

Nonunion of Lateral Humeral Condylar Fracture in A Child with Cubitus Varus

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ABSTRACT

Patients with cubitus varus deformity secondary to malunited supracondylar fracture are at risk for lateral humeral condylar (LHC) fracture. This report describes a child presenting with preexisting malunion of supracondylar fracture presenting along with nonunion of a LHC fracture following a recent injury. The patient underwent resection osteotomy of the metaphyseal proximal fragment of the fracture surface, reduction of the displaced LHC fragment and screw fixation. This procedure corrected the cubitus varus and treated the nonunion of the lateral condyle thus avoiding a supracondylar osteotomy procedure. Treatment resulted in solid union, good range of motion and no avascular necrosis.

Key Words:

Cubitus Varus, Lateral Condyle, Humerus, Nonunion, Resection Osteotomy

INTRODUCTION

Cubitus varus is the most common complication following supracondylar fracture of the elbow in children. In addition to causing unacceptable cosmetic problems especially in females, it also places such patients at risk for lateral humeral condylar (LHC) fracture¹. While there are many acceptable surgical methods for correcting cubitus varus, surgery for nonunion of fracture of the lateral condyle is recommended only if avascular necrosis (AVN) and stiffness can be avoided.

We report here a case involving a child with underlying cubitus varus following supracondylar fracture who presented with nonunion of a LHC fracture following a recent injury. Both the LHC nonunion and cubitus varus were treated in one surgery.

CASE REPORT

In 2007, a 3-year-old girl sustained a closed Gartland type II fracture of the left supracondylar humerus. Treatment

consisted of casting without reduction. The fracture united but resulted in a cubitus varus deformity. Eight months later, she sustained another injury in the left elbow, which caused an ipsilateral LHC fracture that was treated with cast immobilisation. As the fracture did not unite after 5 months, the child was then referred to us at 5 years of age (Figure 1a). She had no limitation in range of motion and the elbow was not painful; however, plain radiograph showed nonunion of a LHC Milch type II fracture with an underlying malunited supracondylar fracture (Figure 1b).

Surgery was performed using a lateral approach. The distal humerus was identified, and followed down to the fracture site and articular surface without disturbing the posterior of the fracture. After identifying the nonunion site, the metaphyseal proximal fragment of the fracture surface was resected adequately to correct the varus deformity and the fragment was fixed with 2 screws (Figure 1c, d). The elbow was immobilised with a back slab in 90° flexion for three weeks followed by self-administered physiotherapy. The fracture united within 6 weeks. The child regained almost full range of motion within 3 months (Figure 2a, b). Radiograph taken at 18 months post-surgery showed good union and an carrying angle of 0° with no AVN (Figure 2c).

DISCUSSION

A displaced LHC fracture carries a high risk of nonunion due to its intra-articular location and subsequent pull from the common extensor muscle. Long term follow up of untreated LHC fracture has shown that tardy ulnar nerve dysfunction is a major problem that can present more than 7 years after injury². Other possible complications include pain, instability, progressive valgus and loss of motion². Since progressive cubitus valgus is a potential sequela of nonunion of a LHC fracture, one would think that cubitus varus in this patient would be corrected even if the fracture is left untreated. However, biomechanical analyses suggest that in cubitus varus malalignment, distraction and shear forces generated across the capitellar physis during a fall on an outstretched hand are increased¹. Therefore it is always

