Skeletal Radiol (2018) 47:397–400
DOI 10.1007/s00256-017-2782-7

CASE REPORT

An uncommon variant of the Essex-Lopresti injury

Mohamed Ali Kedous[1,2] · **Ahmed Msakni**[1] · **Wael Chebbi**[1] · **Mourad Zaraa**[1] · **Mondher Mbarek**[1]

Received: 7 August 2017 / Revised: 11 September 2017 / Accepted: 19 September 2017 / Published online: 2 October 2017

Abstract The Essex-Lopresti injury is an extremely rare condition combining radial head or neck fracture, distal radio-ulnar joint dislocation and rupture of the interosseous membrane. However, there are rare or unusual varieties or associated injuries. We report a case of a 46-year-old woman with a posterior dislocation of the radio-humeral joint, a radial shaft fracture, and a distal radio-ulnar joint dislocation. She underwent open reduction and internal fixation of the radial shaft fracture followed by an immobilization by a long elbow splint in supination for 6 weeks. At 18 months of follow-up, she was asymptomatic and she had a full range of elbow and wrist motion and had resumed thoroughly her previous job. The Essex-Lopresti injury results from a complex injury to the forearm axis with resultant longitudinal instability, which can be challenging to treat. There are some variations that can lead to a missed diagnosis resulting in persistent pain and instability of the wrist. The best outcomes are reached with early diagnosis and prompt management.

Keywords Radial head · Radius · Dislocation · Fracture · Distal radio-ulnar joint · Interosseous membrane · Essex-Lopresti injury

✉ Mohamed Ali Kedous
kedous.ma@gmail.com

[1] Trauma Center, Ben Arous, Tunisia

[2] Faculty of Medicine of Tunis, University of Tunis El Manar, Tunis, Tunisia

Introduction

The Essex-Lopresti injury (ELI) is an unusual condition, which is commonly overlooked. It is characterized by a radial head or neck fracture associated with a combination of a distal radioulnar joint (DRUJ) dislocation and a rupture of the interosseous membrane (IOM) and it is an extremely rare condition, although some uncommon varieties of this complex forearm injury have been reported.

We present an uncommon variety of the Essex-Lopresti injury combining a radial head dislocation, a radial shaft fracture, and a distal radio-ulnar joint dislocation. We aim to study by means of our case report and a review of the literature, the clinical features, the mechanism, and the management of these injuries.

Case report

A 46-year-old secretary fell down a flight of stairs onto her outstretched left hand. She presented to the emergency department with a forearm deformity and ache associated to an ipsilateral elbow and wrist tenderness. Plain radiographs revealed a posterior radial head dislocation without fracture, a transversal radial shaft fracture, and a distal radio-ulnar joint dislocation (Fig. 1).

The radial shaft was managed by open reduction and internal fixation using an anterior dynamic compression plate. The dislocation of the radial head was reduced intraoperatively after the fracture stabilization. It was stable on supination. The distal radio-ulnar joint was reduced spontaneously and it was stable in all positions (Figs. 2 and 3).

Fig. 1 Pre-operative plain radiographs showing posterior radial head dislocation, transversal radial shaft fracture, and distal radio-ulnar joint dislocation

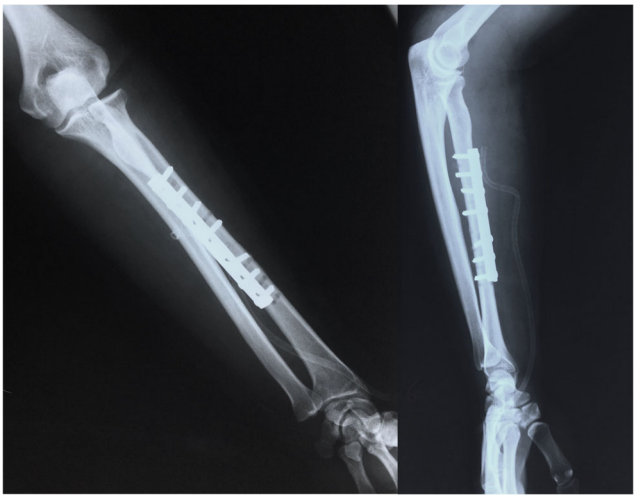

Fig. 2 Post-operative plain radiographs: Radial shaft managed by open reduction and internal fixation using an anterior dynamic compression plate. The radial head and the distal radio-ulnar joint are reduced

A long elbow splint was applied in full supination, 90° of elbow flexion and the wrist in neutral position for 6 weeks. Plain radiographs were performed weekly to ensure that the reduction was maintained. The patient then had 24 physiotherapy sessions spread over 2 months.

