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Comminuted distal radial fracture with 180º rotation of an articular fragment

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Abstract

A case of an unusual comminuted intra-articular fracture of the distal radius with 180 degrees rotation of the palmar medial fragment is reported.

Introduction

Intra-articular fractures of the distal end of the radius constitute a distinct and complex group of injuries [5]. Based on radiographic analysis, Melone [8] identified four basic patterns of articular fragmentation. We present an intra-articular fracture of the distal end of the radius, with 180 degrees rotation in the saggital plane, of the palmar medial fragment. We could find only a few previous reports of this type of injury in the literature [3,10]. We report this case to emphasize the need for proper radiographic evaluation and operative treatment.

Case Report

A 37-year-old man fell off from a 10 m high roof, on his right side and sustained a craniocerebral injury and a comminuted intra-articular fracture of his right distal radius. On admission, he was in confusion, had normal vital signs and was bleeding from the right side of his head.

Physical examination of his right hand showed gross swelling of the wrist. The skin and neurovascular status was intact. Initial roentgenograms of the wrist showed dorsal subluxation of the carpus, non-displaced fractures of the radial and ulnar styloid processes, 180-degrees rotation of the palmar medial fragment and displaced fracture of the dorsal rim of the radial articular surface (Fig. 1).

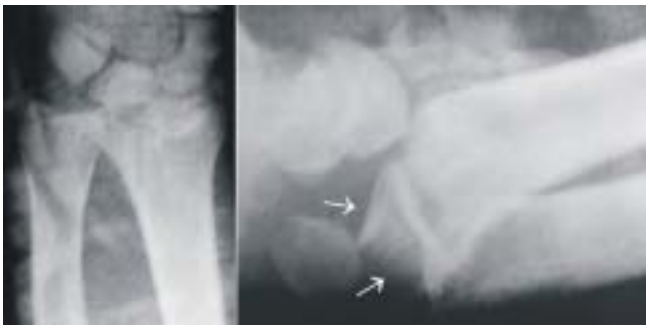

Figure 1: *PA and lateral view on admission demonstrates an intra-articular fracture of the distal radius with 180^{o} rotation of the palmar medial fragment (white arrows).*

Initial management consisted of closed reduction and forearm casting. The patient was admitted at Intensive Care Unit for monitoring. CT scan of his brain showed multiple cerebral abrasions and a fracture of his right temporal bone.

Surgery was performed 5 days after injury. Through a dorsoradial incision, reduction and fixation of the large rotated fragment with Kirschner wires, was achieved. Corticocancellous bone fragments floating free in the joint, being too small for fixation, were discharged. Norian SRS® was used to fill in the resulting defect. The carpus was immobilized with an external fixator device for 6 weeks. When examined 26 months after injury the patient had no complaint of pain. The range of motion was 30% of normal extension, 70% of normal flexion and 80% of normal pronation and supination when compared with the opposite wrist. Grip strength was 50% of the opposite wrist. X-ray films showed a healed fracture of the distal radius (Fig. 2).

Figure 2: *PA and lateral view 26 months postoperatively, demonstrating a healed intra-articular fragment of the distal radius.*

Discussion

Intra-articular involvement has long been recognized as poor prognostic factor in fractures of the distal radius. These fractures comprise a wide spectrum of injuries for which optimal management requires differing methods of treatment.

Preservation of articular congruity is the cornerstone for a successful recovery. Based on radiographic analysis, Melone [8] formulated a classification of intra-articular fractures of distal radius along with specific operative indications. Fractures with significant separation or rotation of the palmar and dorsal medial articular fragments, (type IV injuries) are considered unstable and always require open reduction and internal fixation. The mechanism of injury presumably involves two types of forces: the typical axially directed impaction of the lunate against the medial articular surface of the radius, which can produce displacement of a palmar medial fragment and additional rotational forces that could allow disruption of the soft tissue attachments to the former fragment, allowing rotational displacement [2].

Nerve contusion is the prominent complication. The median nerve could be injured at the sharp edge of the radial metaphysis just proximal to the carpal tunnel; the ulnar nerve is compressed by the displaced palmar medial fragment or the subluxed ulnar head at the proximal aspect of Gyon's canal.

The extent of articular disruption may not be evident on plain films or may only become apparent following an attempt at reduction. In these uncertain cases, distraction views or computed tomography can facilitate an accurate diagnosis [4].

External fixation, either static or dynamic, is a method that provides supplementary stabilization and secures immobilization during the period of fracture healing [1,6]. Internal fixation usually requires a far more extensive exposure, occasionally combining dorsal and volar approaches [9]. The contribution of metaphyseal comminution to articular fracture instability and irreducibility can be coped with using cancellous bone grafting [7]. Our case is an example of a type IV injury, with 180^{o} rotation of the palmar medial articular fragment, causing a complete reversal of its articular surface toward the radial shaft. There weren't any neurovascular complications. The lesion was clearly visible on lateral radiographs. We used an external fixator device for stability, Kirschner wires to restore the articular congruity and

Norian SRS® to reconstitute the subchondral metaphyseal defect. Although the displacement of the fracture was so severe and the follow-up period is quite short, the result so far is favorable and coincides with Melone's proposals indicating meticulous restoration of the articular surfaces.

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