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Case Report

Bilateral clavicle fracture: A case report

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ABSTRACT

Clavicle fractures are among the most common fractures in adults. Nevertheless, bilateral fractures are rarely reported in the literature. We present the case of a 35-year-old male patient who was admitted with a bilateral clavicle fracture following a motorcycle accident. The patient underwent open reduction and bilateral intramedullary fixation with Kirschner wires. After six months of follow-up, the functional result was satisfactory; the patient achieved full range of motion in both shoulders and was free from pain. X-rays showed a complete fusion of the fracture on both sides.

Introduction

Clavicle fractures are among the most common fractures in adults. Fractures of the middle third, or midshaft, are the most common, accounting for up to 80 % of all clavicle fractures. Bilateral fractures are seldom reported in the literature. We present a case of bilateral clavicle fracture in a 35-year-old man victim of a motorcycle accident. The patient underwent open reduction and bilateral intramedullary fixation with Kirschner wires. The functional result was satisfactory.

Case report

A 35-year-old man with no previous medical history was admitted to the emergency department following a motorcycle accident. He complained of pain and swelling in both the right and left midclavicular regions. He was conscious, hemodynamically stable, with a normal respiratory function; his respiratory rate was 21 breaths per minute with O2 saturation at 98 % without oxygen therapy. His neurovascular examination was intact. There was no subcutaneous emphysema, and the skin was intact. Chest and shoulder radiographs revealed a bilateral mid-shaft fracture of the clavicle (Fig. 1). Both fractures were type 2B1 according to Robinson's classification [1]. In the operating room under general anesthesia, with the patient positioned in a supine position, we performed open reduction and intramedullary fixation with Kirschner wires of both clavicles (Fig. 2). A 4 cm horizontal incision was made over the fracture site, and first the medullary canal of the medial fragment was drilled with a 2.5 mm drill bit. Kirshner wires were advanced in the lateral bone fragment intramedullary canal until they exited throughout the postero-lateral skin of the shoulder. The fracture was then reduced, and the Kirshner wires were advanced using a hammer in the medial bone fragment (in-out technique). The advancement of the K-wires was controlled using fluoroscopy. Postoperatively, both shoulders were immobilized in a sling for 3 weeks, followed by progressive active-assisted physiotherapy. Three months after surgery, X-rays showed a complete fusion of the fracture on

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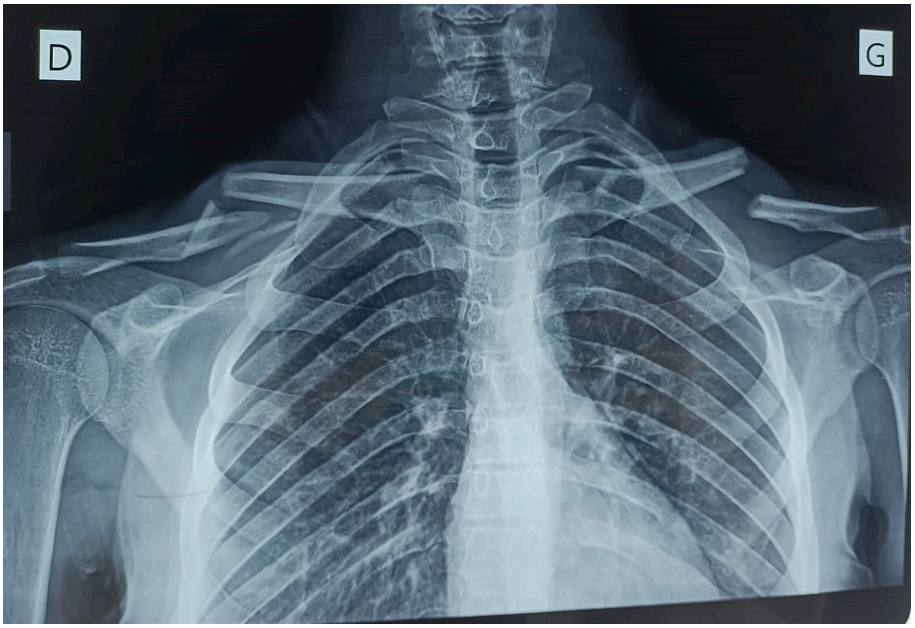

Fig. 1. X-rays at initial presentation: bilateral clavicle fracture.

