

A unique case of complex elbow dislocation with isolated ipsilateral distal radius fracture

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ABSTRACT

Only a few cases of elbow dislocation with ipsilateral distal radius fracture have been reported in literature. Most of these reports have described surgical approaches to this injury, though often in these situations, there were complicating factors, such as associated compound or coronoid process fractures. Herein, we present the case of a patient with combined elbow dislocation and isolated, ipsilateral distal radius fracture. To be able to quickly identify this type of injury, it is important to have a high index of suspicion for the possibility of elbow dislocation in the setting of any severe wrist injury. Plain radiographs were essential for diagnosis. Three-dimensional computed tomography may be helpful for evaluating the injury and guiding treatment planning. The patient was treated conservatively with closed reduction and obtained satisfactory clinical and functional results at 12 months of follow-up. In the absence of complicating factors, elbow dislocation with isolated, ipsilateral distal radius fracture may be treated successfully without surgery.

Key words: *Complex elbow dislocation, conservative management, distal radius fracture*

Introduction

The elbow joint is the second most commonly dislocated joint in the upper extremity, after the shoulder joint [1]. The simplest elbow dislocation is a pure capsuloligamentous injury without any associated fractures [2]. The majority of elbow dislocations without fractures occur in patients under the age of 30, and these are usually managed non-surgically with satisfactory clinical outcomes [3]. On the other hand, complex elbow dislocations, which by definition are associated

with a fracture, can be substantially more challenging to manage [4].

It is generally believed that up to 20% of elbow dislocations are associated with fractures elsewhere in the upper extremity or adjacent structures [5], although one older study reported an incidence as high as 26% [6]. Elbow dislocations may be associated with fractures of the clavicle, carpal bones, coronoid process, olecranon, and radial head, as well as with distal radioulnar joint dislocations [7-10]. Monteggia fracture-dislocations

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involve fractures of the ulna shaft with radial head dislocation [11]. The so-called terrible triad of the elbow represents a severe elbow fracture-dislocation pattern, characterized by posterior elbow dislocation and fractures of the radial head and coronoid process, and this has notably poor long-term outcomes [12].

However, despite all of these other dislocation-fracture combinations, elbow dislocations associated with isolated, ipsilateral distal radius fracture are uncommon, even rare [10]. In fact, to our knowledge, only a few of these have been reported in the literature [13-17]. Herein, we present the case of a patient with combined elbow dislocation and isolated, ipsilateral distal radius fracture, who was treated conservatively and obtained satisfactory results.

Case Report

A 43-year-old female patient was admitted to the emergency department (ED) with a history of falling from an apartment ladder at a height of approximately

two meters, onto her outstretched right hand, with her arm in extension. In the ED, she complained of pain in the right elbow and wrist. On physical examination, the right elbow was grossly deformed and the right wrist was swollen. Both the right elbow and wrist were tender to palpation. An attempt was made to assess the range of motion of both joints, but this could not be done because of the level of pain elicited by manipulation. There was no distal neurovascular deficit identified.

In the ED, the patient had plain radiographs, which demonstrated a right posteromedial elbow dislocation and a right distal radius fracture with intra-articular extension (Figure 1). Closed reduction of the dislocated elbow joint was performed with the elbow in extension, using simultaneous longitudinal traction and olecranon suppression. The distal radius fracture was then reduced using hyperextension followed by hyperflexion. These procedures took a total of 10 minutes and went smoothly. The patient was not pre-medicated, she tol-



Figure 1. Immediate post-injury X-rays. (A) Right wrist – AP and lateral views, (B) Right elbow – AP and lateral views.



Figure 2. Immediate post-closed reduction imaging. (A) Right elbow X-ray – AP and lateral views, (B) Right elbow CT – 3-dimensional views.



Figure 3. Two months post-injury X-rays. (A) Right elbow – AP and lateral views, (B) Right wrist – AP and lateral views.

erated both reductions with minimal discomfort, and she noted resolution of her elbow and wrist pain afterwards. Immediately thereafter, the patient underwent plain radiography and three-dimensional computed tomography (CT), and the imaging showed that both the distal radius fracture and the elbow dislocation were anatomically reduced (Figure 2). Following the reduction, the right upper extremity was immobilized in a long-arm (above elbow) cast.

At one month post-injury, imaging was repeated to confirm anatomic reduction and then the long-arm cast was converted to a below-elbow cast. At this point, the patient was educated about and encouraged to initiate passive and active elbow exercises, and she noted a return to full elbow flexion and extension within the next month. The below-elbow cast remained in place for another month to allow the radius fracture to fully heal. At two months post-injury, plain radiography of the right upper extremity confirmed complete union of the radius fracture and stability of the elbow joint, including while in flexion (Figure 3). Consequently, the below-elbow cast was removed and the patient was educated about and encouraged to initiate passive and active wrist movements. She was noted to have full wrist

extension and flexion at her three-month post-injury follow-up, and magnetic resonance imaging (MRI) of the elbow demonstrated no evidence of ligament injury (Figure 4). At this point, she was considered fully recovered from her injury.

