



Treatment of medial epicondyle fractures accompanying elbow dislocations in children

Çocuklarda dirsek çıkığına eşlik eden medial epikondil kırıklarının tedavisi

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Amaç: Kliniğimizde, dirsek çıkığına eşlik eden medial epikondil kırığı nedeniyle tedavi edilen çocuk hastaların klinik ve radyografik sonuçları değerlendirildi.

Çalışma planı: Bu çalışmaya, dirsek çıkığına eşlik eden medial epikondil kırığı olan 10 çocuk hasta (9 erkek, 1 kız; ort. yaş 12; dağılım 1.5-15) alındı. Üç hastada posteromedial, yedi hastada posterolateral çıkık vardı. Üç olguya konservatif, dört olguya erken cerrahi (7. günden önce), üç olguya geç cerrahi (7. günden sonra) tedavi uygulandı. Cerrahi tedavi uygulanan hastaların üçünde eklem içi fragman, dördünde ise instabilite vardı. İnstabilite olan olguların hepsinde medial epikondilde 5 mm'nin üzerinde deplasman vardı. Cerrahi tedavi uygulanan hastalarda posteromedial insizyon kullanıldı ve ulnar sinir eksplorasyonu yapıldı. Klinik sonuçlar Mayo dirsek performansı skoru ile değerlendirildi, 75 puan ve üstü yeterli sonuç olarak kabul edildi. Ortalama izlem süresi 28 ay (dağılım 3-103 ay) idi.

Sonuçlar: Hastaların tümünde medial epikondil kırığı 4-6 haftada kaynadı. Mayo dirsek skoruna göre olguların hepsinde 75 puan ve üstü (ortalama 93.5) sonuç alındı. Mayo dirsek skoru yedinci günden sonra ameliyat edilen olguların ikisinde 80, birinde 75, diğer tüm olgularda 100 puan idi. Konservatif ve erken cerrahi tedavi uygulanan tüm hastalarda dirsek hareket açıklığı tamdı. Geç cerrahi tedavi uygulanan hastaların birinde 5° ekstansiyon, birinde ise 10° fleksiyon kaybı görüldü. İnstabilite nedeniyle ameliyat edilen dört olgunun son kontrollerinde instabilite saptanmadı.

Çıkarımlar: Medial epikondilin eklem içinde olduğu ve 5 mm üzerinde deplasmanı olan olgularda cerrahi, 5 mm ve altında deplasmanı olan olgularda konservatif tedavinin en iyi seçenek olduğunu düşünüyoruz.

Anahtar sözcükler: Çocuk; çıkık/tedavi/komplikasyon; dirsek eklemi/yaralanma/radyografi; kırık fiksasyonu, internal; humerus kırığı/cerrahi.

Objectives: We evaluated the clinical and radiographic results of treatment for medial epicondyle fractures accompanying elbow dislocations in children.

Methods: The study included 10 children (9 boys, 1 girl; mean age 12 years; range 1.5 to 15 years) with medial epicondyle fractures accompanying elbow dislocations. Three patients had posteromedial and seven patients had posterolateral dislocations. Three patients were treated conservatively, while four patients and three patients underwent early and late surgical treatment before or after the seventh day of injury, respectively. Surgery was indicated due to entrapment of the medial epicondyle fragments in three patients, and to instability in four patients with more than 5 mm of displacement. At surgery, a posteromedial incision was used and ulnar nerve exploration was performed. The results were evaluated using the Mayo elbow performance score. The mean follow-up period was 28 months (range 3 to 103 months).

Results: Union of the medial epicondyle fractures was achieved between four to six weeks in all the patients. The mean Mayo elbow performance score was 93.5. Late surgery was associated with a score of 80 in two patients and 75 in one patient, the remaining patients had an excellent result (100 points). Full range of elbow motion was achieved in all the patients treated conservatively and with early surgery; however, following late surgery, two patients had extension and flexion losses of 5° and 10°, respectively. None of the patients had instability postoperatively.

