Repair of Nonunion Lateral Humeral Condyle: A Case Report

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Abstract

Epiphyseal injury of the lateral condyle of distal humerus is found commonly in children. Complications following such an injury can result in nonunion with late development of angular deformity and ulnar nerue neuritis. Nonunion at this area is extremely troublesome and difficult to treat. Controversy exists as whether late open reduction and fixation can restore the anatomy of the elbow joint and improve the function. We describe a technique of corrective osteotomy to correct the cubitus valgus deformity and repair the nonunion. The patient was treated successfully with 4 years follow-up.

A CASE REPORT

An eight year-old girl was presented because of paresthesia and numbness along the course of her right ulnar nerve. Four years ago, the child had sustained an elbow injury when she fell down from a table. The X-rays at that time showed epiphyseal injury of distal lateral humeral condyle (Fig. 1A, 1B). The parents refused surgical treatment and the child was left without any treatment. Progressive valgus deformity was observed without any medical attention until the child had symptoms of ulnar nerve irritation.

Initial physical examination of the child demonstrated a cubitus valgus deformity of the right elbow, increased carrying angle of + 50° compared with + 8° on the left elbow. Percussion test over the ulnar nerve at the elbow was positive with paresthesia and numbness at the ulnar one and a half fingers. There was no weakness of the intrinsic muscles of the hand. Active range of elbow motion was painless from 15° to 100°. X-rays of elbow revealed a nonunion of lateral humeral condyle with proximal migration of the fragment (Fig. 2). The child was operated on to correct the valgus deformity and to stabilize the condyle fragment.

Surgical Technique

On semiprone position, from posterolateral approach an incision through the triceps mus-

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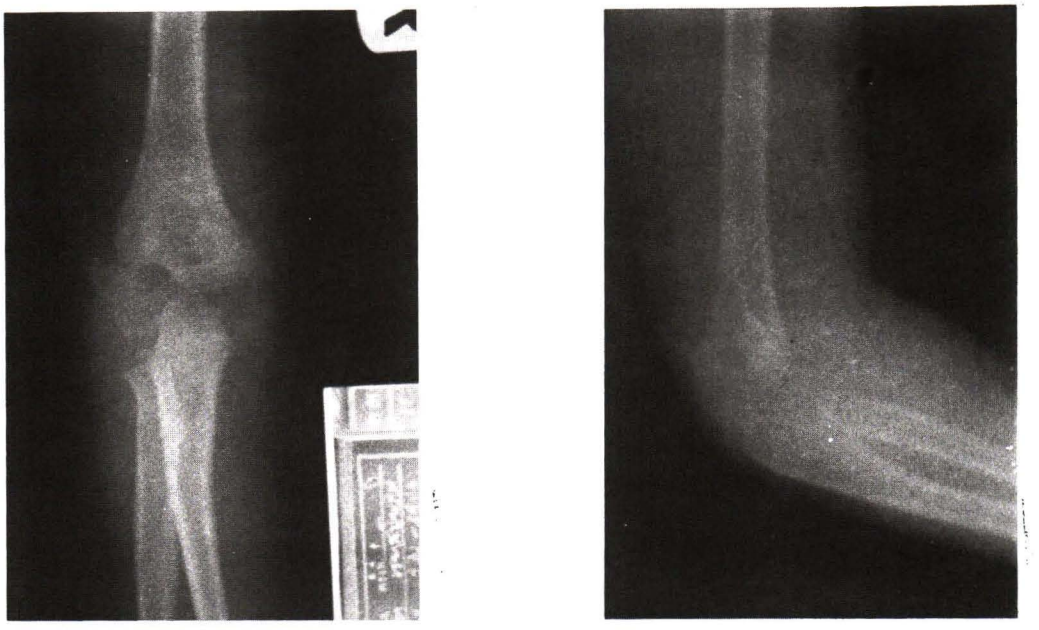

Fig. 1A, 1B. AP and lateral radiographs of Rt. elbow show displaced epiphyseal injury of lateral distal humeral condyle.

Fig. 2. AP radiograph shows cubitus valgus deformity of Rt. elbow due to nonunion of the lateral distal humeral condyle with proximal migration of the fragment.

cle posteriorly and brachioradialis anteriorly was carried down to expose the distal posterolateral aspect of distal humerus and the ununited lateral condyle fragment. The distal incision was extended from the lateral condyle curving towards the olecranon process (Fig. 3A). The fibrous tissue was then dissected out and the nonunion site was gently freshened. The fragment across the condyle was temporary fixed with one smooth Kirschner wire (Fig. 3B). Closed pentalateral osteotomy at supracondylar area was performed to correct the valgus deformity. The pentagon shape was planned by using 2 lines, one parallel to the elbow joint and the other line perpendicular to the long axis of the humeral shaft. The apex of the pentagon was located on the lateral aspect and the wide base was on the medial side (Fig. 3C). Multiple drills were used before cutting the bone with a chisel. Care was taken not to cut through the lateral cortex of the humerus. When the osteotomies were complete, realignment could be achieved by apposing the cut fragments (Fig. 3D). The resected bone was then inserted into the gap of nonunion. Two Kirschner wires were fixed from lateral condyle through the osteotomy sites (Fig. 3E). Alignment and range of motion were checked before wound

