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Bilateral Concomitant Radial Head and Capitellar Fractures: A Case Report

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Abstract

Concomitant bilateral radial head and capitellar fractures is a rarely mentioned entity.

We present a case of a 36-year-old male presenting for fall on both outstretched hands, resulting in bilateral elbow pain and limited ROM. Imaging showed concomitant bilateral radial head and capitellar fractures. The right elbow underwent capitellar fixation with countersunk Herbert screws and excision of the displaced radial head fragment. Conservative treatment was chosen for the left side. Post-op follow-up showed good bone healing with return to normal ROM bilaterally.

Elbow fractures are complicated to treat, but good understanding of the treatment methods can nonetheless result in satisfactory results when applied properly.

Introduction

Among elbow fractures, radial head fracture is the most common one to occur, and various injuries can be associated [1]. This fracture often occurs after a fall on an outstretched pronated forearm, which can also result in axial load transmission to the capitellum; which in turn; can lead to a concomitant capitellar fracture [2]. Concomitant fractures are rare, the association between the two was 1.7% in a series of radial head fractures and only a few case reports and studies have been written about this combination [3].

We are presenting; what is to our knowledge; the first reported case of a bilateral radial head and capitellar fractures. No mention of this association of fractures occurring bilaterally was found.

Case Report

This is the case of a 36-year-old male patient who presented to our emergency department with bilaterally swollen and painful elbows after a fall on both outstretched hands from approximately a height of 1.5 meters. Neurovascular exam was normal in both upper extremities. Physical examination showed tenderness to palpation at the radial head and lateral condyle bilaterally, more severe on the right side. Motion of the right elbow was restricted, ranging from 30-80 degrees in flexion and extension and limited to approximately 20 degrees in pronation and supination. The left elbow had a nearly normal range of motion with minimal limitation in the extremes of flexion and extension with a ROM

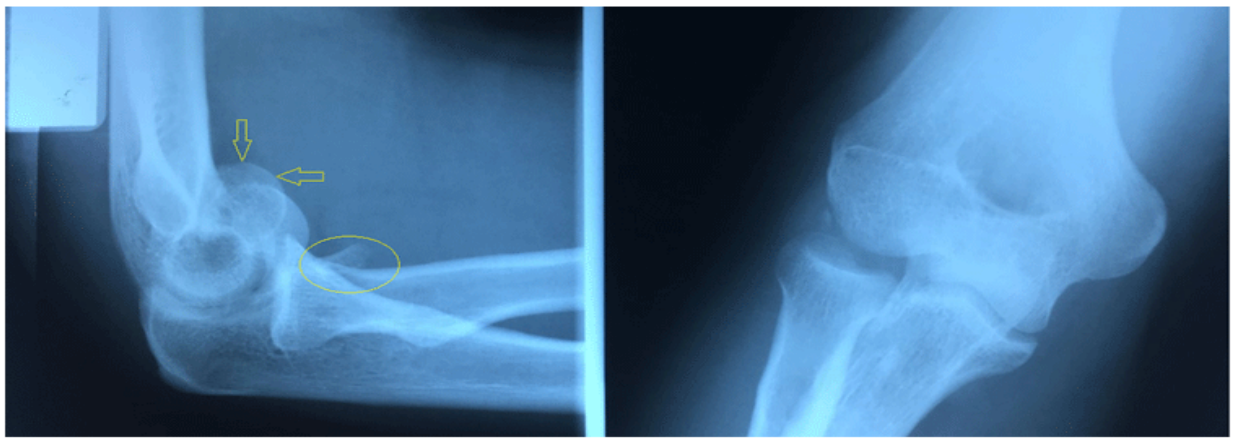

Figure 1: Lateral and AP views of the right elbow joint showing fracture of the radial head as well as capitellar fracture.

of 20 - 130 degrees and normal pronation supination ROM. Varus stress test of the right elbow showed elbow instability, valgus stress test was normal. Varus and valgus stress tests of the left elbow were normal. Imaging showed bilateral fractures of the radial head as well as capitellar fractures (Fig 1). On the right side; CT scan with 3D reconstruction showed the radial head fracture that was classified according to the modified Mason classification as a type II (displaced, non-comminuted) fracture, and the capitellum had a coronal shear fracture that was classified as a type I fracture as per the McKee modification of the Bryan and Morrey classification (Fig 2).

