



International Journal of Surgery Case Reports

journal homepage: www.elsevier.com/locate/ijscr



Treatment of symptomatic medial epicondyle nonunion: Case report and review of the literature

Mehmet Erdil^{a,*}, Kerem Bilsel^a, Ali Ersen^b, Mehmet Elmadag^a, Nejat Tuncer^a, Cengiz Sen^a

^a Bezmialem Vakif University, Medicine Faculty, Department of Orthopaedics and Traumatology, Istanbul, Turkey

^b Mardin Kiziltepe State Hospital, Department of Orthopaedics and Traumatology, Mardin, Turkey

ARTICLE INFO

Article history:

Received 27 March 2012

Accepted 30 April 2012

Available online 29 May 2012

Keywords:

Humerus

Epicondyle

Nonunion

ABSTRACT

INTRODUCTION: Symptomatic nonunion of humeral medial epicondyle can be problematic and difficult to treat due to high complication rates related to open reduction and internal fixation methods.

PRESENTATION OF CASE: We described four patients with symptomatic medial humeral epicondyle nonunion who underwent open reduction and internal fixation.

DISCUSSION: Symptomatic nonunion of humeral medial epicondyle is a rare entity. Surgical technique can be difficult because of anatomical and biomechanical factors. In the literature, there are a few cases of humeral medial epicondyle treated by open reduction and internal fixation.

CONCLUSION: Open reduction and internally fixation of the medial epicondyle nonunion with one cannulated screw results with improved elbow function.

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1. Introduction

Non-displaced medial epicondyle fractures of humerus are best treated by conservative methods whereas incarcerated intra-articular displaced fractures, fractures with ulnar nerve entrapment, and unstable fractures should be treated with open reduction and internal fixation (ORIF).^{1–5} There are some controversies about the treatment methods of displaced extra-articular fractures of humeral medial epicondyle. Nonunion rates of displaced extra-articular medial humeral epicondyle fractures are reported as high as 90% however most of them remain asymptomatic without any functional deficit.^{6,9} Although not common, symptomatic medial humeral epicondyle nonunion could be disabling for patients with a painful and instable, medial collateral ligament (MCL) deficient elbow. Another controversy is about the treatment of symptomatic medial condyle non-union. Excision of the fragment is recommended in several reports however excision is not a solution for instability.^{6,10} Satisfactory results were reported with ligamentous repair with the excision of the fragment.^{6,10} Although achieving osseous union with ORIF is difficult due to small fragment size and hardware prominence, it is the optimal way to restore distal humerus anatomically and therefore obtain normal biomechanics of the elbow joint.

The purpose of this report is to review a case series of 4 patients with symptomatic medial humeral condyle nonunion treated with ORIF of the fragment.

2. Case (1) presentation

24 years old male patient was evaluated in the emergency room after a fall on out-stretched hand and diagnosed with medial humeral epicondyle fracture of a more than 5 mm displaced fragment. Surgical treatment was recommended. However, he did not accept. He also did not come to any follow-up for conservative treatment. 8 months after the accident, he came back with a painful elbow without any radiographic sign of bony union. Open reduction with one 4.0 mm cannulated screw, ulnar nerve release-anterior transposition, and autologous bone grafting was performed. Elbow motion was allowed at the 5th day of surgery. At the 2nd month follow-up according to X-rays the fracture was considered. At first year follow-up, the patient was satisfied without pain and instability, and had full range of motion. The Mayo Elbow Performance score (MEPS) and the quick dash (q-Dash) score were 100 and 2.3 at the last follow-up (16th month of surgery), respectively.

3. Case (2) presentation

14 years old male patient complained of a painful elbow after a minor trauma. He had a history of medial humeral epicondyle fracture 2 years ago which was treated conservatively with 3 weeks of cast immobilization. Radiographs revealed a chronic medial humeral epicondyle nonunion which remained asymptomatic until a minor trauma.

* Corresponding author at: Bezmialem Universitesi Vakif Gureba Hastanesi Ortopedi ve Travmatoloji AD, 34093, Fatih, Istanbul, Turkey. Tel.: +90 5324249732; fax: +90 2124531700.