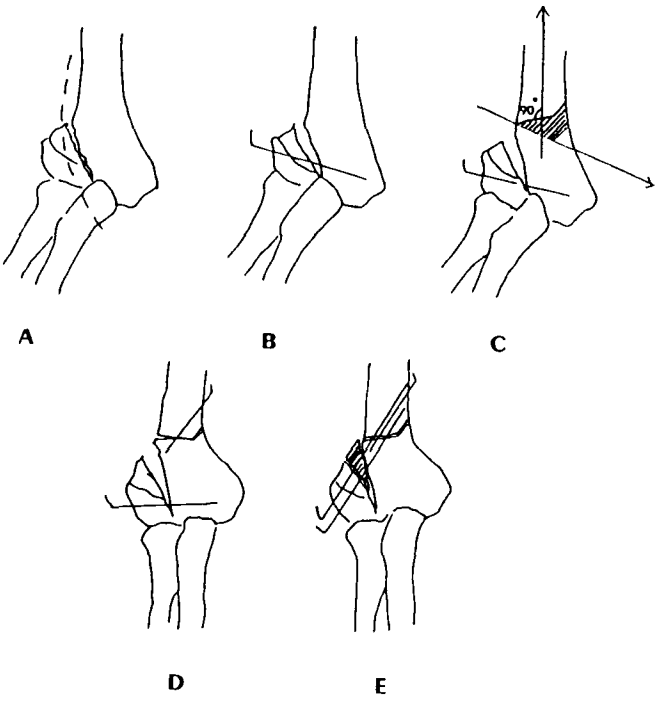

Fig. 3. Illustration of surgical osteotomy correction
A. Dotted line indicates incision
B. Freshened nonunion site, by transfixation one Kirschner wire across condyle for temporary fixation
C. Shaded area indicates the extent of resection, the apex is located at the lateral aspect.
D. Realign and fix with one Kirschner wire
E. Insert bone in the gap and fix with 2 Kirschner wires across the osteotomy site.

closing. The elbow joint was then immobilized by long arm cast for six weeks. The child had immediate relief of ulnar nerve symptoms (Fig. 4). Pins were removed 3 months later.

When last examined at age 12 years (4 yrs follow-up, Fig. 5), she had good alignment with stable full painless elbow motion (Fig. 6).

DISCUSSION

For acute epiphyseal injury of the distal lateral condyle of humerus, the treatment of choice is open reduction and internal fixation[1]. Failure to obtain anatomic reduction and secure fixation of the fragment may inevitably result in progressive valgus deformity of the elbow with tardy ulnar palsy[2]. The most common cause of nonunion or delayed union is inadequate treatment of the acute injury. The lateral humeral condyle fragment is an intraarticular avulsion fracture. Nonunion is due to instability of the distal fragment by the pulling mechanism of the extensor tendon[3,4].

The lateral side of the elbow ceases to grow while the medial side grows normally and results in a progressive valgus deformity of the elbow[5]. Avascular necrosis of the lateral condyle and fish tail deformity of the humerus can be observed following an inadequate reduction of this injury[6,2,7]. Established nonunion with cubitus valgus and proximal migration of the lateral condyle result in severe elbow deformity, instability, loss of function and ulnar nerve paralysis. Treatment of established nonunion of lateral distal humeral condyle is difficult. Some advocated only