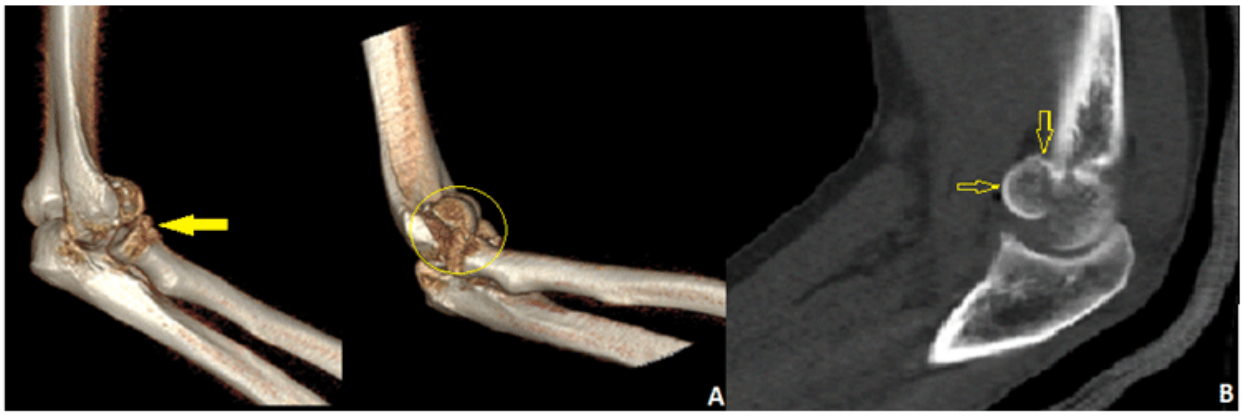

Figure 2: A- Right arm radial head fracture classified as a type II (displaced, non-comminuted) fracture according to the modified Mason classification. B- Right arm capitellum coronal shear fracture classified as a type I fracture as per the McKee modification of the Bryan and Morrey classification.

The left elbow imaging also showed a concomitant radial head and capitellar fractures (Fig 3). On CT scan with 3D reconstruction a type I radius fracture (minimally displaced) and a type II fracture of the capitellum (cartilage sleeve with minimal subchondral bone involvement) were seen (Fig 4). So our decision was to proceed with conservative management for the left upper extremity, whereas surgical treatment was deemed necessary for the right elbow.

The patient underwent surgery 12 hours after the trauma. The right elbow joint was exposed through a lateral (Kocher) approach. The radial head was found to have a 2-part fracture with a small anteromedial fragment displaced antero-distally and the remainder of the radial head was intact. The displaced fragment was removed because it was found to be too small for proper fixation. The capitellar fragment was about 1.5 x 1 cm and contained the majority of the articular surface. Reduction and temporary fixation was done with a 1 mm Kirshner wire. Definitive fixation was done with 3 countersunk Herbert screws placed in the antero-posterior direction (Fig 5). Three anchors were used for anatomic repair of the lateral collateral ligament, after which varus stress test was done intra-operatively and the elbow was found to be stable. The left elbow was examined under general anesthesia, a full ROM was noted with no valgus or varus instability, thus an arm sling was chosen as conservative treatment with immediate mobilization of the elbow.

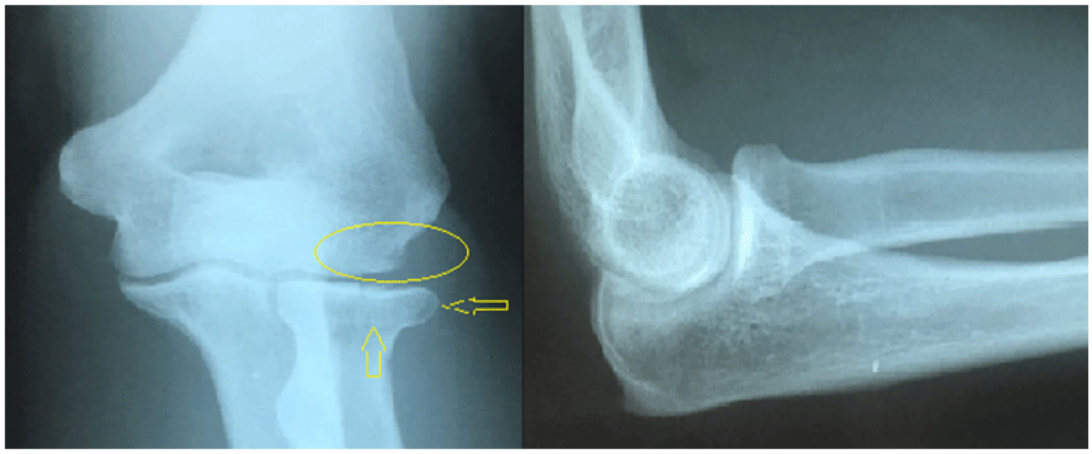

Figure 3: AP and Lateral X-ray of Left elbow showing a concomitant radial head and capitellar fractrures.

