

Clinical and Anatomical Aspects of Anterior Dislocation of the Pisiform Bone

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Abstract

Introduction The pisiform bone is the fourth bone of the proximal row of the carpal bones, and it is located in the tendon of the flexor carpi ulnaris muscle, being considered a sesamoid bone. Traumatic dislocation of the pisiform bone is a rare condition, which usually results from a trauma in dorsal flexion of the wrist. Its treatment can be conservative or surgical, ending or not with the removal of the pisiform bone.

Objective To report a case of a child who fell from his own height and presented wrist pain, diagnosed with dislocation of the pisiform bone. We emphasize the importance of anatomy knowledge in the evaluation of wrist trauma.

Case Report The anamnesis confirmed that the fall occurred with the wrist in hyperextension. The physical examination showed a slight limitation of movement due to pain. Radiographic exams and a computed tomography (CT) scan of the wrist were performed, in which an anterior deviation/luxation of the pisiform bone was evidenced. A conservative treatment with plaster immobilization for analgesia was performed for 1 week. As there were no symptoms and no signs of trauma consistent with the images, such as edema and local ecchymosis, in addition to the early complete disappearance of pain, the responsible team proposed the hypothesis of asymptomatic chronic dislocation of the pisiform bone.

Conclusion Imaging exams in orthopedic traumatology are fundamental for an accurate diagnosis. Nevertheless, they must be associated with knowledge of the anatomy to correlate the image findings with the anamnesis, leading to a better understanding of silent, asymptomatic, and preexisting conditions in the clinical practice.

Keywords

- ▶ anatomy
- ▶ pisiform bone
- ▶ trauma
- ▶ dislocation

Introduction

The pisiform bone, from the Latin *pisum* (pea) and *formis* (form), is the fourth proximal carpal bone, and it is considered by some authors as a sesamoid bone due to its location in the tendon of the flexor carpi ulnaris muscle.^{1–5} It is the only carpal bone that has a tendon insertion of a forearm muscle.⁶ Fleege et al indicate

that the pisiform ossification center usually appears between 7.5 and 10 years of age and is fully developed up to the age of 12 years old, being the last carpal bone to ossify⁵ (→Fig. 1).

The pisiform bone acts as an important point of fixation of soft tissues (→Fig. 2). Pevny et al demonstrated the existence of 10 soft tissue structures related to the pisiform bone,

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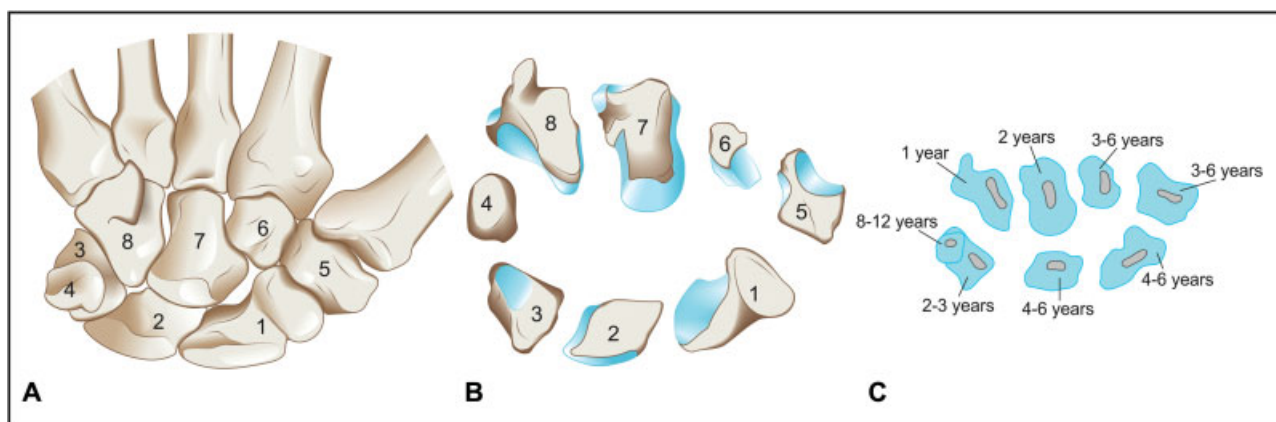