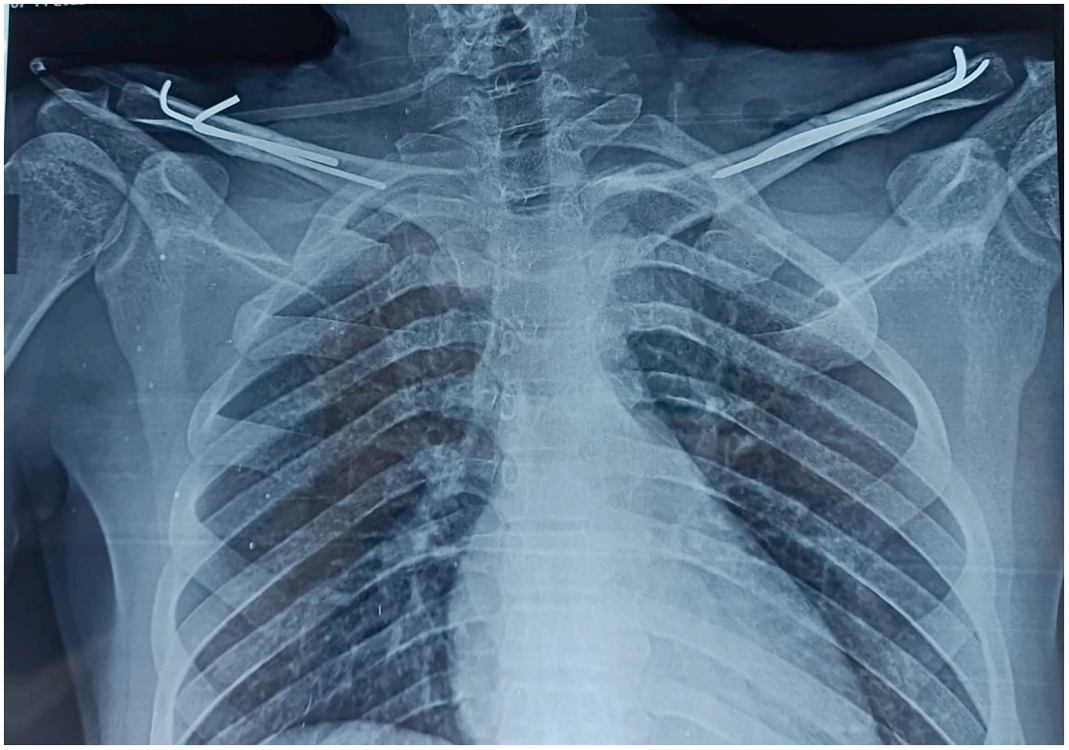

Fig. 2. Postoperative X-rays after intramedullary fixation with Kirshner wires.

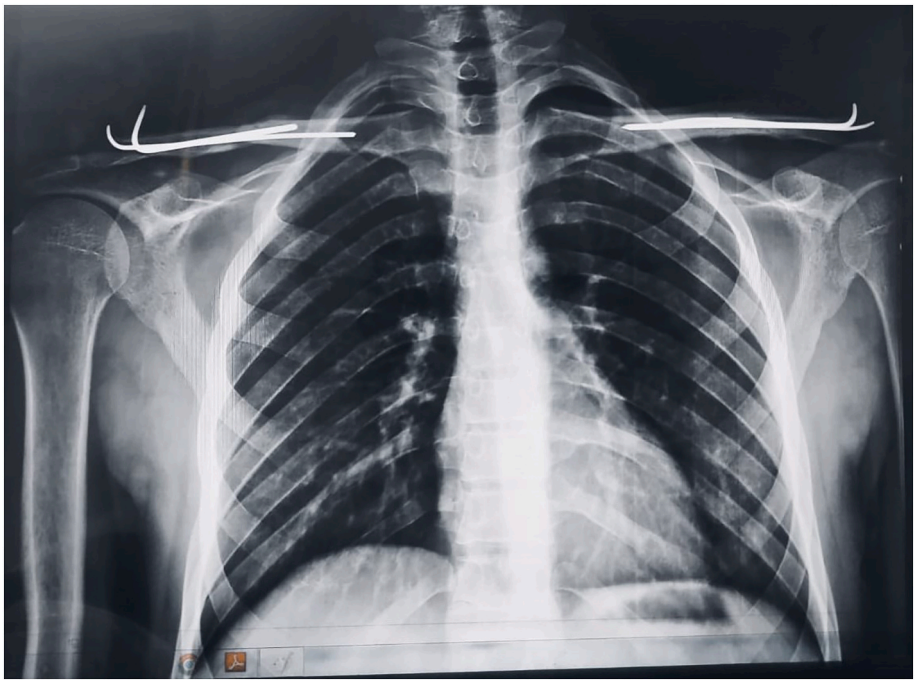

Fig. 3. X-rays at the third month postoperative: fusion of the fracture on both sides.