Conclusion: Patients with entrapment of the medial epicondylar fragment in the joint and with a displacement of more than 5 mm should undergo surgery, while those with a displacement of 5 mm or less can be treated conservatively.

Key words: Child; dislocations/therapy/complications; elbow joint/injuries/radiography; fracture fixation, internal; humeral fractures/surgery.

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Elbow dislocations in children are frequently accompanied with medial epicondyle fractures. The present study evaluated the clinical and radiographic results of the children who were treated for medial epicondyle fractures accompanying elbow dislocations between 1995 and 2003 in our clinic.

Patients and method

The study included 10 children (9 boys, 1 girl; mean age 12 years; range 1.5 to 15 years) with medial epicondyle fractures accompanying elbow dislocations. The fractures with dislocations were due to fall from high (wall or stairs) in three patients, and simply fall (during exercising or walking) in seven patients. All of them were closed fractures; three patients had posteromedial dislocation while seven patients had posterolateral dislocations.

Nine patients underwent closed reduction immediately after the clinical and radiographic diagnosis in the emergency polyclinic. One patient presented to our polyclinic 10 weeks after the trauma. For all cases, the neurovascular findings were normal following the admittance, closed reduction and operation. Three patients were treated conservatively, while four patients and three patients underwent early and late surgical treatment before or after the seventh day of injury, respectively. In all patients who were conservatively treated, a long arm cast was applied following closed reduction and radiographic control in our emergency polyclinic. When the fixation by cast was terminated at week six, all patients had achieved union.

Surgical treatment was preferred due to entrapment of the medial epicondyle fragments in three



Figure 1. (a, b) Preoperative, and (c,d) postoperative radiographs at month 9 of a patient who was surgically treated for the presence of intra-articular fragment.

patients (Figure 1, 2), and instability in four patients (Figure 3, 4). In all cases with instability, there was a displacement over 5 mm in the medial epicondyle. For all patients who underwent surgical treatment, posteromedial incision was used, and ulnar nerve exploration was performed. The medial epicondyle fixation was achieved by cross Kirschner wires in six cases, and by parallel Kirschner wires in one of the cases. All patients used a long arm cast for a period of 4 to 6 weeks after the operation.

Clinical results were assessed using the Mayo elbow performance score.^[1] A score of 75 points and over was considered satisfactory. The mean follow-up period was 28 months (range 3 to 103 months).

Results

The direction of the dislocation, time to surgery, indication for surgery, type of incision, duration of

splint, Mayo elbow scores and radiographic results of the patients were evaluated. The mean time to surgery was three days in the group with early intervention (1, 1, 3 and 7 days, respectively), and 30 days in the group with late intervention (9,11, and 70 days, respectively). A 13 year-old girl who presented to our polyclinic very lately was operated 10 weeks after the trauma. In addition to the posteromedial incision, lateral incision was used in order to achieve both the debridement of myositis ossificans in the lateral and the reduction in this patient; the medial epicondyle which was formed with a fibrous callus to the trochlea of the humerus was reduced, and fixed with two Kirschner wires. The medial epicondyle was fixed in the anatomical position with Kirschner wires in all cases who were operated because of intra-articular fragments or instability. The union of the medial epicondyle was achieved in 4 to 6 weeks in all patients.

