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Trauma Case Reports

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Case Report

Distal clavicle fracture treated with a titanium elastic nail (TEN)

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ARTICLE INFO

Keywords:

Clavicle fracture
Distal clavicle
Internal fixation
Titanium elastic nail (TEN)

ABSTRACT

It is generally known to use internal fixation using a hook plate or Kirschner wire as an operative treatment for distal clavicle fracture. TEN is a surgical technique that is mainly used in clavicle mid-shaft fracture, and there is no reported case for distal clavicle. We report a case of distal clavicle fracture treated with TEN. A 19-year-old man came to the emergency department with right shoulder pain after bicycle accident. The radiographs showed a distal clavicle fracture without apparent disruption of the acromioclavicular joint (AC-joint) and classification with a Neer type IIA fracture pattern. One day after trauma the patient was treated with closed reduction and internal fixation using a titanium elastic nail (TEN). At 6 months postoperatively, there was no complication and radiograph showed good distal clavicle union. Therefore we performed removal of a TEN.

Introduction

General surgical treatments of distal clavicle fracture are internal fixation using Kirschner wire and hook plate. Titanium elastic nail (TEN) is a surgical technique that is mainly used in clavicle mid-shaft fracture, but there is no reported case for distal clavicle. Hereby, we present a case of a 19-year-old male with distal clavicle fracture treated with TEN.

Case presentation

A 19-year-old male came to the emergency department with left shoulder pain after bicycle accident. On physical examination, we found deformity of left shoulder. There was moderate tenderness and swelling. There was limited shoulder movement due to pain, flexion was about 90° and abduction was about 30°. VAS score was 7 points and constant score was 12 points. Neurovascular examination of the arm was normal.

The radiographs showed a distal clavicle fracture without disruption of the acromioclavicular joint (AC-joint) and classification with a Neer type IIA fracture pattern (Fig. 1). A CT-scan (Computed Tomography) was not performed.

Intervention

One day after the initial trauma, the patient was treated with closed reduction and internal fixation using a TEN (Fig. 2). A skin incision was made about 2 cm above sternal end of the clavicle. About 2 cm canal was made in medullary cavity using 2.5 mm drill and widened with an awl. The 3.0 mm nail was used with T-handle and advanced with oscillating movement under fluoroscopic

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<https://doi.org/10.1016/j.tcr.2018.11.009>

Accepted 21 November 2018

Available online 06 December 2018

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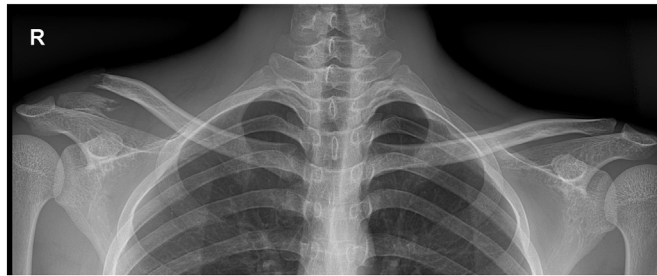


Fig. 1. Preoperative anteroposterior radiograph of the both clavicle showing the distal fracture of right clavicle.

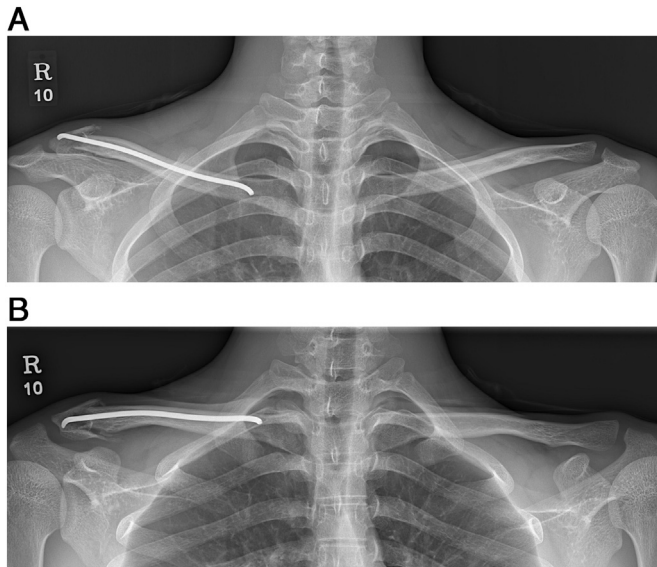


Fig. 2. Postoperative anteroposterior (A) and lodontic (B) radiographs of the both clavicle. The distal fracture of right clavicle was fixed with a TEN.

control. When the TEN was reached the fracture site, we reduced fragment using reduction clamps. We confirmed good reduction using fluoroscopic control, and then the TEN was inserted to distal fragment.