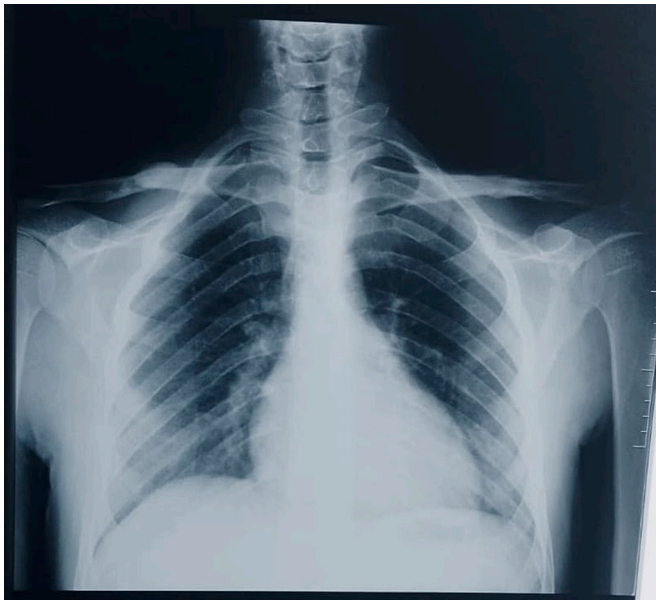

Fig. 4. X-rays at six months after surgery.

both sides (Fig. 3). Kirshner wires were removed in consultation under local anesthesia. After six months of follow-up, the functional result was satisfactory; the patient achieved full range of motion in both shoulders and was free from pain (Fig. 4).

Discussion

The clavicle is one of the most commonly fractured bones, accounting for 2.6 %–4 % of adult fractures and 35 % of injuries to the shoulder girdle [2]. Bilateral clavicular fractures are rarely observed and represent 0.43 % of all clavicle fractures [3]. They usually occur following high-energy trauma (road traffic injuries, falls from height) and therefore are associated with other severe concomitant

injuries such as severe chest injuries (multiple rib fractures, flail chest, sternal fractures, hemopneumothoraces, pneumopericardium, lung contusion, aortic dissection), intra-abdominal injuries (ruptured spleen), brachial plexus injury, scapula fractures, humerus fracture, spinal fractures, pelvic fractures, and lower extremity fractures [4]. These injuries are not always evident and should be actively sought for and excluded [5]. Historically, midshaft clavicle fractures have usually been treated nonoperatively, using a sling or figure-of-eight bandage, which ends in bone union in nearly 95 % of cases. Treatment guidelines were based on Neer and Rowe's two large series that showed nonunion rates of less than 1 % in conservatively managed fractures compared with nearly 4 % in operatively treated fractures [6]. However, recent studies have demonstrated increased rates of non-union and poorer functional outcomes after non-operative treatment, with the results of primary operative reduction and fixation improving considerably [7–9]. Surgical treatment is unanimously indicated with open fractures or in cases of cutaneous damage, neurovascular complications, and impaction of the shoulder stump syndromes [10]. Nevertheless, there is no general consensus on the modality of treatment for bilateral clavicle fractures. Based on the current literature, most authors recommend surgical treatment for bilateral clavicle fractures, especially in cases with compromised ventilatory function, to improve respiratory function and reduce the duration of functional disability associated with conservative treatment [11]. The optimal method of surgical treatment is another debatable issue. The gold standard for clavicle fixation remains open reduction and fixation with a plate [12], although recent studies seem to indicate no difference between plate fixation and intramedullary fixation [13]. Intramedullary clavicle fixation is a safe method, especially for displaced two-part midshaft clavicle fractures (Robinson 2B.1). It has the benefit of a smaller incision, reducing soft tissue stripping and damage, which has been attributed as the principal cause of non-union in surgical fixation [14], and load-sharing fixation with relative stability that encourages copious callus formation [15]. However, not all fracture types are suitable for intramedullary fixation. In multifragmentary fractures (Robinson 2b.2), intramedullary devices provide little or no control over the comminuted fragments of the fracture, which allows excessive motion of these fragments, which explains the higher observed non-union rates [16]. Therefore, intramedullary fixation should be avoided in fractures with significant comminution [17]. The use of a number of different devices, including Kirschner wires, Knowles pins, Hagie pins, Rockwood pins, Titanium Elastic nails (TEN), Screw Intramedullary Flexible Nail (SIFN), and Anser clavicle pins, has been described. Implants can be inserted antegradely, through an anteromedial entry point in the medial fragment, or retrogradely, through a posterolateral entry portal in the lateral fragment, or at the fracture site, which requires an open approach [12]. Common disadvantages of intramedullary fixation are hardware irritation, protrusion, shortening of the clavicle (telescope effect), and implant migration [18], hence the need for implant removal, especially for Kirschner wires. It is strongly advocated to bend wires twice to form a 180° angle to prevent migration. Additionally, K-wires should be removed as soon as the bone is healed and united. In our case, clavicular fractures were fixed with intramedullary Kirshner wires inserted at the fracture site (in-out technique) with good results. We did not encounter any complications.