E-mail addresses: drmehmeterdil@gmail.com (M. Erdil), kbilsel@gmail.com (K. Bilsel), ali.ersen@hotmail.com (A. Ersen), drelmadag@gmail.com (M. Elmadag), dr.nejattuncer@gmail.com (N. Tuncer), senc64@gmail.com (C. Sen).



Fig. 1. 46 year-old patient with medial humeral epicondyle nonunion: (a) pre-operative antero-posterior radiograph; (b) pre-operative lateral radiograph; (c) pre-operative CT, frontal view; (d) pre-operative CT, axial view.

Open reduction was performed and the diagnosis of chronic nonunion was confirmed with fibrous tissue between fragments. After removing all fibrous tissue, the fracture was fixed with a 4.0 mm cannulated screw. Bone grafting and ulnar nerve transposition were also performed.

Postoperative period was uneventful. Osseous union was observed in radiographs at the 2nd month follow-up. He returned to sportive activities without any complaint after 3rd month of the surgery. Thirteen months after surgery follow-up, the MEPS and q-dash score were 100 and 0, respectively.

4. Case (3) presentation

46 years old male patient was complaining of medial sided elbow pain and a sensation of weakness. He had this complaint since a fall on his elbow 1.5 years ago; however he never went to a physician to be evaluated. Radiographs revealed a displaced medial humeral epicondyle nonunion (Fig. 1). The range of motion of the elbow was decreased to 20–90°.

ORIF was our choice of treatment. To restore the MCL, two 3.5 mm suture anchors were added to one 4.0 mm cannulated screw. Anterior transposition of the ulnar nerve was performed due to screw impingement of the nerve in its original place. Bone grafting with spongius allograft and Demineralized Bone Matrix (DBM) were added to enhance the bony healing.

Postoperative period went unremarkable with early range of motion exercises. At the end of the third month the epicondyle was healed radiographically (Fig. 2). The elbow range of motion was increased to 10–140° (Fig. 3). The first year follow-up,

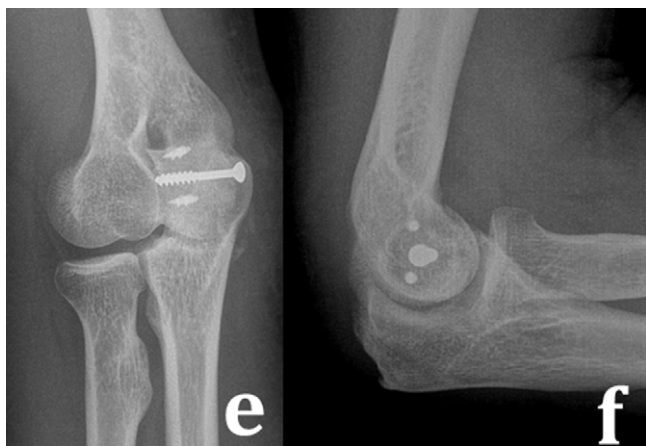


Fig. 2. 46 year-old patient with medial humeral epicondyle nonunion at the 3rd month follow-up: (a) post-operative antero-posterior radiograph; (b) post-operative lateral radiograph.

improvements in elbow function and pain were achieved according to MEPS and q-Dash scores.

5. Case (4) presentation

41 years old male was evaluated in the outpatient clinic for chronic elbow pain which was resistant to anti-inflammatory medications. He had a history of sports injury 2.5 years ago. The radiographs revealed a displaced medial epicondyle non-union. The nonunion was considered as the cause of the elbow pain and open reduction and fixation with a 4.0 mm cannulated screw was performed with autologous bone grafting and ulnar nerve transposition.

Postoperatively, the pain reduced significantly and resolved at the end of the first month. The medial epicondyle was radiographically healed at the 2nd month of follow-up. At the latest follow-up, the MEPS was 100, which was 70 pre-operatively. The range of motion of the elbow was full without any complaints at the 14th month follow-up.