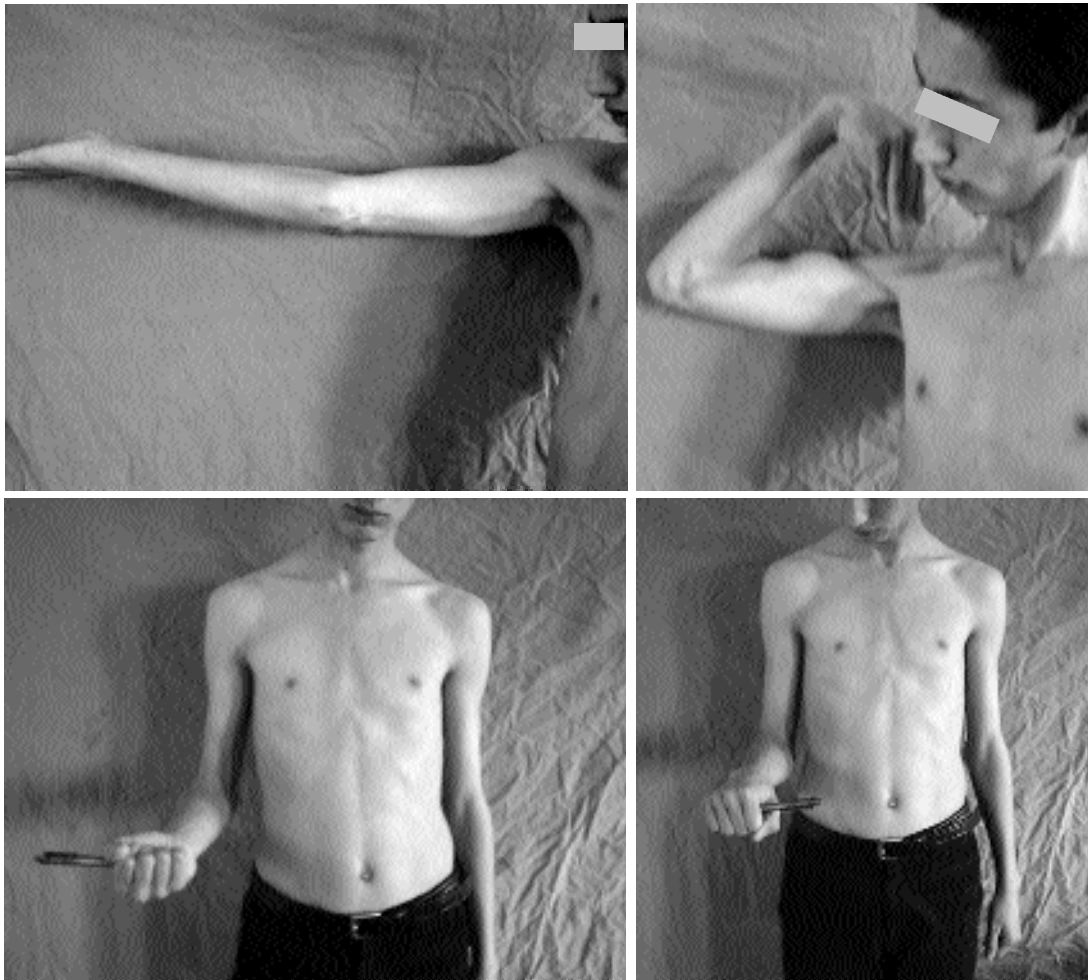


Figure 2. The functional evaluation of the patient at postoperative month 9, whose radiographies are presented at Figure 1.

According to the Mayo elbow scores, all patients had satisfactory (75 points and over, mean 93.5) results. The Mayo elbow score was 80 in two of the patients, who underwent surgery after seven days; and 75 in the patient who underwent surgery at week 10; and 100 points in all of the remaining cases.

A full range of motion was achieved in all patients who were treated conservatively or under-

went early surgical treatment. One of the patients who underwent late surgical treatment had a 5° extension loss while the other had a 10° flexion loss. The patient who was treated with a ten weeks delay had a full range of pronation-supination during the examination at post-operative week 14; the range of flexion-extension was 30°-120°. There was no instability and pain in the elbow.