Conclusion

Bilateral clavicular fractures are extremely rare in the literature. Surgical management is highly recommended to limit the duration of functional disability and improve clinical outcomes. Intramedullary fixation using Kirshner wires is a safe method when applied properly.

Consent

Patient gives informed consent for publication.

Declaration of competing interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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References

[1] C.M. Robinson, Fractures of the clavicle in the adult. Epidemiology and classification, JBJS Br. 80-B (1998) 476–484.
[2] F. Postacchini, S. Gumina, P. De Santis, F. Albo, Epidemiology of clavicle fractures, J. Shoulder Elb. Surg. 11 (5) (2002) 452–456.
[3] H.E.T. Van den Bout, C.H. Snyckers, Bilateral clavicle fractures a case report and review of the literature, S. Afr. Orthop. J. 10 (2) (2011) 55–66.
[4] H.E.T. Van den Bout, Bilateral clavicle fractures a case report and review of the literature, S. Afr. Orthop. J. 10 (2) (2011) 55–66.
[5] I.R. Murray, L.A.K. Khan, C.M. Robinson, Fractures of the shaft of the clavicle, in: G. Bentley (Ed.), European Surgical Orthopaedics and Traumatology, Springer, Berlin, Heidelberg, 2014.
[6] E.A. Perez, Fractures of the Shoulder, Arm, and Forearm. Campbell's Operative Orthopaedics, 2021, pp. 3031–3126. Chapter 57.
[7] M.D. McKee, E.M. Pedersen, C. Jones, D.J. Stephen, H.J. Kreder, E.H. Schemitsch, et al., Deficits following nonoperative treatment of displaced midshaft clavicular fractures, J. Bone Joint Surg. Am. 88 (1) (2006) 35–40.
[8] Canadian Orthopaedic Trauma Society, Nonoperative treatment compared with plate fixation of displaced midshaft clavicular fractures. A multicenter, randomized clinical trial, J. Bone Joint Surg. Am. 89 (1) (2007) 1–10.
[9] M.D. McKee, L.M. Wild, E.H. Schemitsch, Midshaft malunions of the clavicle, J. Bone Joint Surg. Am. 85-A(5):790–7 (2003).
[10] N. Bonnevialle, Y. Delannis, P. Mansat, O. Peter, B. Chemama, P. Bonnevialle, Bilateral clavicle fracture external fixation, Orthop. Traumatol. Surg. Res. 96 (7) (2010) 821–824.

[11] D. Feng, W. Jiang, X. Kang, et al., Simultaneous bilateral traumatic clavicle fractures: incidence, characteristics, and surgical outcomes, BMC Musculoskelet. Disord. 24 (2023) 112.
[12] P. Johnson, M. Mckee, Midshaft clavicle fractures, in: Skeletal Trauma of the Upper Extremity, Elsevier, 2022, pp. 28–35.
[13] J.M. Burnham, D.C. Kim, S. Kamineni, Midshaft clavicle fractures: a critical review, Orthopedics. 39 (5) (2016) e814–e821. Sep 1.
[14] B. Bakota, G. Chan, M. Staresinic, V. Rajput, J. Phadnis, Z. Korac, Safe intramedullary fixation of displaced midshaft clavicle fractures with 2.5mm Kirschner wires - technique description and a two-part versus multifragmentary fracture fixation outcome comparison, Injury. 48 (Suppl. 5) (2017) S27–S33. Nov.
[15] R. Govindasamy, S. Kasirajan, J.J. Meleppuram, F. Thonikadavath, A retrospective study of titanium elastic stable intramedullary nailing in displaced mid-shaft clavicle fractures, Rev. Bras. Ortop. 52 (3) (2016) 270–277. Dec 30.
[16] G. Chan, Z. Korac, M. Miletic, D. Vidovic, J. Phadnis, B. Bakota, Plate versus intramedullary fixation of two-part and multifragmentary displaced midshaft clavicle fractures - a long-term analysis, Injury. 48 (Suppl. 5) (2017) S21–S26. Nov.
[17] R.M. Houwert, D.P. Smeeing, U. Ahmed Ali, F. Hietbrink, M.C. Kruyt, O.A. van der Meijden, Plate fixation or intramedullary fixation for midshaft clavicle fractures: a systematic review and meta-analysis of randomized controlled trials and observational studies, J. Shoulder Elb. Surg. 25 (7) (2016) 1195–1203. Jul.
[18] P. Hoogervorst, T. van Dam, N. Verdonschot, G. Hannink, Functional outcomes and complications of intramedullary fixation devices for Midshaft clavicle fractures: a systematic review and meta-analysis, BMC Musculoskelet. Disord. 21 (1) (2020) 395. Jun 22.