.

CASE REPORT

A previously healthy 51-year-old woman, right-handed, was referred to our emergency department after suffering an injury to her left upper limb due to a ground level fall.

On presentation, the patient reported pain at the ulnar side of the left hand and wrist, and whole elbow. The physical examination revealed swelling of hand, wrist and elbow. Skin contusions were found on the palmar and dorsal aspect of the wrist. There was tenderness over the hypothenar eminence and elbow. The wrist and elbow motion were restricted by pain and swelling. The ulnar artery pulse was palpable, and ulnar nerve sensory and motor functions were intact.

The radiographs of the left wrist showed an isolated dislocation of the pisiform. On the radiographs of the elbow there was an elbow dislocation, a radial head fracture and a fracture of the coronoid process of the ulna (Fig. 1).

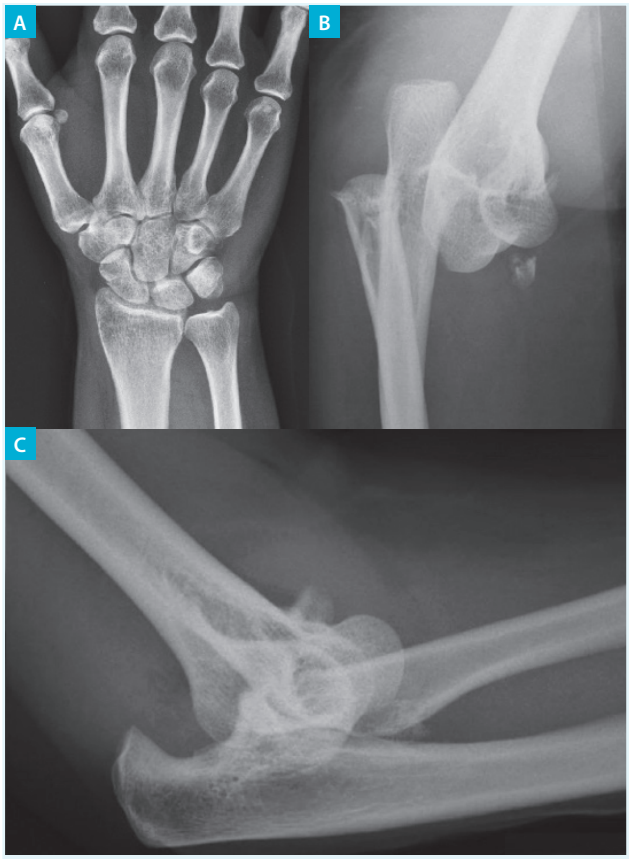

FIGURE 1. (A) Anteroposterior radiograph of the left wrist showing a pisiform dislocation. (B) Anteroposterior and (C) lateral radiographs of the left elbow showing an elbow dislocation, a radial head fracture and a fracture of the coronoid process of the ulna.

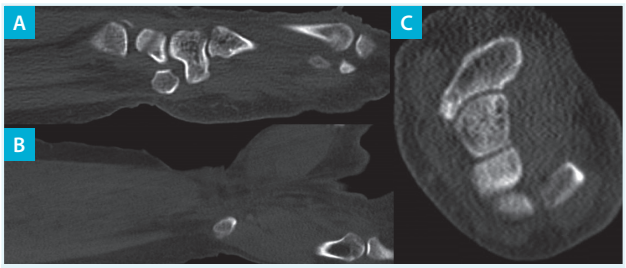

FIGURE 2. (A) Sagittal; (B) coronal and (C) axial computed tomographic images showing a pisiform dislocation.

