

available at www.sciencedirect.comjournal homepage: www.elsevier.com/locate/inext

CASE REPORT

Paediatric multiple carpal fractures: A case report

Gauraang Bhatnagar^{a,*}, David Crone^b, Hasan Ahmed^b^a SHO to Mr. Hasan Ahmed, Consultant Trauma and Orthopaedics, Whipps Cross Hospital, Whipps cross road, Leytonstone E11 1NR London, United Kingdom^b Trauma and Orthopaedics Department, Whipps Cross Hospital, Whipps Cross Road, Leytonstone, E11 1NR London, United Kingdom

Accepted 16 January 2008

The case

An 11-year-old boy presented after sustaining an injury to his dominant right wrist after a brick wall had collapsed onto it. Standard radiographs of the hand were obtained displaying multiple carpal bone fractures (Figs. 1 and 2). Computerised tomograms confirmed the presence of fractures involving the capitate, hamate, triquetrum and pisiform (Figs. 3–5). He was managed conservatively in a below elbow cast for 5 weeks.

At 2-month follow-up he was completely pain free and the right wrist was minimally more swollen than the left. The patient was able to palmar/dorsi-flex to 50% on the right in comparison to the left. However a full range of pronation/supination was present. At this stage radiographs revealed the capitate and hamate had yet to unite.

At 4-month follow-up he remained asymptomatic; he recovered his full range of movement. Radiographs showed a healing capitate fracture. At 6-month follow-up he had a fully functioning non-painful wrist and was discharged from clinic.

The patient was recalled to clinic at 3 years. He was asymptomatic, using his wrist fully and was participating in all sports including goalkeeping in football. On examination the wrist was normal with no swelling and no deformity. There was no tenderness on palpation and no pain on stressing the wrist. Active range of motion was full and equal to

the normal wrist. Radiographs revealed that the capitate fracture had united but the hamate fracture remained ununited (Figs. 6–9). This was confirmed on CT scanning.

Discussion

Fractures and dislocations in the paediatric carpus are extremely rare. As an anatomical structure the immature carpus is a relatively cartilaginous and therefore fairly immune to injury.

Carpal injuries are often a diagnostic and therapeutic conundrum. The combination of a difficult to examine patient and the limited ability of X-rays to detail the immature skeleton are all contributing factors.^{2–7} Our patient was almost skeletally mature and the fractures were clearly evident on X-ray.

The Scaphoid is the most frequently injured carpal bone in children, and in adults; one of the few similarities in skeletally mature and immature patients.^{1–8} Single carpal bone fractures in children are uncommon. However multiple carpal fractures in this age group are very rare indeed. Goddard emphasises the importance of being aware of the possibility of combination injuries (particularly in association with distal radial fractures) and the value of MRI in excluding ligamentous damage.²

Garcia-Elias et al. proposed that crush injuries of the adult carpus involved a disruption of the transverse carpal arch. There is involvement of the flexor retinaculum and the capito-hamate and piso-triquetral joints. It was postulated that these joints acted as a “weak zone”. All described cases displayed medial dislocation of the ulnar structures as one unit, whilst the radial carpal bones

* Corresponding author at: Department of Trauma and Orthopaedics, Whipps Cross University Hospital, NHS Trust, United Kingdom. Tel.: +44 7971260857.

E-mail address: gkhatnagar@doctors.org.uk (G. Bhatnagar).



Figures 1–5 Plain radiographs and CT images of the initial injury.

remained protected perhaps by the padding afforded by the thenar muscles.³

The case may be different in children. Our patient sustained fractures of the capitate, hamate, triquetrum and pisiform (the ulnar-sided carpal bones) but with no medial dislocation.

It is important to be aware of the possibility of such injury especially in a younger child with a mainly cartilaginous carpus in which the diagnosis can be easily missed. We support the opinion of MRI as an important diagnostic tool.⁶ Open reduction is advocated for displaced injuries. Pin fixation provides temporary stabilisation without permanently compromising joint motion.^{2–6}

Little is documented on these combination injuries of the carpus in the English literature. Kamano et al. reported a good clinical result in an 11-year-old in which displaced fractures of the scaphoid, capitate and hamate were treated with wire fixation.⁵ Our study clearly displays that a comparable result can be obtained with conservative management without subjecting the patient to complications of operative fixation.

There is little documented in the literature on paediatric multiple carpal injuries. The condition is rare and our case illustrates that non-operative management of minimally displaced carpal fractures can serve to give a good result in the medium term despite the presence of non-union.



Figures 6–9 Plain radiographs 3 years post-injury displaying united capitate but non-union of the hamate.

References

1. Beatty, Light, Belsole, Ogden. Wrist and hand skeletal injuries in children. *Hand Clin* 1990;6(4):723–38.
2. Goddard. Carpal fractures in children. *Clin Ortho Rel Res* 2005;432:73–6.
3. Gracia-Elias, Abanco, Salvador, Sanchez. Crush injury of the carpus. *J Bone Joint Surg* 1985;67B(2):286–9.
4. Johnson, Haigh, Symonds. MRI in the management of scaphoid fractures in skeletally immature patients. *Paediatr Radiol* 2000;30(10):685–8.
5. Kamano, Fukushima, Honda. Multiple carpal bone fractures in an eleven year old. *J Orthop Trauma* 1998;12(6):445–8.
6. Light. Injury to the immature carpus. *Hand Clin* 1988;4:415–24.
7. Mahabir, Kazemi, Cannon, Courtemanche, Douglas. Paediatric hand fractures: a review. *Paediatr Emerg Care* 2001;17(3):153–6.
8. Vahvanen, Westerlund. Fracture of the carpal scaphoid in children. A clinical and roentgenological study of 108 cases. *Acta Orthop Scand* 1980;51:909–13.