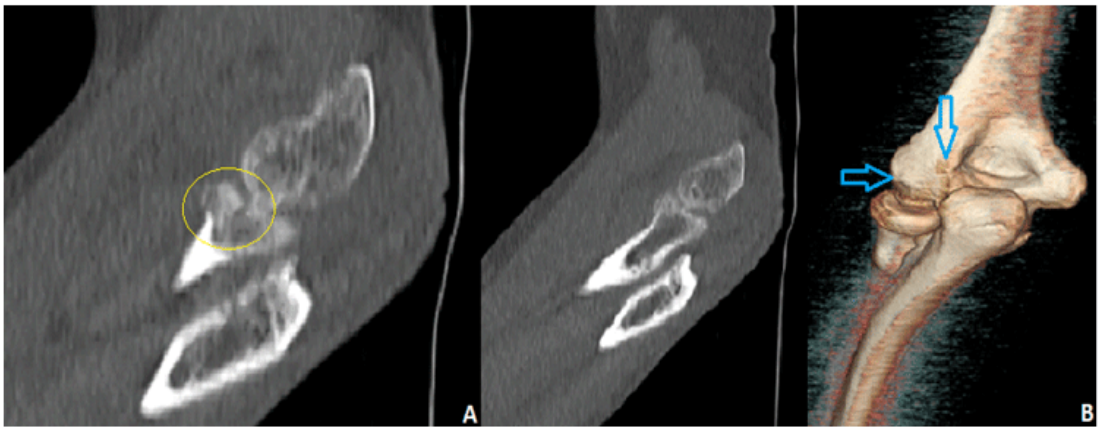

Figure 4: A- Left elbow type I radius fracture with minimal displacement. **B**- Left elbow type II capitellum fracture with cartilage sleeve and minimal subchondral bone involvement.

Figure 5: Definitive fixation was done with 3 countersunk Herbert screws placed in the antero-posterior direction along with three anchors which were used for anatomic repair of the lateral collateral ligament after which varus stress test was done and the elbow was found to be stable.

Immobilization by a posterior splint of the right elbow was used for 3 weeks post-operatively. 1 week after the procedure active elbow ROM was started, followed by active assistive exercises at 12 weeks. At that time, patient had regained nearly full ROM, with only slight limitation in the extreme of flexion. No instability on valgus and varus stress testing was noted and patient was satisfied with the treatment.

Discussion

Concomitant radial head and capitellar fractures occur with falls on outstretched hands with the elbow partially flexed or extended. Damage to the capitellum occurs due to transmission of an axial force from the radial head across the radiocapitellar joint, with the capitellum more likely to be damaged when the force it receives is greater. This association of injuries is most likely more present than previously believed, and is frequently missed leading to elbow stiffness, chronic pain, intra-articular loose bodies, malunion, and nonunion. Therefore, radiocapitellar articular surface open reduction and internal fixation when needed is of utmost importance [2,4].

Capitellum fractures as per the McKee modification of the

Bryan and Morrey classification are divided into 4 types. Type I (Hahn-Steinthal fracture) involves a large osseous piece of the capitellum and can also involve the trochlea. Type II (Kocher-Lorenz fracture) is a shear fracture of articular cartilage (articular cartilage separation) with very little subchondral bone attached to it. Type III (Broberg-Morrey fracture) is the multifragmentary severely comminuted capitellar fracture. Type IV (McKee modification) is a coronal shear fracture that includes the capitellum and trochlea. Non-displaced type I and II fractures can usually be conservatively treated. ORIF is indicated in displaced fractures and in types III & IV fractures. Fragments that are too small for fixation should be removed. [5,6]

The Hotchkiss modification of the Mason classification of radial head fractures was used. It consists of 3 types; type I is a non or minimally displaced (< 2mm) radial head fracture, type II is an angulated radial neck fracture or displaced radial head fracture (> 2mm), and type III is a comminuted fracture. Typically type I are treated conservatively, type II & III are treated by ORIF, and Arthroplasty is reserved for the highly comminuted. As like in the capitellum, fragments that are too small to be fixed should be excised. [2,6]

Milch, in 1931, was the first to describe an association between these two fractures, and his treatment was to resect the radial head and the capitellar fragments. [8]

A few case reports were published afterwards describing the same association of fractures with the standard of surgical treatment shifting from the initial resection of the radial head and of the capitellar fragment; to internal fixation of the fragments whenever possible, radial head arthroplasty if the radial head was too comminuted, and resection of the fragments judged to be too small for fixation [2,8-13].