At 18 months of follow-up, the patient was asymptomatic and had full pronation and 75° of supination. She had elbow flexion from 0° to 150°. Her wrist motion was from 80° of flexion to 70° of extension. The X-ray showed that the radial shaft fracture had healed and the radial head and the distal radioulnar joint were reduced (Fig. 3). She had resumed thoroughly her previous job.

Discussion

It is fundamental for the understanding of the Essex-Lopresti injury to consider the forearm as a single functional unit rather than isolated structures acting separately. The forearm unit consists of the radius, the ulna, the proximal radio-ulnar joint (PRUJ), the DRUJ, and the IOM. Any injury affecting an element of this unit will affect inevitably the forearm function as a whole [1].

The IOM is in charge of several important biomechanical functions. It serves to transmit load from the wrist to the elbow, transfer load from the radius to the ulna, maintain forearm stability, and help to maintain the DRUJ stability. It comprises five distinct components, however only the central band was consistently identified as the most important component for radio-ulnar stability and force transmission [2].

The mechanism of injury is a fall on the outstretched hand, with forearm in pronation and elbow in flexion. It is caused by a violent load propagating and longitudinal compression force transmitted from wrist to elbow tearing the distal oblique ligament, the IOM, the supporting structures of the DRUJ, and the PRUJ [2, 3].

Some variety of the Essex-Lopresti injury have been reported in the literature with associated elbow dislocation [4], bilateral elbow dislocation [5], or radial displacement in distal direction [6]. However, only one case of Essex-Lopresti injury with associated radial shaft fracture has been reported in the literature [7].

Optimal outcome for this type of injury requires a prompt diagnosis [8, 9]. In fact, delayed diagnosis and treatment leads necessarily to proximal radius migration, and persistent DRUJ dislocation. This is the main cause of chronic instability, which is difficult to manage because of the sequelae of ulnar-sided wrist pain and both forearm and wrist weakness [8, 9].

The diagnosis of ELI in the acute setting can be challenging and requires a high index of suspicion. Patients presenting with radial head fracture should be examined for wrist and forearm, particularly in the presence of high energy and high radial head displacement [2, 8].

The tenderness on compression in the wrist is an early clue of IOM rupture [8]. Injury of the IOM is more frequent than it is generally known, even in association with a radial head fracture without dislocation of the DRUJ [10]. Dynamic X-rays, ultrasound, and MRI can be used to diagnose when this lesion is suspected [1, 8, 11].

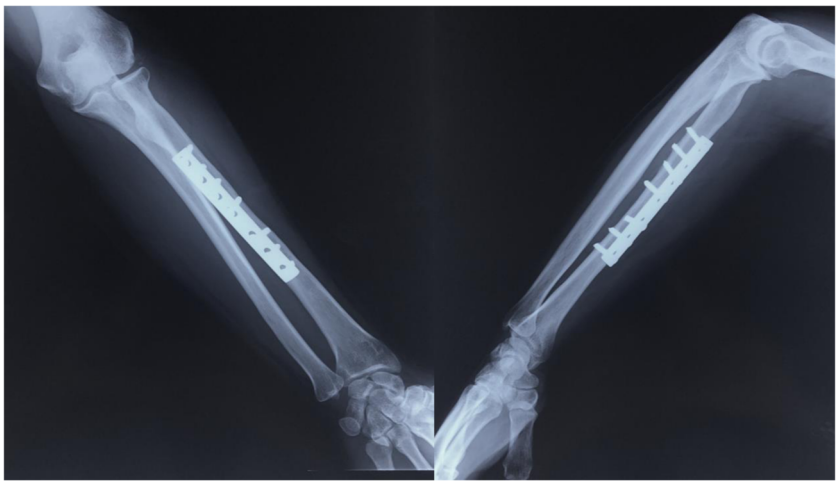

Fig. 3 Follow-up X-ray at 18 months showing that the radial shaft fracture had healed properly. The radial head and the distal radio-ulnar joint are reduced

Treatment of the ELI is a surgical challenge and is still a subject of controversy [12, 13]. Several methods have been reported in the literature, but there is no widely accepted technique for the surgical management of ELI. However, with current awareness of the importance of the radial head in maintaining stability of both the elbow and the forearm, most updated techniques emphasize the importance of open reduction and internal fixation (ORIF) or replacement of the radial head [8]. The stabilization of the DRUJ is constantly necessary for 6 weeks. It consists of either casting [14, 15] or K-wiring, always in supination [16, 17]. In fact, in order to avoid the limitation of DRUJ rotation, IOM must heal in supination because in this position the strain is higher on the distal part of the membrane than in pronation [18].

Some recent research has suggested that the healing potential of the IOM is hypothetical, and we should not rely on it. Therefore, the reconstruction of the IOM is a new therapeutic orientation that provides stability and a good functional outcome. There is a huge variety of graft choice used in the literature such as Achilles' tendon, patella tendon, flexor carpi radialis, and palmaris longus. [12, 19, 20]. Currently, it is considered the reference treatment for IOM lesions and should give the best functional results [19].

