Isolated nondisplaced transverse capitate waist fracture in an adolescent: An unusual case

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ABSTRACT
Isolated fracture of the capitate without dislocation is very rare and comprises just 1.3% of all carpal fractures, most commonly after falling on an open hand. Nonunion has been reported as the most common complication. Isolated and nondisplaced capitate fractures are successfully treated with cast immobilization. Here, a case of a 16-year-old boy who had isolated transverse nondisplaced capitate fracture is described. The wrist was placed in a rest position short-arm cast for 8 weeks. After immobilization with the cast had been finalized, range of motion and strengthening exercises began. In general, diagnosis of carpal bone fracture may be missed, especially in skeletally immature and adolescent patients. To prevent late diagnosis in such population, early control radiography should be performed. If further examination is required, computed tomography should be conducted. It is possible to achieve satisfactory results with cast immobilization in this age group. As a result, the authors advise surgical treatment for nonunion of capitate fracture, but conservative treatment should be considered for early period and acute fractures.

Key words: Carpal bone injuries, capitate bone, early treatment, imaging

Introduction
Capitate fractures (CFs) are among the rarest injuries, and account for only 1.3% of all carpal fractures. Isolated CFs comprise just 0.3% of all carpal injuries [1,2]. CFs occur most frequently in younger male patients who may be more prone to high-energy trauma than the general population and are commonly seen after falling on an open hand [3]. Isolated CF without dislocation is very rare and often non-displaced [4]. An isolated CF can be missed initially because it may produce only a few symptoms, and radiographs of a nondisplaced CF may not be diagnostic. However, delayed treatment can lead to posttraumatic arthritis, nonunion and avascular necrosis of the capitate head. Nonunion has been reported as the most common complication, ranging from 19.6% to 56% in isolated CFs [5]. Isolated and nondisplaced CFs are usually successfully treated with cast immobilization [6]. Displaced fractures should be reduced anatomically and fixed with K-wires or a mini Acutrack [4,6-9]. In the literature, surgery is advised for the treatment of nonunion CFs [5,10,11]. Here, a case with acute nondisplaced CF that was successfully treated conservatively is presented.
Case Report

A 16-year-old boy presented to the authors’ outpatient clinic that fell on his left hand while playing football. One day before, he had been to the emergency clinic where radiographs were taken but no fracture was observed (Figure 1). Upon physical examination, it was determined that minimal edema and pain with palpation of the scaphoid and metacarpal bones existed. Wrist range of motion was nearly full but the final stage was tender. There was also tenderness determined with an anatomical snuff box with palpation. Lichtman and Watson tests were negative. A forearm cast with thumb extension splint was applied, a non-steroidal anti-inflammatory drug was prescribed, and the arm was elevated. The patient was asked to visit the clinic for a control examination 10 days later. Advanced imaging techniques to control examination were planned to continue the pain mediation. Computed tomography (CT) and 3D CT clearly showed the transverse fracture in the capitate bone (Figures 2-3). Magnetic resonance imaging (MRI) was employed to visualize the nondisplaced fracture and bone marrow edema (Figure 4).

Conservative treatment for nondisplaced CF was advised. The wrist was placed in a short-arm cast for 8 weeks. After the immobilization had been finalized, range of motion and strengthening exercises were initiated. The patient was followed for nonunion and post-traumatic arthritis.

Discussion

CF is a rare injury, especially in adolescence, and is usually missed entirely, accounting for only 0.3% of all carpal fractures. Most of these fractures occur in association with additional carpal injury, particularly scaphoid fractures. This is usually the result of high-energy trauma. Isolated CFs usually occur after falling on an open hand [7]. Persistent localized tenderness over the capitate is the most important diagnostic sign [12].
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Capitate fractures are often missed entirely because the initial radiographies of nondisplaced fractures are usually nondiagnostic. CT is very helpful for diagnosis of isolated fractures. MRI is useful in diagnosing nondisplaced fractures when the initial plain radiographs are nondiagnostic [13]. MRI is beneficial in exhibiting avascular necrosis and for deciding whether there is union or nonunion [4,7,8]. The complication rate for capitate fractures is relatively high and the consequences significant [8]. Functional limitation is common secondarily to nonunion, avascular necrosis of the proximal pole, capitate collapse, symptomatic midcarpal arthritis, or associated injuries [1]. The outcome and the treatment modalities of isolated capitate fractures are not well described. Conservative treatment of capitatum can be decided by a clinician with peace of mind based on the stable anatomy of the capitatum. Schrijver et al. reported two cases of isolated capitatum fractures treated conservatively [8,14]. The orthopedists concurred with conservative treatment with initial cast immobilization (generally 6 to 12 weeks of immobilization), followed by mobilization within pain limits, because the displacement was minimal and the fracture fragment was small and did not rotate [8,14,15]. Displaced fracture of the capitate requires anatomic repositioning and internal fixation with headless cannulated compression screws or K-wires. The headless compression screw has an advantage over the K-wire as it provides compression across the fracture site and allows early wrist exercise [10].

**Conclusion**

Carpal bone fractures may be underdiagnosed, especially in skeletally immature and adolescent patients. In cases where initial plain radiographs do not show a fracture of the capitate, capitate fracture should be considered and the patient should be checked with repeated physical examinations and radiographs if there is suffering from persistent localized pain and tenderness over the capitate. If complaints persist, control radiographies should be taken as soon as possible. If further examination is necessary, CT and MRI are advised. Surgery is the recommended treatment for nonunion of a capitate fracture. However, patient age should also be taken into account because cast immobilization may be a suitable treatment choice for skeletally immature and adolescent patients.

**Conflict of interest statement**

The authors have no conflicts of interest to declare.

**References**

