Double Dislocations of the Fourth and Fifth Metacarpals

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Simultaneous double dislocations of the fourth and fifth metacarpals have not been reported previously in the literature. Even double dislocation of a single metacarpal is rare. Only two cases of these injuries of the little finger\textsuperscript{1,2} have been reported previously. This article presents a case of simultaneous dislocations of the carpometacarpal joints and metacarpophalangeal joints of the ring and little fingers in which the diagnosis was missed initially.

Case Report

A 19-year-old man was hit by an automobile while riding a motorcycle, resulting in unconsciousness. In the emergency department, subarachnoid hemorrhaging over the frontal lobe and a right femoral shaft fracture were noted. After 8 days of supportive treatment, the patient regained consciousness. Closed reduction and internal fixation with intramedullary rod for his femoral shaft fracture was performed.

The patient’s recovery was uneventful until 5 days after surgery, when swelling on the dorsum of the right hand and impaired motion of the fourth and fifth digits were noted. Radiographs of the right hand revealed double simultaneous dislocations of the fourth and fifth metacarpals with a dorsal fracture-dislocation in the fourth carpometacarpal joint, a dorsal dislocation of the fifth carpometacarpal joint, and dorsal dislocations of the fourth and fifth metacarpophalangeal joints (Fig 1).

Closed reduction for the dislocated metacarpal joints was unsuccessful. Open reduction was performed via a dorsal approach. A straight incision was made over the fourth metacarpophalangeal joint, and the extensor tendon and joint capsule were split. The volar plate was located in the dorsal aspect of the caught metacarpal head. Reduction was achieved with an elevator inserted into the plane between the volar plate and the metacarpal head, and levering the proximal phalanx distally and volarly. Reduction of the fifth metacarpophalangeal joint was achieved in the same way.

After reduction, stability of the metacarpophalangeal joints was satisfactory. The dislocated carpometacarpal joints were easily reduced but unstable. The joints then were openly reduced and fixed with transarticular K-wires, inserted from the head of the fourth metacarpal and obliquely from the shaft of the fifth metacarpal down to the distal carpal row, respectively (Fig 2).

Postoperatively, a volar splint was applied for 6 weeks and then the K-wires were removed. Active mobilization was encouraged. One year later, the patient had full range of wrist and finger motion. Functional recovery was satisfactory. Radiographs demonstrated no instability at the metacarpophalangeal and carpometacarpal joints (Fig 3).

Discussion

The exact mechanism of injury was difficult for this patient to recall. It is believed that a fall on the ulnar border of the outstretched hand dislocated the hyperextended metacarpophalangeal joints dorsally, and the force of the fall was transmitted longitudinally through the metacarpals to dorsally dislocate the slightly flexed fourth and fifth carpometacarpal joints.

It is well-known that dorsal dislocation of the metacarpophalangeal joint can seldom be reduced by closed manipulation because of trapping of the metacarpal head by the interposed volar plate and the stretched collateral ligaments dorsally, by the flexor tendons ulnarily, the lumbrical muscles radially, and the taut transverse fibers of the palmer fascia volarly.\textsuperscript{2} However, double dislocation of a metacarpal can be reduced easily by applying longitudinal traction because the more proximal dislocation, which shortens the bony skeleton, causes a functional shortening and thus loosening of those trapping components, permitting the metacarpal head to be dislodged.\textsuperscript{1,2} In cases where the diagnosis is delayed for 2 weeks, such as
with the patient described here, closed reduction is unlikely to be successful and open reduction will be necessary.

Previously, some authors have emphasized the necessity for longitudinal incision of the volar plate during open reduction of the metacarpophalangeal joint. We suggest that reduction of the metacarpophalangeal joint should be attempted first with a levering technique as described above before incision of the volar plate.

The configurations of the bases of the metacarpals play an important role in the pattern of carpal metacarpal dislocations. There is an increasing degree of concavity of each joint as one proceeds from the ulnar to the radial side of the hand. The bases of the second and third metacarpals have multiple articular facets that are firmly fixed to the carpus by thick, strong dorsal, palmar, and interosseous ligaments. The fourth and fifth metacarpals are mobile, with fewer ligamentous attachments and simpler base geometry. All of these factors account for the increased incidence of dislocation of the bases of the fourth and fifth metacarpals compared with dislocations of the four medial metacarpals.

REFERENCES

LUMBAR L5 BURST FRACTURE IN A CHILD
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Burst fractures were described in Denis’ classification as those involving two of the three columns, the majority being considered as unstable. Burst fractures of the spine in children are uncommon, but L5 burst fractures are exceptionally rare, with only 26 cases having been reported in the literature. Only two of the reported cases occurred in children aged 12 and 13. No cases have been reported in children <10 years old, even in extensive surveys.

Burst fractures at the L5 level are considered lumbar fractures due to the rarity, different treatment, and prognosis. This article reports an L5 burst fracture in a child.

CASE REPORT
A 9-year-old boy who fell off of a bicycle presented with intense lumbar back pain over the sacrum. No abnormalities were noted in the neurological examination.

Radiographs showed a seemingly L5 hyperflexion fracture (Fig 1), but computed tomography (CT) and magnetic resonance imaging (MRI) scans showed an L5 burst fracture with superior and inferior end plate fractures, discrete bony retropulsion, and posterior cortical fracture of the vertebral body (Figs 2 and 3).

The patient was treated by postural reduction and bed rest for 2 weeks, and was placed in a body cast with leg extension in hyperextension for 6 weeks. A CT scan taken 4 months later showed complete resolution of the fracture.

Two years later, the patient remains asymptomatic without loss of lordosis (Fig 5) or scoliosis. The vertebral body has normal height and there is no progression of collapse. The patient is able to participate completely in sports.

DISCUSSION
L5 burst fractures are extremely rare in childhood. Because of the density of the cancellous bone density, spine fractures in children usually have slight displacement on radiographs and CT scans, and for this reason, CT scans usually are not performed. Twenty percent of burst fractures are compression fractures.

The mechanism by which the vertebral body fails depends on the role of fluid pressurization, which enhances the compressive strength of the