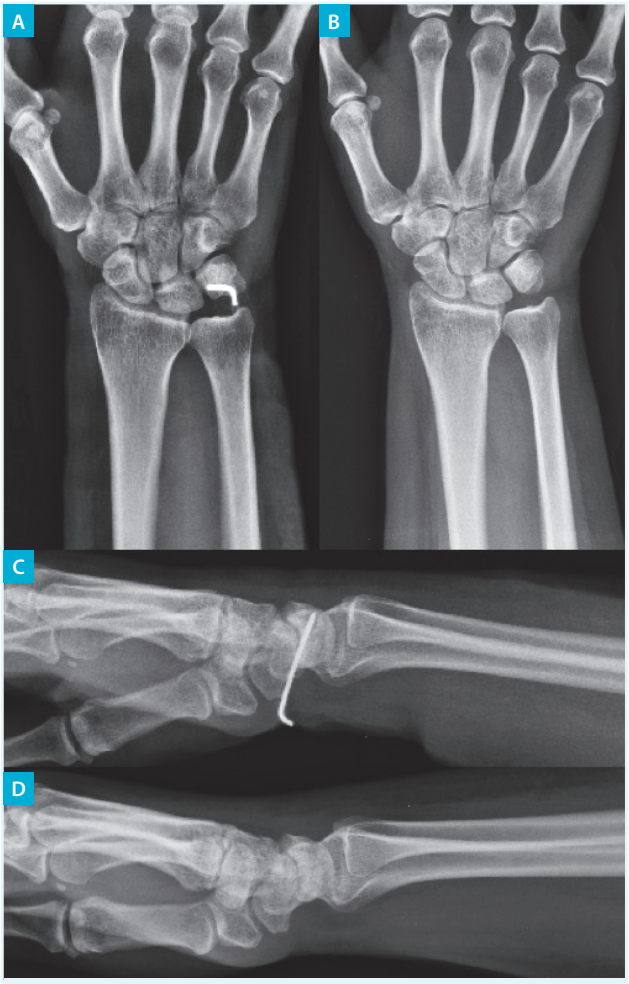

FIGURE 3. Radiographs of the left wrist at the immediate postoperative period (A - anteroposterior view; C - lateral view) and seven months after surgery (B - anteroposterior view; D - lateral view) showing a well reduced position of the pisiform.

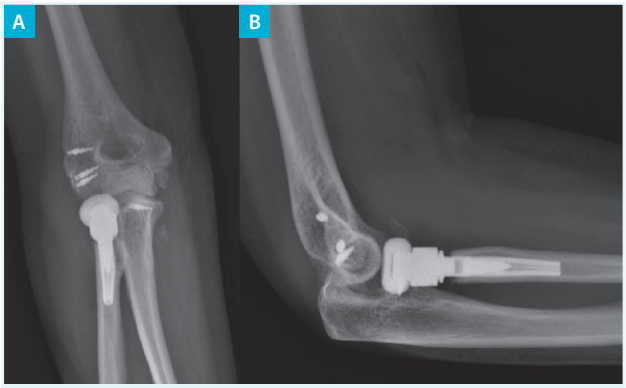

FIGURE 4. Radiographs of the left elbow seven months after surgery (A - anteroposterior view; B - lateral view).

The initial management involved reduction of the elbow and immobilization of the wrist and elbow with a plaster splint.

An additional computed tomography (CT) scan of the wrist and elbow confirmed the pisiform dislocation (Fig. 2) and a terrible triad injury of the elbow with a radial head fracture - Mason IV - associated with a fracture of the coronoid process of the ulna - Regan and Morrey II. No other injuries were reported.

Seven days after the injury, under general anesthesia, a lateral surgical approach of the elbow was carried out through the Kocher interval. Regarding to the coronoid process, the fracture-avulsion was reinserted with an anchor. Because the radial head had a non-reconstructible Mason type IV fracture, a radial head arthroplasty was performed. The damaged radial collateral ligaments and posterolateral capsule were reinserted with 3 anchors in the humerus.

A closed reduction of the pisiform was attempted under a C-arm image intensifier. Direct pressure was applied to the pisiform while flexing and pronating the wrist. However, stable reduction was not maintained. Therefore, the pisiform was fixed to the triquetrum using a 1.6 mm Kirschner wire percutaneously. Repeat radiographs confirmed reduction of pisiform. Neurologic examination of the upper limb was normal after the surgery.

The upper limb was immobilized with a long arm plaster splint with the wrist pronated, flexed and ulnarly deviated, and with the elbow in 90º of flexion, for 2 weeks. Then, the splint was shortened to allow forearm pronation and supination, but the wrist was still held flexed and deviated ulnarly for another 3 weeks. The splint and Kirschner wire were removed 5 weeks postoperatively.

The postoperative course was uneventful. Seven months after the surgery the patient was clinically well without any pain or limitation of motion on the wrist, and full recovery of her grip strength. The sensitivity in the ulnar nerve distribution area was undisturbed. The pisiform was still adequately reduced. No subchondral cysts of the pisiform or triquetrum or narrowing and irregularity of the pisotriquetral joint indicating arthritic changes where found (Fig. 3). On the elbow, flexion was 140º and extension loss was 10º. Prono-supination was complete. The elbow was stable in flexion-extension and varus-valgus. On radiographs, the elbow was well centered, without signs of osteoarthritis of the humeroulnar joint (Fig. 4).

The patient regained all her professional and leisure activities and was satisfied with the aesthetic and functional result.

DISCUSSION

The pisiform is a sesamoid bone that lies in the proximal row of the carpal bones.[4,5] The ulnar artery and nerve are located lateral to the pisiform.[5]

Dislocation of the pisiform bone is a very rare occurrence.[2,5,6] To our knowledge, there are no other reported cases on the literature of pisiform dislocation in association with terrible triad injury of the elbow.