Results

Operation was performed under general anesthesia and anesthesia took approximately 20 min. A operation lasted about 30 min except anesthesia and there was few blood loss.

Preoperative VAS score was 7 points, but after 3 days of operation, pain improved rapidly to VAS score 2 points. Arm sling applied immediately after surgery until 2 weeks and rehabilitation was started after 2 weeks postoperatively.

At six weeks postoperatively, there was no pain and complication. Full range of motion of shoulder was possible and VAS score

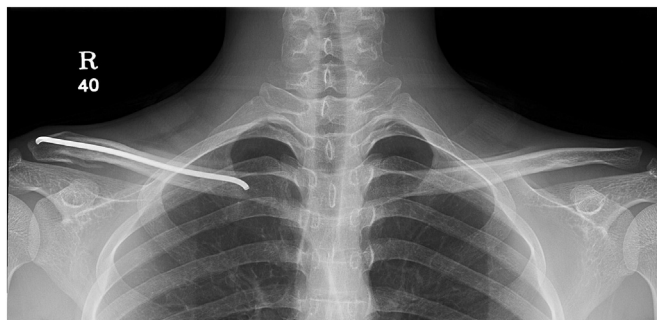


Fig. 3. After 6 months postoperative anteroposterior radiograph of the both clavicle showing the union of the distal fracture of right clavicle.

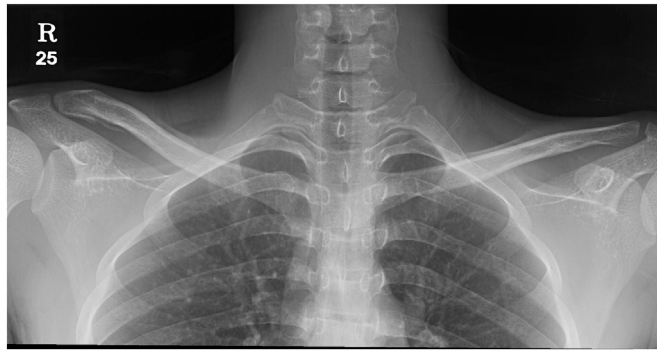


Fig. 4. Anteroposterior radiograph of the both clavicle after removal of TEN.

was 0 point, constant score was 98 points. Also radiograph showed good distal clavicle union. Post-operative scar remain about 1.5 cm. After six months postoperatively, TEN was removed under general anesthesia and it took 5 min (Figs. 3, 4).

Discussion

Distal clavicle fractures account for about 15% of the clavicle fractures and are less commonly happened than mid-shaft fractures [1]. The Neer classification and the Craig's classification are the most widely used to classified distal clavicle fracture. According to Neer classification, Type I injuries are distal clavicle fractures with the coracoclavicular ligaments intact. They are inherently stable. Type II injuries are fractures of the distal clavicle medial to the coracoclavicular ligaments. If there is no damage to the coracoclavicular ligaments, it is classified as type IIA, and if coronoid ligament tear is present, type IIB. Type III injuries are distal clavicle fractures with extension into the acromioclavicular joint. Type IV injuries are distal clavicle fracture with periosteal disruption and type V are with comminuted fracture [2,3]. In this case, the clavicle fracture was classified as type IIA.

It is generally known to use internal fixation using a hook plate or Kirschner wire as an operative treatment for distal clavicle fracture [4]. TEN is a surgical technique that is mainly used in clavicle mid-shaft fracture [5], and there is no reported case for distal clavicle. According to Muramatsu et al., the hook hole of the acromioclavicular joint can be widened when the hook plate is used for internal fixation. This suggests that shoulder pain and movement restriction may occur. Other complications such as infection and osteolysis are known to occur, and there is a disadvantage that the post-operative wound is relatively wide after surgery [6]. According to Yun-Feng Chen et al., advantage of the TEN is that it allows for early shoulder pain relief and functional recovery [7]. In particular, as minimal invasive surgical method, there is an advantage that the wound after surgical treatment is smaller than other techniques. (Fig. 5). Other advantages include the short operating time and simple metal removal.

As mentioned earlier, several authors have applied the hook plate to the distal clavicle, and this case was also able to use the hook plate. But considering pain and wound problem after surgery, we applied TEN and there was no complication such as nonunion or infection after surgery.

Conclusion

We performed internal fixation with TEN in the distal clavicle fracture and showed good prognosis after surgery. Therefore, TEN can be used as an effective surgical technique for distal clavicle fracture in younger patients especially Neer classification type II.



Fig. 5. A photo of wound after removal of TEN. The post-operative wound size was about 1 cm.

Conflict of interest statement

We have read and understood ‘Trauma case report’ policy on declaration of interests and declare that we have no competing interests.

Acknowledgements

This study was supported by Inha University research grant.

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