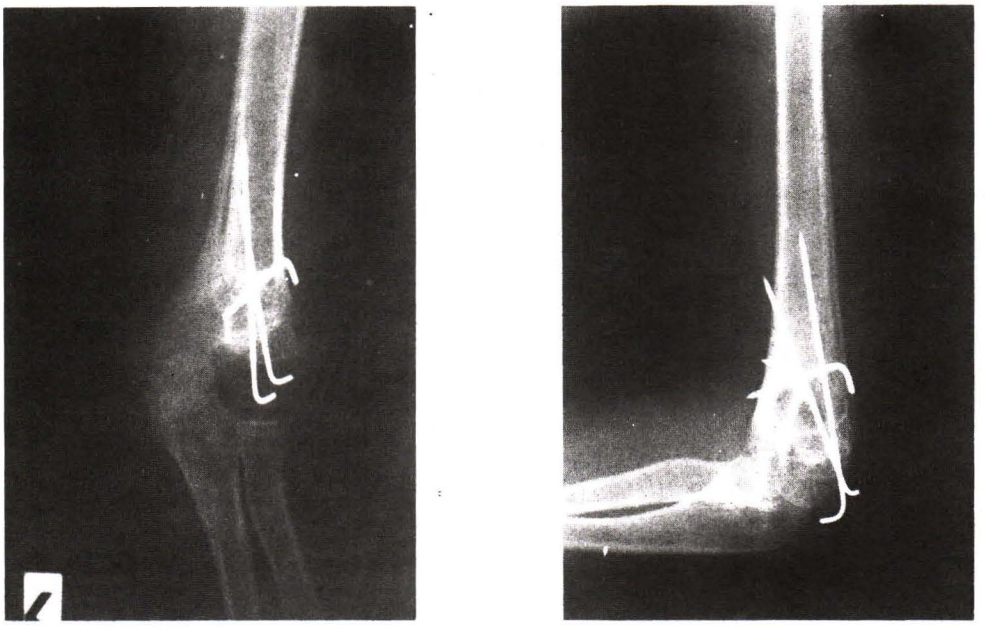

Fig. 4A-B. Postoperative AP and lateral view of Rt. elbow show good alignment with progressive bone healing

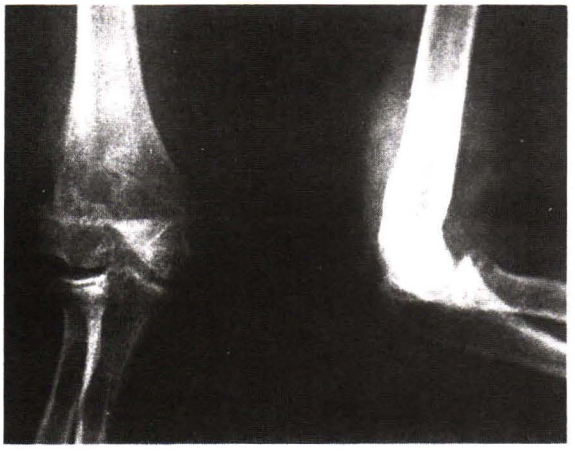

Fig. 5. Four years follow-up, the radiograph shows normal carrying angle of Rt elbow. The child grows up with almost normal shape of distal humerus.

Fig. 6A. The carrying angle of Rt. elbow is approximately the same as the Lt elbow. She can fully extend her Rt. elbow joint.

Fig. 6B. The child had nearly full range of elbow flexion.

early transposition of the nerve[8,9]. Following surgical intervention, the results were mostly unsatisfactory. Speed and Macey[10] were among the first to question whether surgical treatment was better than no treatment at all. Jakob and Fowels[11] recommended that an old fracture of more than 3 weeks should be left alone. Several advocated late open reduction and internal fixation especially in a symptomatic elbow[6,12-15]. Flym[12] suggested that a nonunion treated in time will allow the condylar fragment to grow with the elbow to maturity so that the elbow joint can be salvaged. The principle of our technique is the same as for correction of angular deformity in supracondylar fracture[16]. The two important lines for the osteotomy are the line that is parallel to the elbow joint and the line that is parallel to the long axis of the humerus.

The apex of the pentagon on the lateral cortex of humerus should not be cut through, this can provide fragment stability during apposition. Resected bone from the osteotomy can be inserted to repair nonunion. Gentle meticulous dissection, appropriate technique of fixation and the potential of bone healing in a young child can result in a more stable elbow joint without disturbing the ulnar nerve.

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การรักษาโดยการซ่อมกระดูกไม่ติดบริเวณ lateral humeral condyle รายงานผู้ป่วย 1 รายเพื่อทบทวนวารสาร

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การบาดเจ็บบริเวณข้อศอกในเด็กเล็กในกรณีของ epiphyseal injury ของ lateral condyle ของปลายกระดูกฮิวเมอรัส เป็นภาวะที่พบได้ง่าย ภาวะแทรกซ้อนที่สำคัญคือ กระดูกไม่ติดทำให้เกิดความพิการผิดรูปในลักษณะ cubitus valgus ของข้อศอก เมื่อเด็กโตขึ้น และยังมีอาการชา (อาการชาเป็นอาการเริ่มต้นยังไม่มีอาการอ่อนแรง แต่ถ้าใช้คำอัมพาตหมายถึง มีอาการอ่อนแรงด้วย) ของเส้นประสาทอัลน่าอีกด้วย ยังมีข้อถกเถียงกันในกรณีของ ภาวะกระดูกไม่ติดของชิ้นกระดูก lateral condyle ว่าจะรักษาโดยการผ่าตัดเพื่อแก้ความพิการผิดรูป หรือแค่ผ่าตัดย้ายเส้นประสาทอัลน่าที่ถูกระคายจากการ โก่งผิดรูปของกระดูก รายงานนี้เป็นการทบทวนวารสารและเสนอผลการผ่าตัดรักษาภาวะกระดูก lateral condyle ของปลายกระดูกฮิวเมอรัส หักแล้วไม่ติดในเด็กเล็กที่มีความพิการผิดรูปแบบ cubitus valgus โดยการตัดกระดูกเพื่อแก้แนวกระดูกให้ตรงตามปกติและซ่อมกระดูกที่ไม่ติดสามารถติดตามผู้ป่วยได้เป็นเวลา 4 ปี

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