About a new entity in the coronal shear fracture of the distal humerus: Broberg–Morrey’s fracture with Laugier’s fracture in the same elbow

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Abstract

Coronal shear fractures of the distal humerus involving only the capitellum or the trochlea are rare injuries. Their combination has rarely been described. Herein, we report the case of a 39-year-old man who presented with pain and total functional impotence in his right elbow following a fall; the clinical and radiological findings revealed a new entity in the coronal shear fractures of the distal humerus, which included a comminuted fracture of the capitellar and displaced separate trochlea in the same elbow. This fracture was treated surgically with a good outcome at the last follow-up.

INTRODUCTION

The coronal shear fractures of the distal humerus involving the capitellum and the trochlea are rare injuries that constitute a surgical challenge for orthopedic surgeons [1]. They are frequently missed on the first examination, which leads to unsatisfactory outcomes [2].

To the best of our knowledge, herein we report a new entity in the coronal shear fractures of the distal humerus that associates the Broberg–Morrey’s fracture (isolated comminuted fracture of the capitellum) with the Laugier’s fracture (isolated fracture of the trochlea) in the same elbow.

CASE REPORT

A 39-year-old man with no trauma history presented with severe pain in his right elbow following a fall. On admission, the physical examination found a swollen and multiple bruises on the anterior side of the elbow; its mobilization and palpation were painful with no neurovascular impairment. He reported a fall on the hand: both the hand and elbow were in an extended position. We realized a lateral view X-ray (Fig. 1B) that showed a displaced fragment above the elbow with no evident fracture on the antero-posterior view (Fig. 1A). We performed a computed tomography scan with 3D reconstruction of the elbow that revealed a comminuted fracture of the capitellum with displaced separate trochlea (Fig. 2), prompting the patient to undergo surgery. Given the anterior multiple bruises in the elbow, we performed a transolecranon approach to fix the fractures using two postero-anterior Herbert screws (Fig. 3). Postoperatively, the elbow was immobilized in a 90° flexion back splint for 2 weeks. After that, a progressive flexion extension of the elbow was started, which was guided by the physiotherapist. After 6 months, the patient had regained satisfactory motion with no pain.
DISCUSSION

Trochlear fractures have been rarely reported in the literature, the reason for which they have no clear classification. However, capitellar fractures have many classifications despite their rarity. Bryan and Morrey [3] proposed a classification based on three types of capitellar fracture: Type 1 (Hahn–Steinthal) involves the capitellum with an attached subchondral bone; Type 2 (Kocher–Lorenz) involves only the cartilaginous articular surface of the capitellum; Type 3 (Broberg–Morrey) corresponds to a comminuted fracture of the capitellum; and Type 4 added by McKee et al., which includes both the capitellum and a part of the trochlea in one fragment [4].

On the other hand, the classification of Dubberley et al. (Fig. 4) is comprehensive and allows the inclusion of all varieties of these fractures. It is the only one that indicates the surgical approach based on the fracture type; it takes into account the fracture of both capitellum and trochlea as separate fragments: the Type I fracture include capitellar fracture with or without a part of the lateral trochlear ridge; Type II fracture involves the capitellum and trochlea as one fragment. Type III fracture involves the capitellum and trochlea as two independent fragments. Each type is subdivided to B or A depending on the presence or absence of the posterior condylar comminution, respectively [5]. According to this last classification, our case belongs to the type III fracture. However, its subdivided entities do not take into consideration the comminution or not of the capitellar fracture. We propose to subdivide the Types III A and III B into subtypes 0 and 1 depending on the absence or presence of comminution of the capitellum, respectively (Table 1). Thus, our case will be classified exactly as a Type III-A1 fracture according to the Dubberley’s classification.

The exact mechanism of these injuries is still uncertain. However, isolated trochlea fractures (Laugier’s fractures) are suggested to be secondary to indirect trauma following a fall on the outstretched hand in combination with an axial load as the predominant mechanism. Isolated capitellum fractures can occur as a
result of compression by the radial head with the elbow in full extension during the injury event or as a result of direct trauma to a highly flexed elbow. In our case, we suggested that the fracture was caused by a complex mechanism that included elbow extension, axial load from the coronoid process to the trochlea, varus stress and radial head compression force on the capitellum [1, 6]. The diagnosis is based on plain radiographs of the injured elbow. The computed tomography scan with 3D reconstruction is useful to ascertain the diagnosis and to exclude other bony injuries [2, 7].

Once diagnosed, only surgical treatment allows anatomic reduction [5]. In our case, we elected for an olecranon osteotomy to fix the fractures because of the presence of multiple bruises on the anterior surface of the elbow. This was followed by early mobilization of the elbow, which led to a satisfactory outcome at the last follow-up.

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CONFLICT OF INTEREST

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ETHICAL APPROVAL

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CONSENT

The patient had given his written consent for publication.

GUARANTOR

The guarantor is Dr Naoufal Elghoul.

REFERENCES

1. Sun Y, Thanomsingh P, Jeon IH. Coronal shear fracture of distal humerus associated with olecranon fracture: a case report and pathomechanism. J Orthop Surg (Hong Kong) 2019;27:2309499019849707.
2. Mehdian H, McKee MD. Fractures of capitellum and trochlea. Orthop Clinics 2000;31:115–27.
3. Bryan RS, Morrey BF. Fractures of the distal humerus. In: Morrey BF ed. The Elbow and Its Disorders. Philadelphia, PA: WB Saunders, 1985, 302–39.
4. McKee MD, Jupiter JB, Bamberger HB. Coronal shear fractures of the distal end of the humerus. J Bone Joint Surg Am 1996;78-A:49–54.
5. Dubberley JH, Faber KJ, Macdermid JC, Patterson SD, King GJ. Outcome after open reduction and internal fixation of capitellar and trochlear fractures. J Bone Joint Surg Am 2006;88:46–54.
6. Gonçaalves LBJ, Ring DC. Fractures of the humeral trochlea: case presentations and review. J Shoulder Elb Surg 2016;25:e151–5.
7. Lamas C, Grau A, Almenara M, Thigo L. Coronal shear fractures of the capitellum and trochlea: interobserver variability in classifying the fracture and the need for a computed tomography scan for the correct surgical planning. JSES Int 2020;5:314–9.