

CASE NOTE

# Extracapsular extrusion of a horizontal metacarpal head fracture

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Intra-articular fractures of the metacarpal head are rare, often requiring surgical fixation to maintain articular congruence.<sup>1</sup> McElfresh and Dobyns<sup>2</sup> presented a 10-group classification of 103 such fractures based on anatomic involvement and fracture pattern (Table 1). They identified only 4 with a horizontal fracture pattern. On a further review of the literature, Hastings and Carroll<sup>3</sup> identified 4 additional cases with this pattern. Surgical management, long-term outcome and the possibility of extrusion of the metacarpophalangeal joint capsule were not described.

We report the unusual case of a horizontal fracture of the metacarpal head, complicated by 90° dorsal rotation about a transverse axis, and extrusion of the head fragment from the joint capsule. We describe our approach to assessment, surgical management and successful restoration of function.

**CASE REPORT**

A 45-year-old man presented with painful swelling of his left third metacarpophalangeal (MCP) joint after landing on the hand in a closed-fist position. Physical examination revealed abrasions over the dorsum of the hand, crepitus and a decreased range of motion of the third MCP joint. There were no sensory or vascular disturbances. Radiographs demonstrated a dorsally displaced, intra-articular fracture of the head of the third metacarpal, with the articular surface dislocated from its normal articulation with the proximal phalanx (Fig. 1). The patient consented to surgery.

Type	No. fractures
Epiphyseal injuries	4
Collateral ligament avulsions	17
Osteochondral	8
Oblique (sagittal)	22
Vertical (coronal)	4
Horizontal (transverse)	4
Comminuted	31
Boxer's into joint	3
Loss of substance	6
Avascular necrosis	4
Total	103

Adapted from McElfresh EC, Dobyns JH. Intra-articular metacarpal head fractures. *J Hand Surg (Am)* 1983;8:384.<sup>2</sup>



**Fig. 1.** Anteroposterior and lateral radiographs at the time of injury reveal a dorsally displaced intra-articular fracture of the head of the left third metacarpal, with the articular surface dislocated from its normal articulation with the proximal phalanx.



**Fig. 2.** Anteroposterior and lateral radiographs 10 months after open reduction and internal fixation demonstrate no evidence of avascular necrosis or subchondral collapse.

The surgeon made a longitudinal incision dorsally over the third MCP joint, incising the sagittal band just ulnar and parallel to the extensor tendon. Immediately the entire articular surface of the distal metacarpal could be seen. It had rotated 90° about a transverse axis in the sagittal plane and faced dorsally. The large, crescentic fragment, which consisted of articular cartilage, subchondral bone and some metaphyseal bone, had displaced and was completely extruded from the dorsal joint capsule. The surgeon took care to preserve the minimal remaining dorsal synovial attachment to the fragment. Fine K-wires provided anatomic reduction initially, then 3 countersunk 1.3-mm screws near the articular margin provided definitive fixation. Use of an image intensifier helped to confirm the anatomic reduction and stable fixation during passive range of motion (ROM). After closure of the joint capsule, extensor hood and skin, we applied an initial plaster splint in the “safe position” (MCP joints flexed and interphalangeal joints extended).

At 3 days postoperatively, we removed the plaster splint and replaced it with a removable thermoplastic splint. We removed the splint daily for active flexion and passive extension ROM exercises. At 4 weeks postoperatively, we discarded the splint and began progressive ROM and strengthening exercises. By 8 weeks, radiography demonstrated bony union of the fragment. The patient had regained almost full active flexion and extension. Radiographic follow-up at 10 months postoperatively did not demonstrate any evidence of avascular necrosis, subchondral collapse or secondary arthritic changes (Fig. 2).

## DISCUSSION

Historically, the prognosis for displaced intra-articular

horizontal fractures of the metacarpal head is poor. The most commonly reported complications are avascular necrosis and joint stiffness secondary to scarring of the ligamentous structures.<sup>1,2</sup> In 3 of the 4 cases identified by McElfresh and Dobyns,<sup>2</sup> necrosis became evident 3–12 months postoperatively. Blohm and Hansen<sup>4</sup> reported a single case with 180° longitudinal rotation of the distal MCP joint fragment. They performed open reduction, fixing the distal fragment with a single K-wire for 4 weeks. At the final 3-month follow-up, the patient had an extension defect of 5° but no sign of necrosis. In our case of fragment rotation complicated by complete extrusion from the joint capsule, no postoperative complications were apparent after 10 months of follow-up.

Care and attention to the physical examination and radiographic images is important in recognizing a rare, extracapsular extrusion. The contour and shape of the involved bones should be compared with adjacent digits and the uninjured side. The location and position of a fragment that has button-holed through the capsule would preclude any attempt at closed reduction. Anatomic reduction and stable internal fixation are imperative to allow early active ROM exercises and minimize the risk of postoperative stiffness. During the surgical approach, the surgeon must show increased vigilance to limit injury to the articular cartilage, since the fragment lies beneath only the skin and extensor mechanism. The head fragment is at substantial risk for devascularization. Therefore, it is imperative to preserve any remaining blood supply. Similar to fractures in other anatomic areas that have a precarious blood supply (e.g., the scaphoid), monitoring for avascular necrosis must extend beyond the time required for fracture healing.<sup>5</sup> We suggest that clinical and radiographic surveillance continue for up to 1 year postoperatively to ensure that late avascular necrosis does not develop.

**Competing interests:** None declared.

## References

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