Other associated findings such as interposition of a cartilaginous segment of the capitellum in the radial head fracture line was reported several times such as by Milch; and Newman in case reports as well as by Ward & Nunley and Caputo in larger case series [8,10,13,14]. The standard of care nowadays in these cases is removal of the interposed segment that is too small for fixation with appropriate surgical treatment of the radial head according to the characteristic of the fracture.

A concomitant medial collateral ligament rupture was described in a published case report in 1982 by Hendel, which emphasizes the necessity to keep in mind the possibility of an unstable elbow associated to these fractures and to address the ligamentous injuries when present [9].

Claessen et al published a study in 2016 that aimed to investigate what radial head fracture type might be associated with a concomitant capitellar fracture [2]. They concluded that type II radial head fractures are more likely, when compared to other radial head fractures, to have an associated capitellar fracture. However, their study didn't include any type III fractures. So further studies are still needed to settle this question.

In our case, latest follow-up was done at 8 months post-operatively and patient satisfaction was perfect. Full range of motion in terms of pronation, supination (Fig 6) and extension was found in both elbows (Fig 7). When it comes to flexion, the left elbow has full range of motion whereas right elbow flexion was limited to 130° (Fig 8).

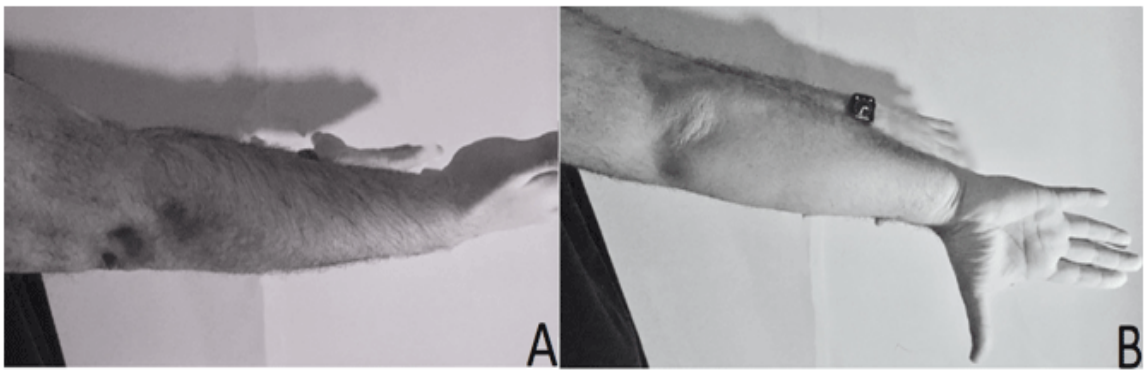

Figure 6: Full range of: **(A)**supination and **(B)**pronation was seen on physical examination in both elbows on 8 months follow up.

Figure 7: Full extension in both elbows was seen on physical examination on 8 months follow up

Figure 7: (A) Left elbow showed full range of flexion on examination. (B) Right elbow showed a limited range of flexion reaching 130° on 8 months follow up.

These results can be credited to the decision to excise the small radial head fragment and fixation of the capitellar fragment. Trial of fixation of the radial head fragment could have caused more harm by damaging the rest of the radial head. The capitellar fragment size was also suitable for fixation by 3 Herbert screws, which provided good fragment compression and permitted early physiotherapy of the elbow that is essential for proper recovery of the elbow's range of motion.

Good surgical results can be achieved by proper radiological examination pre-operatively, with the use of CT scan with 3D reconstruction for better assessment of the fractures characteristics when needed. Associated radial head and capitellar fractures are rare, but should always be suspected when one of the two fractures is present, and elbow stability should always be properly examined. Surgical treatment should be intended to achieve stable anatomic reduction of the articular surfaces with early ROM whenever possible.

