A RARE CASE OF TRIFOCAL RADIUS FRACTURE

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Abstract

Trifocal fracture of a radius is a rare injury. Trifocal factures involving the shaft of a radius were previously mentioned in a few literature. This type of fractures, involving proximal, shaft, and distal radius with ulna shaft fracture, has also been reported once. However, to the best of our knowledge, our report is the first describing trifocal injuries affecting the shaft and proximal and distal intraarticular part of the radius with an intact ulna shaft. Thorough clinical and radiological assessments are necessary for diagnosis as these injuries are commonly missed. We would like to share the presentation of this rare case and the importance of the correct management to achieve a good outcome.

Keywords Radius, Trifocal, Radial Fracture

Introduction

Radius fracture is commonly encountered in clinical practice. It can be further categorized based on the location of the fracture. Distal radius is the commonest, making up 8-15% of adult radial fractures (1). Unifocal radius fracture is frequently seen, while bifocal and trifocal radius fractures are rarely encountered. A multifocal injury is defined as the presence of more than one fracture in the same limb, provided the fractures are independent of each other. Only 6% of multifocal upper limb fractures are trifocal injuries, as described in a report (2). Multifocal fractures of a humerus and a femur had previously been mentioned (3, 4). Based on our literature research, there were limited reports of trifocal fracture of a single radial bone. However, these fractures often involved the diaphyseal part of the radius (5, 6). In this article, we report a rare case of ipsilateral trifocal radius fracture involving the distal end of the radius, radial styloid process, shaft and radial head with concurrent ulna styloid and coronoid process fracture.

Case presentation

A 54-year-old right-hand dominant gentleman was presented with a left elbow, forearm, and wrist pain following a self-road traffic accident. He sustained direct trauma to his forearm with an outstretched left elbow and wrist in a dorsiflexed position. Upon examination, there was tenderness over the proximal, middle, and distal forearm with painful restriction motion over the left elbow and wrist. His forearm was swollen, but the compartments were soft. Furthermore, the neurovascular assessment was not remarkable.

A plain radiograph revealed radial head, radial shaft, radial styloid, and as well as ulna styloid fracture. He was then immobilized in an above-elbow backslap with elbow flexion at 90 degrees and forearm in supination. A computerized tomography was performed over the left elbow and left wrist to assess the intraarticular fracture configuration.

The left elbow computerized tomography revealed a displaced comminuted fracture of the radial head with extension to the radial neck and a comminuted fracture of the coronoid process of the ulna. The left wrist computerized tomography demonstrated an undisplaced radial styloid fracture. Another minimally displaced intraarticular fracture was observed medially involving the distal radio-ulnar joint.

Open reduction and internal fixation were planned. However, due to the overwhelming number of emergency cases during the pandemic period, his operation was delayed. He was subsequently scheduled for surgery two weeks later.

During the second hospital admission for elective surgery, he no longer had pain over the proximal forearm. Upon examination, the elbow range of motion was acceptable, with flexion and extension at 30 to 90 degrees and supination and pronation at 45 degrees. There was no bony tenderness over the proximal and distal forearm, but there was still tenderness over the mid-forearm. As a result, the radial head fracture was treated conservatively, and a plating of the left radius was performed. The distal radio-ulnar joint was noted to be stable intraoperatively, and he was discharged home uneventfully after the operation.

He had a follow-up consultation at the orthopaedic clinic with repeated radiographs. At third months follow-up, he was able to achieve a satisfactory range of motion over the elbow and wrist with no limitation in his daily activities. Radiographs revealed a united radial head and styloid fracture with callus formation over the shaft.

Discussion

This patient showed a rare injury of upper limb trauma. While fractures of the radius and upper limb are common, multifocal fractures in an individual bone are less frequently encountered. In a study by Broadbent et al. (2), multifocal fractures comprise only 1.3% of all upper limb fractures (2). The majority of multifocal fractures are bifocal fractures, with only a few trifocal fractures. The multifocal fractures described involve multiple bones in the upper limb, with the commonest involving the distal radius and ulna with proximal humerus fracture. There was no reported case of trifocal fractures involving a single bone in the study (2).