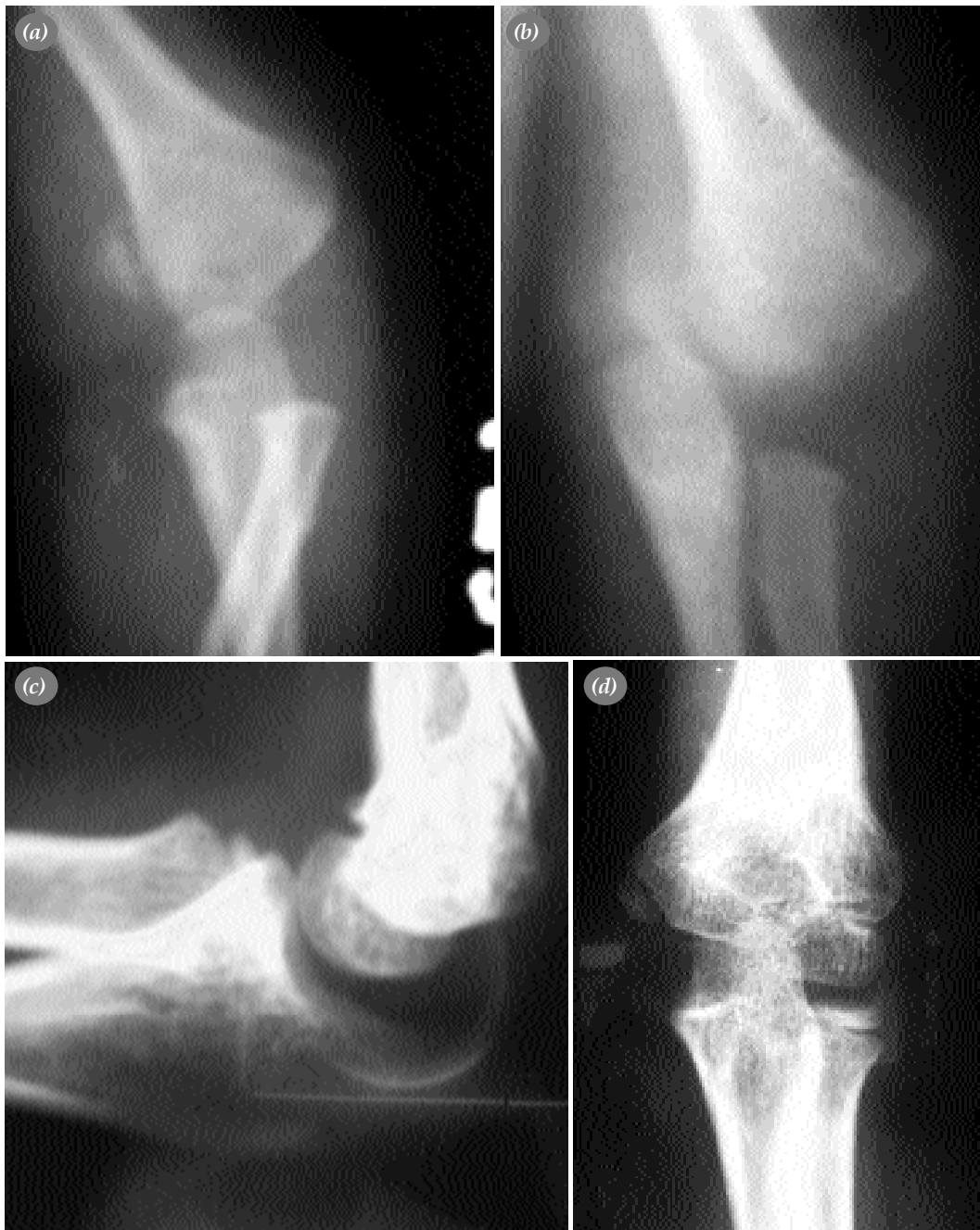


Figure 3. (a, b) The preoperative, and (c, d) post-operative radiographs at month 103 of a patient, who was surgically treated for the presence of instability.

No instability was found during the final examinations of the four cases, who underwent surgery for instability.