Conclusions

The Essex-Lopresti injuries are a heterogeneous group of complex forearm injuries that include a rupture of interosseous membrane. Optimal outcome for this type of injury requires a prompt diagnosis. We recommend examining the distal radio-ulnar joint in all radial head fractures or dislocations and to perform a radiograph of the complete forearm and the wrist if concomitant injuries of the carpus or distal radio-ulnar joint are suspected. It is important to understand the pathoanatomy that leads to longitudinal instability and to consider the forearm as a functional unit to make the right management choice.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Phadnis J, Watts A. Longitudinal instability of the forearm. Orthopade. 2016;45(10):861–9.
2. Matthias R, Wright TW. Interosseous membrane of the forearm. J Wrist Surg. 2016;5(03):188–93.
3. Wegmann K, Engel K, Burkhart KJ, Ebinger M, Holz R, Brüggemann G-P, et al. Sequence of the Essex-Lopresti lesion—a high-speed video documentation and kinematic analysis. Acta Orthop. 2014;85(2):177–80.
4. Bock G, Cohen M, Resnick D. Fracture-dislocation of the elbow with inferior radioulnar dislocation: a variant of the Essex-Lopresti injury. Skelet Radiol. 1992;21(5):315–7.
5. Pérez BR, García AM, Henríquez JM, Moreno GM. Luxación bilateral de codo asociada a lesión de Essex-Lopresti. Rev Esp Cir Ortop Traumatol. 2012;56(1):59–62.
6. Hii J, Page M, Prosser A, Bauer S. An uncommon Essex-Lopresti fracture dislocation with radial displacement in distal direction: diagnosis and surgical treatment of a rare case. BMJ. 2013;2013: bcr2013200295.
7. Eglseder WA, Hay M. Combined Essex-Lopresti and radial shaft fractures: case report. J Trauma. 1993;34(2):310–2.
8. Matson AP, Ruch DS. Management of the Essex-Lopresti injury. J Wrist Surg. 2016;5(03):172–8.
9. Schnetzke M, Porschke F, Hoppe K, Studier-Fischer S, Gruetzner P-A, Guehring T. Outcome of early and late diagnosed Essex-Lopresti injury. J Bone Joint Surg. 2017;99(12):1043–50.
10. Duckworth AD, Watson BS, Will EM, Petrisor BA, Walmsley PJ, Court-Brown CM, et al. Radial shortening following a

fracture of the proximal radius: degree of shortening and short-term outcome in 22 proximal radial fractures. Acta Orthop. 2011;82(3):356–9.
11. McGinley JC, Gold G, Cheung E, Yao J. MRI detection of forearm soft tissue injuries with radial head fractures. Hand. 2014;9(1):87–92.
12. Adams JE, Culp RW, Osterman AL. Central band interosseous membrane reconstruction for forearm longitudinal instability. J Wrist Surg. 2016;5(03):184–7.
13. Adams JE. Forearm instability: anatomy, biomechanics, and treatment options. J Hand Surg. 2017;42(1):47–52.
14. Gupta V, Kundu ZS, Kamboj P, Gawande J, Kaur M. Ipsilateral dislocation of the radial head associated with fracture of distal end of the radius: a case report and review of the literature. Chin J Traumatol. 2013;16(3):182–5.
15. McGlinn EP, Sebastin SJ, Chung KC. A historical perspective on the Essex-Lopresti injury. J Hand Surg. 2013;38(8):1599–606.
16. Grassmann J, Hakimi M, Gehrmann S, Betsch M, Kröpil P, Wild M, et al. The treatment of the acute Essex-Lopresti injury. Bone Joint J. 2014;96(10):1385–91.
17. Adams JE, Culp RW, Osterman AL. Interosseous membrane reconstruction for the Essex-Lopresti injury. J Hand Surg. 2010;35(1):129–36.
18. Gutowski CJ, Darvish K, Ilyas AM, Jones CM. Interosseous ligament and transverse forearm stability: a biomechanical cadaver study. J Hand Surg. 2017;42(2):87–95.
19. Miller AJ, Naik TU, Seigerman DA, Ilyas AM. Anatomic interosseous membrane reconstruction utilizing the biceps button and screw tenodesis for Essex-Lopresti injuries. Tech Hand Up Extrem Surg. 2016;20(1):6–13.
20. Hackl M, Andermahr J, Staat M, Bremer I, Borggrefe J, Prescher A, et al. Suture button reconstruction of the central band of the interosseous membrane in Essex-Lopresti lesions: a comparative biomechanical investigation. J Hand Surg Eur Vol. 2017;42(4):370–6.