Ibrahim et al. (2011) described a trifocal fracture involving a single radial bone (6). However, the fracture involves the diaphyseal part of the radius resulting from high-energy trauma, and there was no proximal or distal radius involvement. In this case, open reduction and internal fixation in the form of plating were performed, with positive results. In 2015, Raval et al. (7), reported another two cases of ipsilateral multifocal radius fracture. Similarly, the multifocal fractures reported involved the radial shaft without proximal or distal radius fractures. In his report, nailing was performed in one of the cases, while plating was performed in the other case. Some studies, nevertheless, describe multifocal injuries involving a single radius in which an ipsilateral radial shaft fracture is accompanied by radial head dislocation (8-10). However, there have not been published reports of fractures involving several radius fragments and an intact ulnar shaft.

Surgical fixation of a distal radius fracture should be considered in fractures with intra-articular step-off greater than 2 mm, radial height reduction of more than 3 mm, and dorsal tilt greater than 10 degrees (11). Lafontaine et al. (1989), stated a few parameters that need to be evaluated: initial dorsal angulation of more than 20 degrees, dorsal comminution, radiocarpal articular involvement, associated ulna fracture, and age of more than 60 years old. The presence of at least three of these factors is associated with unstable cast immobilization, and surgical treatment is strongly recommended (12). Mason classification is the most popular guideline used to manage a radial head fracture. Mason type I fracture is minimally displaced and can be treated non-surgically. Displacement of at least 2mm or more is considered Type II, and ORIF is recommended. Excision of the radial head or arthroplasty surgery is indicated when the radial head is severely comminuted (type III) (13). As for our patient, we plan to treat the radial styloid fracture conservatively due to minor intra-articular steps and displacement. Although the displacement was less than 2 mm, after considering patient's age, intraaticular involvement and fracture comminution, we advocated surgical fixation for the radial head fracture. However, the patient refused surgical intervention for the radial head fracture as he experienced no more pain over the elbow and was satisfied with the range of motion at the time of counselling. The patient was informed of the complications and risks of conservative management, and he still opted for conservative management for the radial head fracture. As for the radial shaft, ORIF was planned to achieve anatomical reduction and absolute stability.

Our patient exhibited a unique injury pattern. He sustained a trifocal radius fracture involving different parts of the ipsilateral radius from a single trauma event. After a few weeks of delay in surgery during the pandemic season, he regained the functional range of motion of the elbow. Ultimately, he underwent fixation for the radial shaft while the radial head was treated non-surgically. Clinically, there was an acceptable range of motion of his elbow and wrist. Plain radiograph at three months demonstrated fracture union for all three injuries.

The favourable outcome for the radial head fracture in this case could be contributed by the minimal articular depression and fracture angulation. Regardless, good results are reported to be achieved in both conservative and surgical management in Mason II fractures (14). However, the worrisome aspect of conservative management is the high rate of post-traumatic radio capitellar arthritis in the future.

Conclusion

Trifocal fractures involving different parts of the radius are rare. This case report highlights the importance of assessment of the proximal and distal joints of a fractured radial shaft to avoid missing concurrent injuries. Thorough clinical and radiological assessments are vital in providing the patient with the best functional outcome with the least complications. Computerized tomography is recommended for intra-articular fractures to evaluate the indications for surgery. We recommend surgical intervention for a trifocal radius fracture that involves proximal and distal articular sites and the shaft if the indications are met. Our patient had a satisfactory outcome even though the displaced radial head fracture was not surgically addressed.

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Competing interests

The authors declare that there is no conflict of interest.

Financial support

The authors declare that there is no financial support received for this case write up.

Informed consent

Verbal and written informed consents were obtained from the patient's next of kin for inclusion in this case report