At six months after the injury, plain radiography corroborated our findings that the patient had fully regained forearm pronation and supination and elbow flexion and extension. The patient opted to return to her work as a teacher six months after her injury and at her 12-month post-injury follow-up, her examination was normal and she reported no residual problems.

Discussion

In our review of the literature, we found that elbow dislocation, with fracture of the ipsilateral radial shaft was relatively uncommon, but a fair number of case reports and case series have been published [18-20]. On the other hand, elbow dislocation with fracture of the ipsilateral distal radius was indeed rare, as we were only able to identify a small number of these cases in the literature [13-17]. Our case of posterior elbow dislocation and distal radius fracture without radial shaft or radiocapitellar involvement adds to this small population of cases. Furthermore, the fact that we were able



Figure 4. Three months post-injury MRI. Right elbow.

to successfully manage this injury without surgery was unique, in that only one other case report has described using non-surgical treatment for this particular type of complex elbow dislocation [15].

Based on the patient's injury, we propose a possible mechanism of injury for dislocation of the elbow with ipsilateral distal radius fracture. This mechanism involves a single-impact theory in which a fall from a height results in compressive forces that, when directed onto the outstretched arm and hand, first cause a fracture of the distal end of the radius. The enormous energy generated during the fall then creates valgus stress on the hyperextended elbow, and this force is transmitted primarily along the ulna because of the loss of integrity of the radius. This then pushes the ulnar groove out of the trochlea, resulting in posteromedial elbow dislocation.

There are several factors that may be essential in the successful management of complex elbow dislocations, like the one in our case. A complete history and physical examination is necessary for all patients with these injuries. In order to obtain the patient's history, a clear description of the mechanism of injury should be sought. To be able to identify the type of injury that was experienced by our patient, examiners need to focus on the mechanism and to remain aware of the possibility of elbow dislocation in the setting of any severe wrist injury. The physical examination should always include a search for any concomitant bony and soft tissue injuries.

We found that plain radiographs were essential for proper diagnosis of complex elbow dislocations. Though we did not utilize it for the wrist in this patient, we suggest that three-dimensional CT at the time of initial presentation may be helpful for more fully evaluating fractures and guiding treatment planning. Also, we did not perform fluoroscopy to assess stability immediately after the reduction procedures; in retrospect, information from fluoroscopy may have helped inform our decisions about the duration of joint immobilization post-injury.

To our knowledge, there is no standard treatment for complex elbow dislocations associated with distal radius fractures. We applied conservative management and achieved satisfactory results. Others have reported surgical approaches to this injury, though often in settings in which there were other complicating factors (e.g., compound fracture or additional coronoid process fracture) [13,14,16,17]. Based on our limited experience, we would suggest that in the absence of complicating factors, complex elbow dislocation with isolated, ipsilateral distal radius fracture can be treated successfully without surgery. However, we also acknowledge that some may favor surgical management of these injuries in order to potentially allow earlier elbow mobilization [21].

With regards to early joint mobilization, our pri-

mary goal was to protect the radius fracture, and so we erred on the conservative side, leaving the elbow immobilized for one month and the wrist immobilized for two months post-injury. This approach was used to address the possibility of any associated elbow ligament injury and to reduce the risk of recurrent elbow dislocation in the early post-injury phase. Some may argue that a shorter period of immobilization for a simple elbow dislocation may be prudent, in order to mitigate the risk of elbow stiffness. However, we did not find that our conservative approach substantially impeded the overall recovery of our patient, whose range of motion in both joints returned quickly with passive and active motion exercises. Our plan was to send the patient to a physiotherapist if she had not regained full extension and flexion of each joint within one month of cast removal. However, this was not necessary.

Ultimately, we agree with Chan et al, because there is no universally accepted criteria available for identifying patients with complex elbow dislocations who might benefit from early surgical fixation, therefore, a concerted effort should always be made to elucidate the mechanism of the injury and the energy and forces involved [21]. This, along with a detailed physical exam and radiographic evaluation, may help to understand the pattern of the injury and to guide subsequent treatment.

In conclusion, elbow dislocation with isolated, ipsilateral distal radius fracture is a rare combination injury that may be managed conservatively with closed reduction techniques, resulting in good outcomes. However, surgical intervention for the distal radius fracture aspect of this injury is certainly an option, depending on the fracture pattern, associated injuries, and both patient and surgeon preference.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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