



## Case Report

### Isolated fracture of pisiform: case report of a rare injury of wrist

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**ABSTRACT:** Isolated fracture of the pisiform is an extremely rare injury. Generally fractures of the pisiform are associated with fractures of other carpal bones or the distal radius. Fractures of the carpals and metacarpals account for roughly 6% of all fractures. The average incidence of pisiform fractures is 0.2% of all carpal fractures and approximately half of them are isolated fractures. Fracture of the pisiform may be missed on standard radiographs due to orientation of the fracture, improper wrist positioning, superimposition of adjacent bones, an inadequate number of projections or more obvious fractures of other carpal bones. Special radiographic projections such as carpal tunnel, scaphoid or supinated oblique view are indicated if routine AP and lateral views fail to demonstrate a fracture. MRI is the second-step imaging method in patients whose radiographs are negative or indistinct. MRI not only shows the fracture line but also shows marrow edema within the pisiform bone indicating fracture. Late sequels include pisotriquetral chondromalacia, subluxation and osteoarthritis consequent to poor alignment of the articular surfaces.

**KEY WORDS:** *Isolated fracture; Pisiform; Wrist injury*

#### INTRODUCTION

Fractures of the carpals and metacarpals account for roughly 6% of all fractures. Commonly fractures among the carpal bones are scaphoid (70-80%), triquetral (7-20%) and trapezium (5%)<sup>1</sup>. Fractures of the pisiform are extremely rare and frequently associated with other carpal or distal radial injuries. The average incidence of pisiform fractures is 0.2% of all carpal fractures and approximately half of them are isolated fractures<sup>1</sup>. Pisiform contributes to the stability of the ulnar column by preventing triquetral subluxation and also acts as a fulcrum for forces transmitted from the forearm to the hand.

Fracture of the pisiform may be missed on standard radiographs due to orientation of the fracture, improper wrist positioning, superimposition of adjacent bones, or an inadequate number of projections<sup>1</sup>. Pisiform fractures may be missed on radiographs on account of presence of more obvious carpal or distal radial injuries. Diagnosis may need to be confirmed by special radiographic views, computerised tomography, scintigraphy or magnetic resonance imaging (MRI).

We report this case of isolated pisiform fracture on account of its rarity, propensity to be missed and unfamiliarity of many general orthopaedic surgeons with this rare condition.

#### CASE DETAILS

A 20 year old student presented to the outpatient clinic of the orthopaedics department with the complaint of pain in the right wrist after he

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sustained a fall on the outstretched hand two days ago while running.

Examination revealed an abrasion over the hypothenar eminence and point tenderness over the volar aspect of the right wrist, overlying the pisiform bone. No crepitus was noted. The range of motion of the right wrist was terminally painful and restricted. Roentgenograms of the right wrist revealed an undisplaced comminuted fracture of the pisiform bone (**Figure 1 and 2**).



**Figure 1: Fracture of pisiform in AP view**



**Figure 2: Fracture of pisiform in lateral view**

A lightly padded below-elbow plaster cast was applied to the right forearm and hand, with the wrist in the position of slight palmar flexion and ulnar deviation. The metacarpophalangeal joints were not immobilized. The cast was removed after one month. Check roentgenograms of the right wrist showed a healing pisiform fracture (**Figure 3**). The patient was started on wrist physiotherapy and achieved a full range of movement at 3 months follow-up.



**Figure 3: Healing fracture of pisiform**

## DISCUSSION

Located on the ulnar side of the palmar aspect of the wrist, the pisiform is a small rounded sesamoid bone within the tendon of flexor carpi ulnaris. It is the site of origin for abductor digiti minimi. The transverse carpal ligament and the tendon of flexor carpi ulnaris insert into the pisiform. The flexor carpi ulnaris forms the pisohamate and pisometacarpal ligaments distally which in conjunction with the tendon stabilize the pisiform. The exact mechanism by which these fractures occur is not known; however the most probable mechanism is a fall on the hyperextended wrist with the forearm in pronation and adduction<sup>2,3</sup>. The pisiform may be fractured due to direct trauma or as a result of avulsion injury in the distal part of the bone when the flexor carpi ulnaris resists forcible hyperextension of the wrist<sup>2,3</sup>. Another mechanism is repetitive trauma causing vascular disruption, microfractures, and ultimately a complete fracture<sup>4</sup>. In our case, fracture of the pisiform occurred because of direct trauma.

In isolated fractures the patient presents with immediate pain and swelling, and tenderness localized to the proximal hypothenar eminence occurs. The clinical picture arising due to fracture of the pisiform associated with other fractures of the carpal bones is dominated by signs and symptoms arising due to concomitant fractures, resulting in failure to detect the pisiform fracture. Our patient had signs and symptoms typical of a pisiform fracture, associated with a small abrasion over the palm.

Easy availability and cost-effectiveness of radiographs makes them the first choice investigation to diagnose these rare fractures. Special radiographic projections such as carpal tunnel, scaphoid or supinated oblique view are indicated if routine AP and lateral views fail to demonstrate a fracture<sup>5</sup>. MRI is reported to be a second-step imaging method in patients whose radiographs are negative or indistinct<sup>6</sup>. MRI not only shows the fracture line but also shows marrow edema within the pisiform bone indicating fracture<sup>5,6</sup>. MRI may be helpful to exclude additional carpal fractures and soft tissue injuries. In our case the fracture was detected on plain AP and lateral view. Thus special views and MRI were not required.

Early diagnosis and treatment of pisiform fracture is important as a missed diagnosis or delayed treatment may result in malunion or non-union resulting in chronic pain, weakness of grip and limitation of movement<sup>7,8</sup>. Late sequelae include pisotriquetral chondromalacia, subluxation and osteoarthritis consequent to poor alignment of the articular surfaces<sup>7</sup>. Literature on treatment of an acute fracture of pisiform is limited due to relative rarity to the condition. A review on wrist injuries

involving 6000 X-ray films identified only 13 pisiform fractures<sup>5</sup>. Immobilization in a cast for a period of four-six weeks is advised during the acute period. In our case, immobilization in a short arm cast for four weeks followed by physiotherapy produced a good clinical response.

## CONCLUSION

To summarize, isolated pisiform fractures are rare and require a high index of suspicion for early diagnosis and treatment. Pisiform fractures should be suspected when a patient presents with acute wrist pain located over the ulnar side of the wrist after direct trauma or a hyperextension injury to the wrist joint. Radiographs are the first choice for diagnosis and MRI of the wrist is reported to be the second step imaging method for patients in whom radiographs are negative or inconclusive. Early diagnosis, immobilisation in a below-elbow cast followed by mobilisation at 4-6 weeks gives satisfactory results and prevents further complications and disability.

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