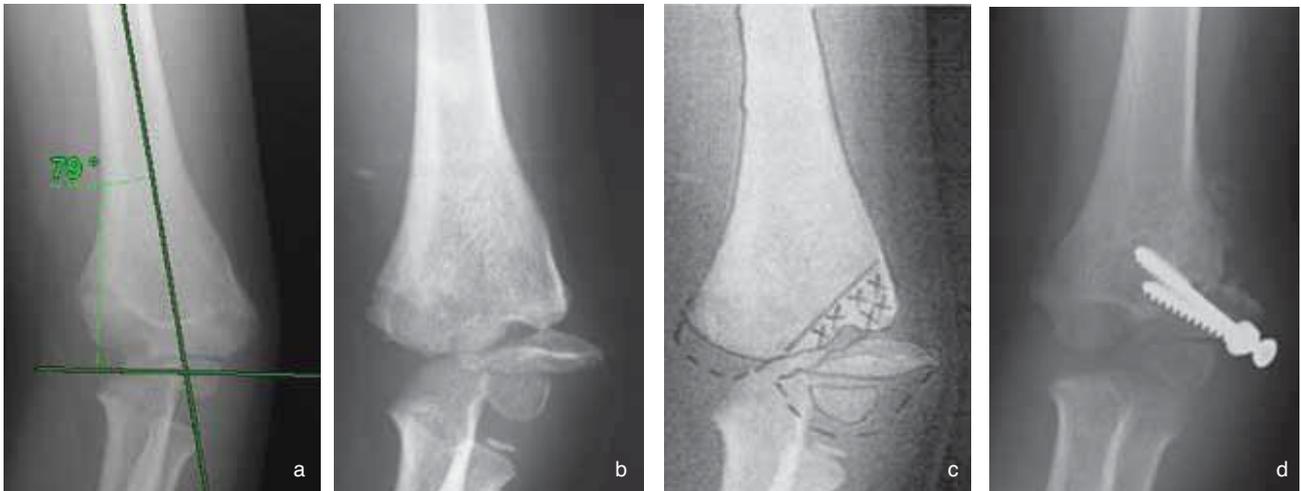


Fig. 1: Serial radiographs of the patient. (a) Cubitus varus with Baumann's angle of 80° before LHC fracture. (b) Nonunion of lateral condyle Milch type II fracture. (c) Tracing of the distal humerus with interrupted line representing non-ossified epiphysis and shaded area in distal metaphysis representing bone resection. (d) Fixation of lateral condyle to proximal fragment with two screws.

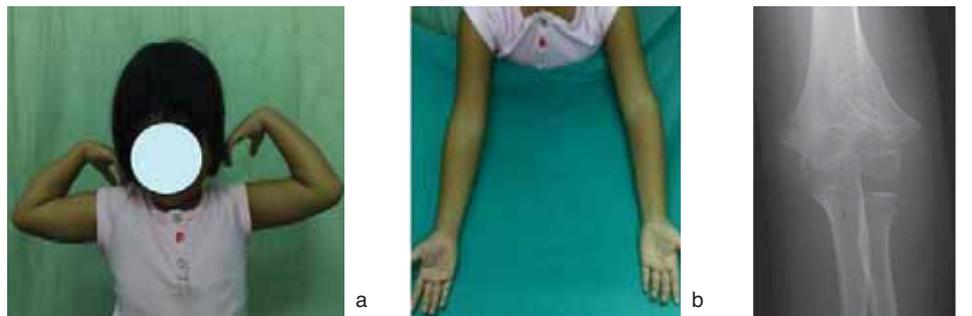


Fig. 2: Photos and radiograph at 18 months after surgery. (a and b) The child had almost full range of motion with minimal cubitus varus. (c) Radiograph shows a united LHC with carrying angle of 0° without evidence of avascular necrosis.

possible that the nonunited LHC will be displaced further in subsequent injury.

The first aim of treating this patient was to achieve union of the LHC fracture without causing AVN and stiffness. The second aim was to correct the cubitus varus deformity for cosmesis as well as prevention of recurrent LHC fracture. Davids et al treated an acute LHC fracture with anatomical reduction and fixation and performed supracondylar osteotomy for cubitus varus a few months later¹. We corrected both problems in one surgery. The operation was performed such that we avoided excessive dissection especially in the area of the posterior aspect of the condyle that carries the critical blood supply³. Resection of the lateral part of the proximal fracture fragment corrected the cubitus varus without requiring supracondylar osteotomy. The resection was extraarticular and did not disturb the growth plate of the lateral condyle, which was located in the distal fragment. The extent of resection was decided based on the joint congruency. This procedure may not be suitable for

fractures that do not extend to the trochlear region such as Milch type I fractures.

Even though smooth pins are usually the preferred method of fixation through the growth plate, Shimada *et al*⁴ found that fixating the neglected LHC fracture with smooth wire resulted in nonunion and ultimately preferred to use either tension band wire or screws⁴. Screw fixation of a fresh LHC fracture has been shown not to cause significant progressive cubitus valgus⁵. Only 20% of humeral growth occurs in the lateral condyle. Based on available information, we decided to use screw fixation for this surgery.

Insult to the LHC blood supply may occur during surgery, even though obvious radiological changes such as AVN may not show till 15 months post-surgery. AVN can lead to pain, joint deformity and decreased range of motion. This patient showed neither AVN symptoms or radiological changes at the 18-month follow up.

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