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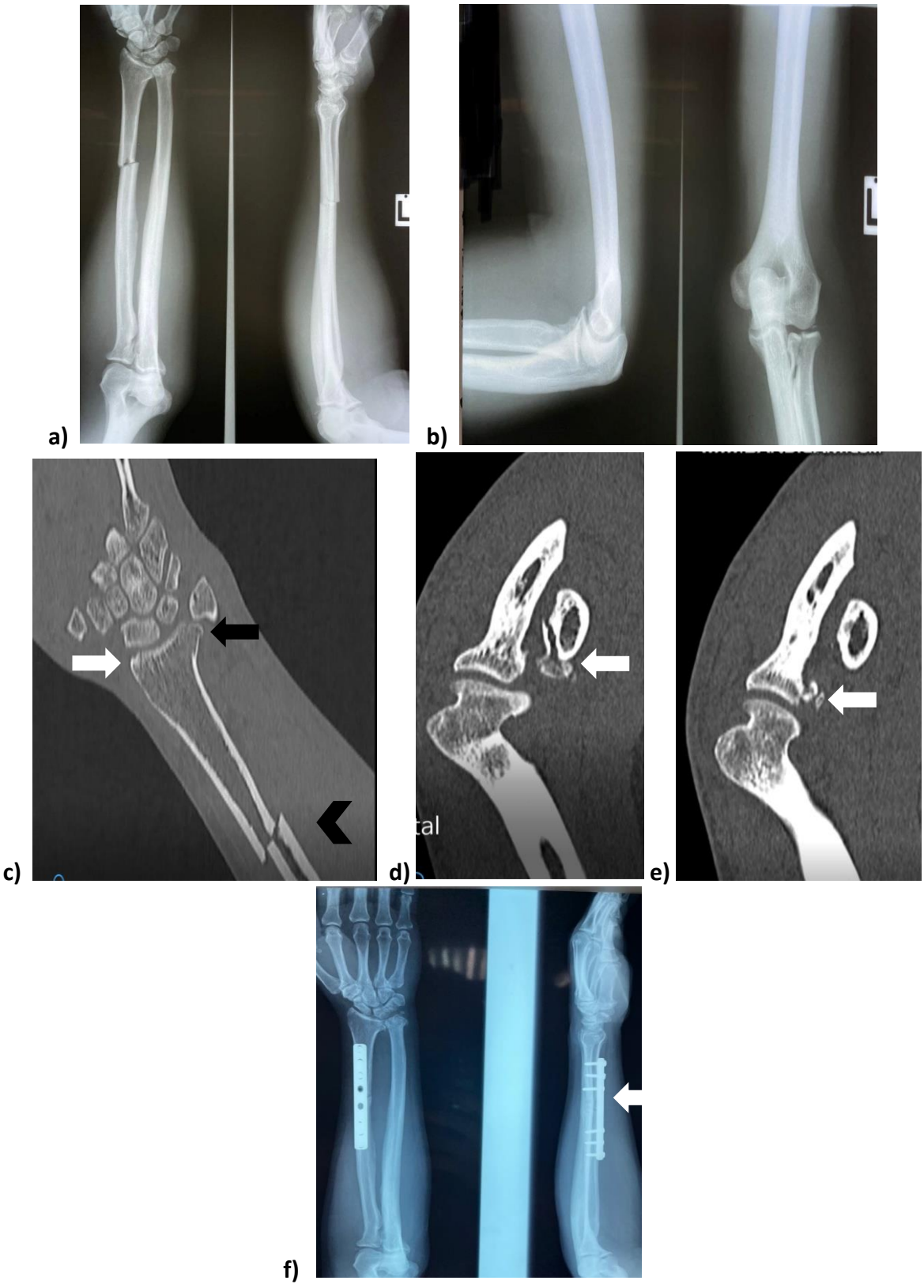

Figure 1: (a) and (b) Plain radiograph performed on the day of the trauma demonstrating a left midshaft radius fracture with radial styloid (white arrow) and radial head fracture (black arrow). We proceeded with computerized tomography that showed an undisplaced radial styloid (white arrow), minimally displaced medial distal radioulnar joint intraarticular fracture (black arrow) and a diaphyseal radius fracture (black chevron) (c). (d) a displaced radial head fracture (white arrow) with 5 mm intraarticular step and radial neck extension was observed (e). A small coronoid process fracture (white arrow) is visualized as well (f). Due to the time constraint in the pandemic season, we proceeded with plating the radial shaft while the radial head was managed conservatively

a) 

b) 

c) 

e) 

Figure 2: (a) and (b). Photos taken three months post-surgery demonstrate an acceptable range of motion of the left forearm. The supination is between 0-75 degrees while the pronation is between 0-45 degrees, comparable to the normal site (c) The left elbow has satisfactory flexion from 15-120 degrees, almost similar to the right elbow