Discussion

Elbow dislocations in children are less frequent than in adults, and majority of the dislocations are toward the posterolateral.^[2] Closed reduction and immobilization are indicated for the treatment of isolated elbow dislocations. However, in case the elbow dislocation is accompanied by fracture, the treatment regimen is determined depending on the position and displacement of the fracture fragment, and whether it is intraarticular or not following the closed reduction of the dislocation.^[3]

Elbow dislocations in children are usually accompanied with fractures. The most common one is the fracture of the medial epicondyle, which

is also likely to be associated with intra-articular medial epicondyle. Surgery is indicated if the medial epicondyle is intra-articular after the closed reduction.^[4-6] Any fracture of the medial epicondyle accompanying the elbow dislocation with an intra-articular nature is classified under Type IV injury.^[5] Pimpalnerkar et al.^[5] indicated that in type IV medial epicondyle fractures, there is an extensive soft tissue damage and ulnar nerve entrapment in most of the cases, and therefore they suggested surgical treatment.

Another surgical indication in the medial epicondyle fractures is the displacement. Hines et al.^[6] suggested surgical treatment for medial epicondyle fractures with a displacement over 2 mm whereas Fowles et al.^[7] reported that they had good results with conservative treatment even in the presence of displacement. Kobayashi et al.^[8] high-

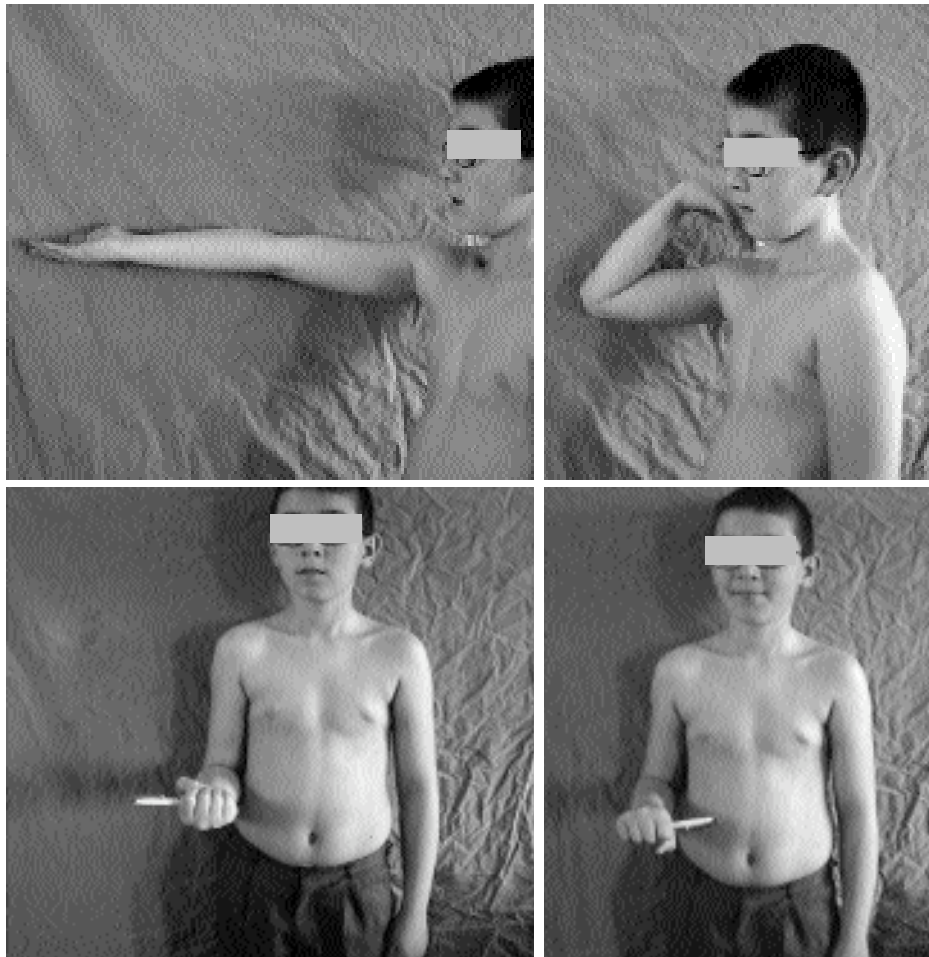


Figure 4. The functional evaluation of the patient at post-operative month 103 whose radiographs are shown in Figure 3.