Conclusion

Stability of the elbow joint is due to both dynamic and static constraints. Static constraints are divided into primary and secondary: The primary static constraints are due to the lateral collateral ligament complex, the anterior bundle of the medial collateral ligament and the ulnohumeral articulation. The secondary static constraints are the radial head and the joint capsule. Dynamic stabilizers mainly consist of the common extensor and flexor groups. The most common mechanism for complex elbow fractures is a fall on an outstretched hand or due to direct trauma to the elbow joint. The most common type of fractures is radial head fracture, which can rarely be associated

with a concomitant capitellar fracture. Complex elbow fractures are treated surgically, with the aim to obtain a stable fixation with anatomic reduction and early mobilization of the elbow joint. The most common complications include stiffness and recurrent instability. Hence, the optimal outcome is to have a stable fixation with early mobilization and physical therapy.

Acknowledgements

*RA analyzed and interpreted the patient's data and is a major contributor in writing the case report, HA contributed in the analysis of the data and the writing of the case report, JM contributed in writing the case report and doing a literature review of the subject, ES contributed in the writing of the manuscript and in editing the text, MD contributed in the writing of the manuscript and in editing the text, DA contributed in the writing of the manuscript and doing a literature review, GER contributed in the analysis of data, in the writing of the manuscript and literature review.

Consent

The patient has given their informed consent for the case report to be published. No information that might refer to his identity is used in this article.

Reference

1. Ufuk Nalbantoglu, Arel Gereli, Baris Kocaoglu, Seref Aktas, Metin Turkmen. Capitellar Cartilage Injuries Concomitant With Radial Head Fracture J Hand Surg. 2008;33(9);1602-1607 Doi: 10.1016/j.jhsa.2008.05.016
2. F. M. A. P. Claessen A. R. Kachooei K. K. J. Verheij G. P. Kolovich Chaitanya S. Mudga. Outcomes of Concomitant Fractures of the Radial Head and Capitellum: The "Kissing Lesion", J Hand Microsurg 2016;8(2):100–105. Doi: 10.1055/s-0036-1585430
3. MacDonald JA, and McGoey PF. Fracture of the articular portion of the capitellum of the humerus in adults. Can Med Assoc J 1959;81:634-636.
4. Emilie V. Cheung. Fractures of the Capitellum. Hand Clin. 2007;23(4):481–486. Doi: 10.1016/j.hcl.2007.08.001
5. McKee MD, Jupiter JB, Bamberger HB. Coronal shear fractures of the distal end of the humerus. J Bone Joint Surg [Am] 1996;78(1):49- 54.
6. Selcuk KESER, Nurettin DEMIREL, Ahmet BAYAR, Ahmet EGE. The coexistence of fractures of the capitellum and the radial head: a rare case. Acta Orthop Traumatol Turc. 2007;41(1):69-73.
7. Sheps DM, Kiefer KR, Boorman RS, Jhon D, Aleem L, Richard W, et al. The interobserver reliability of classification systems for radial head fractures: the Hotchkiss modification of the Mason classification and the AO classification systems. Can J Surg. 2009;52(4):277–282.
8. Milch H. Unusual fractures of the capitellum humeri and the capitellum radii. J Bone Joint Surg Am 1931;13(4):882- 886.
9. Hendel D, and Halperin N. Fracture of the radial head and capitellum humeri with rupture of the medial collateral ligament of the elbow. Injury. 1982;14:98-99. Doi: 10.1016/S0020-1383(82)80020-X
10. Newman JH. Letter to the editor. Injury 1982;14:477.
11. Soejima T, Ando N, Ishida H, Yoshida K, Nagata K. Combined fractures in the capitellum and the radial head associated with medial capsular avulsion. Kurume Med J. 2002;49(1-2):57-59.
12. Selcuk KESER, Nurettin DEMIREL, Ahmet BAYAR, Ahmet EGE. The coexistence of fractures of the capitellum and the radial head: a rare case. Acta Orthop Traumatol Turc 2007;41(1):69-73
13. Ward WG, Nunley JA. Concomitant fractures of the capitellum and radial head. J Orthop Trauma 1988;2(2):110-116.
14. Caputo AE, Burton KJ, Cohen MS, et al. Articular cartilage injuries of the capitellum interposed in radial head fractures: a report of ten cases. J Shoulder Elbow Surg. 2006;15(6):716–720. Doi: 10.1016/j.jse.2006.01.007