Fig. 1 (A-B) Anatomical arrangement of the carpal bones. Right hand, palmar view. Proximal row: scaphoid (1), lunate (2), triquetrum (3) and pisiform (4). Distal row: trapezium (5), trapezoid (6), capitate (7) and hamate (8). (C) Development of the carpal bones and ossification centers. Based and adapted from Werner Platzer.⁷

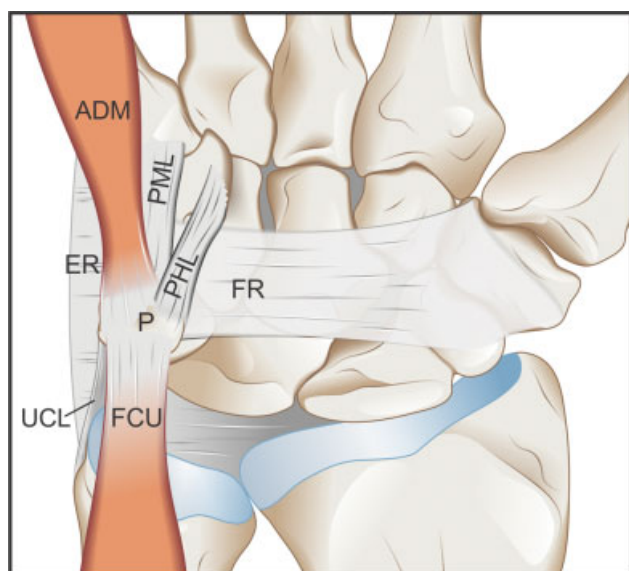


Fig. 2 Main structures attached to the pisiform bone. Right hand, palmar view. Pisiform (P); abductor digiti minimi muscle (ADM), pisometacarpal ligament (PML), pisohamate ligament (PHL), flexor carpi ulnaris muscle (FCU), flexor retinaculum ("transverse carpal ligament") (FR), extensor retinaculum (ER), ulnar collateral ligament of wrist joint (UCL). Based and adapted from Moojen et al.⁹

described as the flexor carpi ulnaris tendon, the extensor retinaculum, the abductor digiti minimi muscle, the flexor retinaculum, the ulnar collateral ligament of the wrist joint, the articular disc of the distal radioulnar joint, the pisohamate ligament, the pisometacarpal ligament, and the pisiform joint capsule, plus a superficial fibrous bundle between the pisiform bone and the hook of hamate.^{3,8,9}

The biomechanics of this region contribute to the kinematics of the wrist and of the hand in an indirect and not very relevant way, being the pisiform bone restricted to a fixation point for the aforementioned soft tissues and participating in the joint with the pyramidal bone.^{6,10,11} The pisiform bone, like the patella, also acts as a lever and provides increased flexion strength of the wrist and extra stability when the wrist is flexed.^{3,6,9}

Historically, the isolated pisiform fracture was identified and described by Guibout in 1847 during a necropsy, along with other carpal fractures.^{1,12,13} Although traumatic luxation of the pisiform is a condition reported as rare in the scientific literature, it usually is a result of a trauma in dorsal flexion of the wrist, in which the impact occurs immediately on the hypothenar eminence with the wrist in hyperextension, the forearm in pronation, and the upper limb in adduction.^{13,14}

There are also other mechanisms for the pisiform fracture, commonly observed in sports, especially in volleyball players, in which repetitive trauma causes vascular injuries and leads to microfractures and, later, to the evolution to a complete fracture.^{1,12,14}

Fractures of the carpal and metacarpal bones represent ~6% of all fractures. Isolated fracture of the pisiform is a rare condition, since it is constantly associated with other injuries of the carpus or of the distal end of the radius. In the fracture with concomitant rotation of the pisiform and/or ligament rupture, the treatment can be conservative or surgical, ending up or not with the removal of the pisiform bone.^{2,14,15}

The objective of the present study is to report a case of a 9-year-old child who suffered a pisiform dislocation, emphasizing the importance of previous knowledge of the anatomy in the clinical practice, aiming at the correlation of the clinical findings for the correct diagnosis.