6. Discussion

Conservative methods are the first choices in treating the non-displaced or minimally displaced medial humeral epicondyle.¹ Several studies showed that bony union cannot be achieved in a big percentage of non-surgically treated medial humeral epicondyle fractures.^{6–9} However, most of these patients are asymptomatic and their elbows function well with a stable fibrous healing.¹⁰ Only a small part of these patients remain symptomatic according to an established nonunion,⁶ and the surgical intervention is difficult due to the small fragment size and biomechanical factors such as the high tension and the torsional forces applied from the flexor-pronator tendon origin. Some authors recommended fragment excision with soft tissue repair because of these difficulties.^{6,10} In our study, via a medial approach, we identified and anteriorly transposed the ulnar nerve. After removing the fibrous nonunion tissue and revitalizing the fragment ends, we used one 4.0 mm cannulated screw for fixation with a mixture of spongius chips bone allograft and 5 ml DBM for bone grafting. In case 3, two suture anchors were also added to repair the MCL (Fig. 1). Physical therapy was started at post-operative day 5 with range of motion exercises. A hinged elbow brace was utilized for protection of the joint against valgus stress.

According to our knowledge, there is little published information about the ORIF of the symptomatic medial epicondylar nonunion. In one study, symptomatic medial epicondyle nonunions of 5 patients were treated by ORIF with a tension band construct. All patients were satisfied with the surgery and bony healing was achieved in all patients with improvement of elbow

Table 1
Patient data (all post-operative measurements are from final follow-up).

Case	Age at presentation (year)	Time since injury (month)	Pre-op MEPS	Post-op MEPS	Pre-op q-DASH	Post-op q-DASH	Pre-op extension/flexion	Post-op extension/flexion
I	24	8	60	100	27.3	2.3	10/130	0/140
II	14	25	60	100	36.4	0	10/140	0/140
III	46	18	55	95	25.0	4.5	30/135	10/140
IV	41	31	70	100	31.8	2.3	15/135	0/135
Mean	31.25	20.5	61.2	98.7	30.1	2.3	16.2/135.0	2.5/138.7



Fig. 3. 46 year-old patient with medial humeral epicondyle nonunion at the 3rd month follow-up: (a, b, c) post-operative elbow range of motion.

extension and elbow function.¹¹ Similarly, a study by Smith et al. with ORIF by one or two cannulated screws in 8 children of medial humeral epicondyle nonunion showed improved outcomes, and pain relief without any complication.¹² In our study, we had significant improvements with MEPS and q-DASH scores and elbow range of motion in a mean follow-up of 13.75 months (Table 1 and Fig. 4). There were no surgical complications and no patient had a weakness and/or instability. Osseous union was achieved which was documented with postoperative plain radiographs.

Our study has some potential weaknesses, including small sample size and lack of grip strength of the patients. Because of the relative rarity of this condition, it was difficult to obtain a large sample size.

In conclusion, symptomatic medial epicondyle fracture nonunion can be treated with one cannulated screw accompanied by ulnar nerve transposition. In this case series, we obtained excellent outcomes with high patient satisfaction.

Conflict of interest

None.

Funding

No funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.

Ethical approval

Obtained.

Author contributions

All authors contributed.

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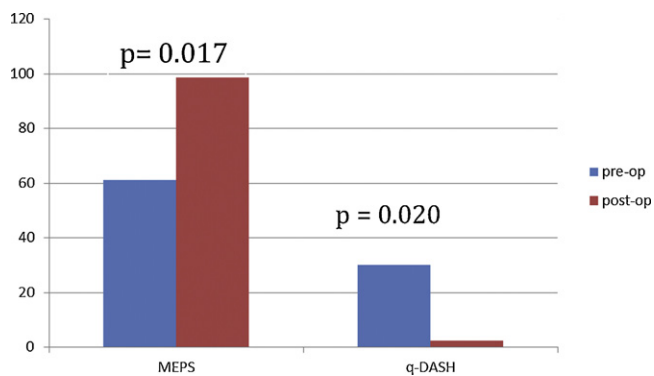


Fig. 4. Mean preoperative and postoperative outcome scores. QuickDASH (q-DASH) scores range from 0 to 100 and higher scores represent greater disability. Mayo Elbow Performance Score (MEPS) range from 0 to 100 with lower scores representing greater disability. *p* values are shown.

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