

Neglected isolated fracture of the trochlea humeri

Ajay Pal Singh*, Ish Kumar Dhammi, Anil Kumar Jain and Saurabh Jain

【Abstract】 A 15 years old girl was found to have isolated trochlea fracture 10 weeks after an injury caused by a fall on her left elbow. Movement of the elbow was severely restricted. Radiographs showed a half moon-shaped and anterosuperiorly displaced osteochondral fragment. Medial approach capsulotomy of the elbow and excision of the intraarticular adhesions were done to expose the isolated trochlea fracture. Headless screws were used for fixation, combined with bone grafting. The follow-up showed union and excellent functional recovery of the elbow. Isolated tro-

olated fracture of the trochlea in adults is rare as compared to that of its capitellar counterpart.¹⁻⁵ Fracture of the humeral trochlea is usually associated with capitellar fracture and/or elbow dislocation.¹ Until now, no neglected cases are reported in the English language literature to the best of our knowledge. Here we report a neglected isolated displaced trochlea fracture in a teenager, which was treated successfully by open reduction, autologous cancellous bone grafting and internal fixation with headless screws.

CASE REPORT

A 15 years old girl was hit by a bicycle from behind and she fell with her left elbow knocked onto the ground. Following the fall, she developed painful swelling and movement restriction of the elbow. There were no associated injuries. She took the treatment of splintage and massage from an osteopath. She came to us 10 weeks after the injury. Clinical examination revealed mild swelling on anterior aspect of her left elbow and tenderness by deep pressure on anteromedial aspect of the elbow. The elbow was fixed in 80 degrees of flexion. There were full supination and pronation. The

chlea fracture in adults is rare and usually associated with capitellar fractures and/or elbow dislocations. A neglected trochlea fracture is rarely reported in the English language literature to the best of our knowledge. Recognition of isolated trochlea fracture is vital to apprehend the pathomechanics of the injury and to devise a suitable treatment approach.

Key words: *Fractures, bone; Humerus; Elbow*

Chin J Traumatol 2010; 13(4):247-249

overlying skin was normal. Anteroposterior and lateral radiographs of the elbow showed a half moon-shaped and anterosuperiorly displaced osteochondral fragment and irregular trochlear and olecranon surfaces. The capitello-radial articulation appeared normal on lateral radiographs (Figure 1). Trochlear fracture or capitello-trochlear fracture was suspected.

The patient underwent an operation in supine position under tourniquet control. Standard medial approach with medial epicondylectomy was performed. The ulnar nerve was identified and secured during operation. A complete anterior and posterior elbow capsulotomy was performed to facilitate restoration of the elbow mobility. In addition, careful excision of the intra-articular adhesions was done to aid articular surface identification and elbow mobilization. The trochlear fracture was exposed, but fibrosis and adhesions of the trochlea made identification of the fracture edges difficult. The fragment was debrided of fibrotic tissues and the fracture bed was prepared. (Figure 2). A small 2-3 mm wide autologous cancellous bone graft was put between the fracture ends. Apposition was achieved and secured with a smooth K-wire. Two Headless screws were used from anterior to posterior direction for definitive fixation. Articular congruency was restored and range of motion of the elbow was checked. Medial epicondyle was secured with a mini screw and the wound was closed in layers. The postoperative period was uneventful. Promotion of the elbow range of motion was started since the first day in form of active assisted exercises. There

DOI: 10.3760/cma.j.issn.1008-1275.2010.04.011

Department of Orthopaedics, Guru Teg Bahadur Hospital, University College of Medical Sciences, University of Delhi, Delhi 110095, India (Singh AP, Dhammi IK, Jain AK and Jain S)

*Corresponding author: Tel: 91-9891394779, E-mail: docajaypal@gmail.com

was no collapse of the fragment or loosening of screws. Union was observed radiologically at 8 weeks and painless elbow range of motion was achieved from 5 degrees to 135 degrees at 8 months. In the 2 years' follow-up, there was no evidence of avascular necrosis or degenerative changes (Figure 3) and the patient had a score of 98 points on a functional elbow rating scale.⁶



Figure 1. Anteroposterior and lateral radiographs of the left elbow. They show a half moon-shaped osteochondral fragment which is displaced anterosuperiorly and has sclerotic margins, and irregular trochlear and olecranon surfaces. The capitello-radial articulation appears normal on the lateral radiograph.

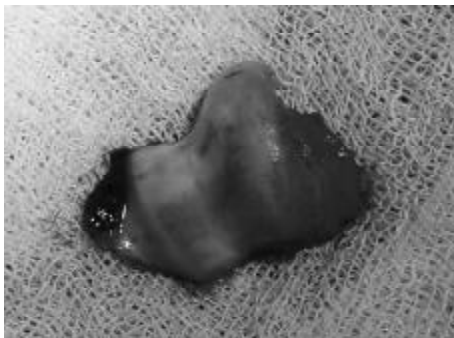


Figure 2. A intraoperative picture showing trochlear fragments.



Figure 3. Follow-up radiographs from anteroposterior and lateral views showing union of the trochlear fragment and the medial epicondyle.