lighted the significance of the size as well as the degree of displacement of the fragment in epicondyle fractures, and suggested that conservative treatment is indicated for patients in whom the maximum diameter of bone fragment is 13 mm or less or the displacement of the bone fragment is 9 mm or less.

In our cases, we used surgical treatment in patients with an intra-articular entrapment of the medial epicondyle and a displacement over 5 mm following the closed reduction, while we preferred conservative treatment in cases with a displacement of 5 mm and less. As the Mayo elbow score was 100 points in all of the cases who were treated conservatively, we believe that the conservative treatment is the best choice of treatment in patients with a displacement less than 5 mm.

The common viewpoint in the treatment of epicondyle fractures is that surgical treatment is indicated when the fracture fragment was entrapped in the joint. Presence of an intra-articular fragment requires a detailed analysis. Small epicondyle fragments may go unnoticed due to superposition with the metaphyseal of the distal humerus. In younger children, epicondyle can be confused with the ossification center of the trochlea.^[7,9]

Immediate surgery is indicated when a displacement or an intra-articular entrapment of the medial epicondyle was detected.^[4,10] As the duration between the trauma and reduction is delayed, achieving a satisfactory outcome becomes less likely.^[11] During the final examinations, the Mayo elbow score was 100 points in all of the cases who underwent early surgical treatment. It was notable that the three patients with a score of 80 or less were in the late surgery group (after day 7).

Any delay in the treatment for entrapment of the medial epicondyle in the joint leads to intra-articular damage, resulting in a remarkable restriction in the elbow functions. Surgical treatment is indicated if the intra-articular entrapment of the medial epicondyle is diagnosed late.^[4,9] Fowles et al.^[9] excised the medial epicondyle in three of the six patients who underwent late surgery for the medial epicondyle fracture accompanying the elbow dislocation, and fixed it in the anatomical position in three patients. The authors observed

asymptomatic pseudoarthrosis in one patient, and premature physal closure in two patients, and found no significant difference between the two groups. We also fixed the medial epicondyle in anatomical position in the patient who presented with a 10-week delay, and found a Mayo elbow score of 75 points during the follow-up.

Another major complication of the elbow dislocations is the myositis ossificans. It is controversial if the surgical treatment and the duration between the trauma and the surgical treatment contribute to the formation of the myositis ossificans. It has been reported that a forced manipulation to the elbow joint in order to treat the stiffness increased the risk for myositis ossificans.^[12] In our cases, only the patient who were treated with a 10-week delay had myositis ossificans. The myositis ossificans was radiographically evident in this patient when presented to the hospital, and we also had to employ lateral incision in order to achieve the debridement of the myositis ossificans tissue occurred in the lateral and the reduction in addition to the posteromedial incision during the operation.

In medial epicondyle fractures accompanying the elbow dislocations in children, presence of intra-articular fragments or displacement following the closed reduction are considered as indications for surgical treatment. In our cases, we used surgical treatment in patients with an intra-articular medial epicondyle involvement entrapment or a displacement over 5 mm while we employed conservative therapy in patients with a displacement of 5 mm and less, and obtained satisfactory outcomes.

In conclusion, conservative and early surgical treatment yielded better outcomes compared to late surgical treatment. We believe that conservative therapy is the best choice in patients with a displacement less than 5 mm, and early surgical treatment in patients with a displacement over 5 mm.

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