Because the pisiform has a flat articular surface,[4,6] it relies mainly on its many soft tissue attachments for stability.[4,6,7] The pisiform is an important stabilizing structure of the wrist and also acts as a lever to increase the force of wrist flexion supplied by the FCU.[4,6-10] A loss of stability in this structure may result in a weak and dysfunctional wrist and possibly dispose the pisotriquetral joint to subsequent degenerative changes.[8]

The pathogenesis of a dislocated pisiform remains obscure,[6] but there are two possible mechanisms. Direct force applied to the pisiform bone may result in a dislocation. Alternatively, acute dorsiflexion of the wrist with the FCU already contracted and the wrist flexed may cause the pisiform bone to become dislocated.[3,4,6-8,11,12] It appears that the latter mechanism occurs more often.[7,11] Dislocations are usually ventral, but may occur dorsally.[5,7] The pisiform typically moves distally after direct trauma and proximally after indirect mechanism.[7] In our patient, we considered that the injury of the elbow increased the tension on the FCU, and in addition to the dorsiflexion of the wrist, caused the pisiform dislocation.

The diagnosis of pisiform dislocation should be made based on the injury mechanism and the clinical presentation.[8,10] Tenderness over the ulnar border of the wrist, pain and swelling are the leading symptoms.[5,7,8,10] In some cases, it can manifest as a visible or palpable depression at this site.[7] A thorough hand examination is essential to elicit damage to either the ulnar artery or nerve.[5] Neurovascular injuries are uncommon.[7] In acute injuries, the clinical examination may be difficult as in our case where a diffuse pain of the wrist was noted without the possibility of further specification.

Standard radiographies of the wrist are recommended for initial diagnosis.[7,8] An oblique view in 15-30º supination,[8] a carpal tunnel view[7] and a radiograph of the unaffected side may be helpful.[3] In our case, after standard radiographies, we ordered a CT scan which confirmed the dislocation of the pisiform. It may also be very useful in these cases[7,10] to demonstrate the integrity of pisiform and to identify any associated bone injuries. Magnetic resonance imaging highlights any ligamentous or ulnar nerve injury.[10]

Due to its rarity, there is no consensus for the optimal management strategy for pisiform dislocation.[1] Treatment of a dislocated pisiform can be either surgical or nonsurgical.[6,9] It includes immobilization after a closed reduction[7], an internal fixation after closed or open reduction and a resection of the pisiform.[4,7]

Non-surgical treatment has been initially attempted in acute cases.[4] Some authors[1,4,6] recommended a closed reduction and immobilization. Sharara *et al*[12] reported a successful closed reduction and attributed this to keeping the wrist in flexion and pronation to maintain the FCU in the relaxed state.

An open or closed reduction and internal fixation of the pisiform might be employed in these cases.[1,2,4] In the presented case we performed a closed reduction and fixation of the pisiform advocated by Sharara and Farrar,[12] which produced a satisfactory result.

Most authors favor an excision of the dislocated pisiform bone either initially or secondarily in cases of persistent pain or recurrent dislocation because of rapid rehabilitation and recovery to normal function[2,4-8] and more predictable outcome.[2,13] Therefore, a surgical resection is recommended if recurrent dislocations occur or the disability remains after conservative treatment.

CONCLUSION

A dislocation of the pisiform in association with terrible triad injury of the elbow is an extremely rare injury. A high index of suspicion is required to identify this type of injury in traumatic patients.

The diagnostic work-up should consist of clinical examination and initial plain radiography. We consider a CT scan of the wrist as necessary after the dislocation is documented to rule out further osseous injury of the wrist.

It is believed that closed reduction and internal fixation with Kirschner wire is an effective and reliable method for treating a dislocated pisiform, although the authors consider that other above-mentioned procedures should also produce satisfactory results.

LEARNING OBJECTIVES

- Provide information about the mechanism of injury for pisiform dislocation in association with terrible triad injury of the elbow.
- Describe the presentation and clinical picture of pisiform dislocation in association with terrible triad injury of the elbow.

- Report the functional outcomes of closed reduction and internal fixation of the pisiform with Kirschner wire in our patient.

CONFLICTS OF INTEREST: The authors declare that they have no conflicts of interest.

FINANCIAL SUPPORT: This work has not received any contribution, grant or scholarship.

CONFIDENTIALITY OF DATA: The authors declare that they have followed the protocols of their work center on the publication of data from patients.

PATIENT CONSENT: Consent for publication was obtained.

PROVENANCE AND PEER REVIEW: Not commissioned; externally peer reviewed.

CONFLITOS DE INTERESSE: Os autores declaram não ter qualquer conflito de interesse na realização do presente trabalho.

FONTES DE FINANCIAMENTO: Não houve qualquer fonte de financiamento na realização do presente trabalho.

CONFIDENCIALIDADE DOS DADOS: Os autores declaram ter seguido os protocolos da sua instituição acerca da publicação dos dados de doentes.

CONSENTIMENTO: Consentimento do doente para publicação obtido.

PROVENIÊNCIA E REVISÃO POR PARES: Não comissionado; revisão externa por pares.

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