DISCUSSION

Fractures of the capitellum account for 1% of all elbow fractures and trochlea fractures are usually accompanied by type IV capitellum fractures or elbow dislocations.¹⁻³ Isolated fractures of the trochlea are rare and until now there are only 5 cases reported in the English language literature.¹⁻⁵ This kind of fracture has not been mentioned in the standard orthopaedic textbooks. It only appears sporadically as a case report in the literature. However, to the best of our knowledge, a delayed presentation of trochlear fracture has not been reported in the English language literature yet. Very little information regarding the mechanism of injury and treatment results of this injury is available.^{1,2} First described by Laugier in 1853, trochlea fracture is also known as Laugier's fracture.⁷ It rarely occurs due to the deep location within the olecranon and distinguish structure of the trochlea. The spool-shaped trochlea interposes between the medial and lateral column of the distal end of the humerus and is essential for stability and arc of motion of the elbows.¹⁻³ Instability and articular incongruity of the trochlea would result in osteoarthritis, thus early recognition and treatment are of paramount importance. This case was presented 10 weeks after injury, hence of neglected nature. And the results of elbow range of motion are guarded in such an old fracture.

The mechanism of injury of trochlea fractures is falls either on the flexed elbow or on the extended elbow. In our case it was a fall on the flexed elbow. The axially transmitted force through the wedge shaped trochlear ridge and sparing the humeral capitellum explains the mechanics of injury best.⁵

Fractures of the capitellum and trochlea are commonly missed on the first examination.³ Inability to obtain and assess the bilateral views of the elbows which are at 90 degrees to each other underestimates the severity of injury and thus correct diagnosis is not made. Modified lateral views and CT scan are helpful in accurately delineating the extent and type of fractures.¹

The approach used to treat isolated trochlea fracture is standard medial approach⁴, and to treat displaced trochlea fracture is open reduction and internal fixation with K-wires, bioabsorbable screws and Herbert screws.¹⁻⁵ In a displaced trochlear fracture, conservative manage-

ment and excision are not warranted for this can result in elbow instability and arthritis.¹ We used 2 Herbert screws (Maxortho surgical, Mumbai, India) for stable fixation and the patient could do immediate mobilization of the elbow. The double threaded design of these headless screws allows them to sink below the level of the articular cartilage and provide necessary compression for early mobilization, fracture healing as well. Small articular pieces can be discarded, but for significant subchondral bone loss, bone grafting should be done.

Five cases of isolated trochlea fractures have been reported in the literature and all of them were presented immediately after injury and treated by open reduction and internal fixation.^{2,4,5,10} Osteochondral nonunion of the distal end of humerus is limited to capitellar fragment only.^{8,9} Encountering a free capitellar fragment and non-union should not discourage the use of internal fixation as avascular necrosis is less likely to occur with good fixation and early mobilisation.⁸ And if osteonecrosis is not apparent after one year, it is unlikely to occur.^{8,9} It has been reported that the realignment and stable fixation of the anterior fragments revascularize the cancellous bone and a rapid process of this can result in woven bone and stable healing.⁹

This case is a delayed presentation of trochlear fracture. Hence we used bone grafts after freshening of the edges. Our case was presented 10 weeks after injury during which she took treatment from an osteopath. Thus severe fibrosis and lots of adhesions existed and extensive dissection was required to identify the fracture ends. This resulted in further stripping of the soft tissue attachments to the trochlear fragment. In treatment of capitello-trochlear fractures, the fractured fragments usually lie free of soft tissue attachments and can be debrided on side tables before internal fixation.^{8,9} This can achieve good results in terms of union and functional recovery, and avascular necrosis has not been reported. In our case, there was no arthrosis or avascular necrosis and the patient has excellent functional score at two years follow-up.

This case aims to stress upon awareness of isolated trochlea fracture among clinicians and management of delayed presentation of such case, although it is rare. We believe that delayed isolated displaced fracture of the humeral trochlea can be treated successfully by elbow capsulectomy, debridement of the fragments, autogenous cancellous bone grafting, stable fixation with headless screws and early mobilization.

REFERENCES

1. Foulk DA, Robertson PA, Timmerman LA. Fracture of the trochlea. *J Orthop Trauma* 1995;9(6):530-532.
2. Nakatani T, Sawamura S, Imaizumi Y, et al. Isolated fracture of the trochlea: a case report. *J Shoulder Elbow Surg* 2005;14(3):340-343.
3. Mehdian H, McKee MD. Fractures of capitellum and trochlea. *Orthopedic Clin North Am* 2000;31(1):115-127.
4. Worrell RV. Isolated, displaced fracture of the trochlea. *NY State J Med* 1971;71(19):2314-2315.
5. Kwan MK, Khoo EH, Chua YP, et al. Isolated displaced fracture of humeral trochlea: a report of two rare cases. *Injury Extra* 2007;38(12):461-465.
6. Broberg MA, Murrey BF. Results of delayed excision of the radial head after fracture. *J Bone Joint Surg Am* 1986;68(5):669-674.
7. Hotchkiss RN, Green DP. Fractures and dislocations of the elbow. In: Rockwood CA, Green DP, Bucholz RW, ed. *Rockwood and Green's fractures in adults*. 3rd edition. Philadelphia: Lippincott, 1991:739-841.
8. Singh AP, Singh AP, Vaishya R, et al. Fractures of capitellum: a review of 14 cases treated by open reduction and internal fixation with Herbert screws. *Int Orthop* 2009 Nov 6. [Epub ahead of print]
9. Ring D, Jupiter JB. Operative treatment of osteochondral nonunion of the distal humerus. *J Orthop Trauma* 2006;20(1):56-59.
10. Kaushal R, Bhanot A, Gupta PN, et al. Isolated shear fracture of humeral trochlea. *Inj Extra* 2005;36(6):210-211.

(Received February 20, 2010)

Edited by LIU Gui-e