Case Report

A 9-year-old male child, led by his parents, presented to the emergency room of the Vitória Apart Hospital reporting pain in the wrist and in the left hand after falling from his own height playing soccer.

During the anamnesis, it was observed that the fall occurred with the wrist in hyperextension and, on the physical examination, there was a slight limitation of the range of motion due to pain. Anteroposterior (AP) and lateral X-ray examinations were performed, showing an anterior deviation of the pisiform bone (► **Figs. 3** and **4**). The child was



Fig. 3 Lateral radiography view of the left wrist showing the anterior dislocation of the pisiform bone (arrow).



Fig. 4 Lateral radiography view of the right wrist showing a normal anatomical position of the pisiform and carpal bones.

referred for a computed tomography (CT) scan of the wrist with suspected fracture and/or carpal dislocation.

The results of the CT scan showed an anterior dislocation of the pisiform bone; bone irregularity in the pisiform bone with a small adjacent bone fragment measuring 0.2 cm suggestive of microfissure; avulsion or a small ossification nucleus; small joint effusion; slight obliteration of the myotendinous planes; and adipose tissue of the wrist of post-traumatic origin, with preservation of the other bone structures (► Figs. 5 and 6).

A conservative treatment with plaster immobilization for analgesia was performed for 1 week. As there were no signs of trauma consistent with the images, such as edema and local ecchymosis, in addition to the early complete disappearance of pain, the responsible team proposed the hypothesis of chronic asymptomatic dislocation of the pisiform bone.

Discussion

The early diagnosis of pisiform fracture is important, since late treatment may result in nonconsolidation and may manifest with chronic pain and limitation of movement.¹⁴ In the present report, the treatment consisted of plaster

immobilization for a short period of time that resulted in a good clinical response.

Moojen et al pointed to the fact that traumas of the pisiform bone and of the pisopyramidal joint are not rare. A correct diagnosis, however, is often difficult, in part due to the lack of attention to anatomical structures during the

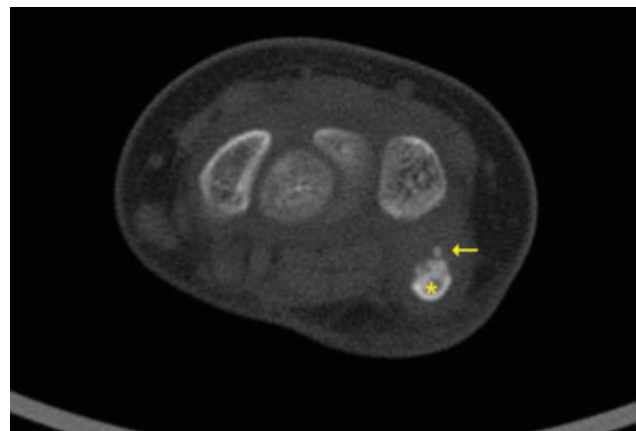


Fig. 5 Axial computed tomography view of the left wrist showing the anterior dislocation of the pisiform bone (*) and a small adjacent bone fragment (arrow).



Fig. 6 Sagittal computed tomography view of the left wrist showing the anterior dislocation of the pisiform bone (*) and a small adjacent bone fragment (arrow).

inspection of the wrist and to the lack of knowledge of the kinematics of the region.⁹

An adequate clinical evaluation and a thorough examination of imaging exams in orthopedic traumatology are essential for an accurate diagnosis. Deep knowledge of the anatomy is essential to correlate the findings of these exams with the anamnesis and to understand the possible existence of silent, asymptomatic, and pre-existent conditions in the clinical practice.

Conflicts of Interest

The authors have no conflicts of interest to declare.

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