

# Complications of Pediatric Elbow Fractures



Brad T. Hyatt, MD, Matthew R. Schmitz, MD, Jeremy K. Rush, MD\*

## KEYWORDS

• Pediatric elbow fractures • Malunion • Nonunion • Tardy ulnar nerve palsy

## KEY POINTS

- Cubitus varus can lead to increased risk of subsequent fracture, elbow instability, and tardy ulnar nerve palsy, and can typically be treated with a correctional osteotomy.
- Displaced lateral condyle fractures found acutely are best treated with open reduction and internal fixation (ORIF); fractures found late can be corrected with various osteotomies. The treatment of subacute fractures (3–12 weeks) is controversial, with recent literature advocating ORIF.
- Medial epicondyle nonunion is common but rarely causes functional deficits.
- Elbow stiffness in pediatric patients is a rare but challenging complication.
- Missed osteochondral lesions and missed Monteggia fractures have poor outcomes and providers evaluating patients with elbow injuries and normal plain films should have a low threshold for obtaining advanced imaging.

## INTRODUCTION

Fractures about the elbow are common in children and adolescents and comprise 5% to 10% of fractures in this age group.<sup>1–4</sup> They also account for most operatively treated injuries, up to 85% in some series.<sup>2,3</sup> Supracondylar humerus fractures are the most common injury in this region, followed by lateral condyle and medial epicondyle fractures. The unique developmental anatomy of the elbow makes radiographs sometimes difficult to interpret. Combined with the potential for complications in the growing child, this often provokes anxiety in referring primary care providers, emergency medicine physicians, or even treating orthopedic surgeons. This article discusses the diagnosis and management of the most common complications encountered by treating orthopedic surgeons.

## SUPRACONDYLAR HUMERUS FRACTURES

### *Malunion*

Cubitus varus is defined as a loss of carrying angle of more than 5° compared with the contralateral elbow. It is the most common angular deformity following supracondylar humerus fractures.<sup>5,6</sup> Historically, it has been reported in up to 58% of nonoperatively treated patients.<sup>7</sup> Pirone and colleagues<sup>8</sup> observed a 3% incidence after operative management of supracondylar humerus fractures. In current practice, an estimated 5% to 10% of supracondylar humerus fractures develop cubitus varus<sup>8</sup>; although rates are lower with operative treatment, varus deformity can occur, typically caused by suboptimal Kirschner wire (K-wire) placement.<sup>7</sup> The typical deformity includes varus malalignment, internal malrotation, and hyperextension or recurvatum (**Fig. 1**).<sup>9</sup>

Department of Orthopaedics and Rehabilitation, San Antonio Military Medical Center, 3551 Roger Brooke Drive, Fort Sam Houston, TX 78234, USA

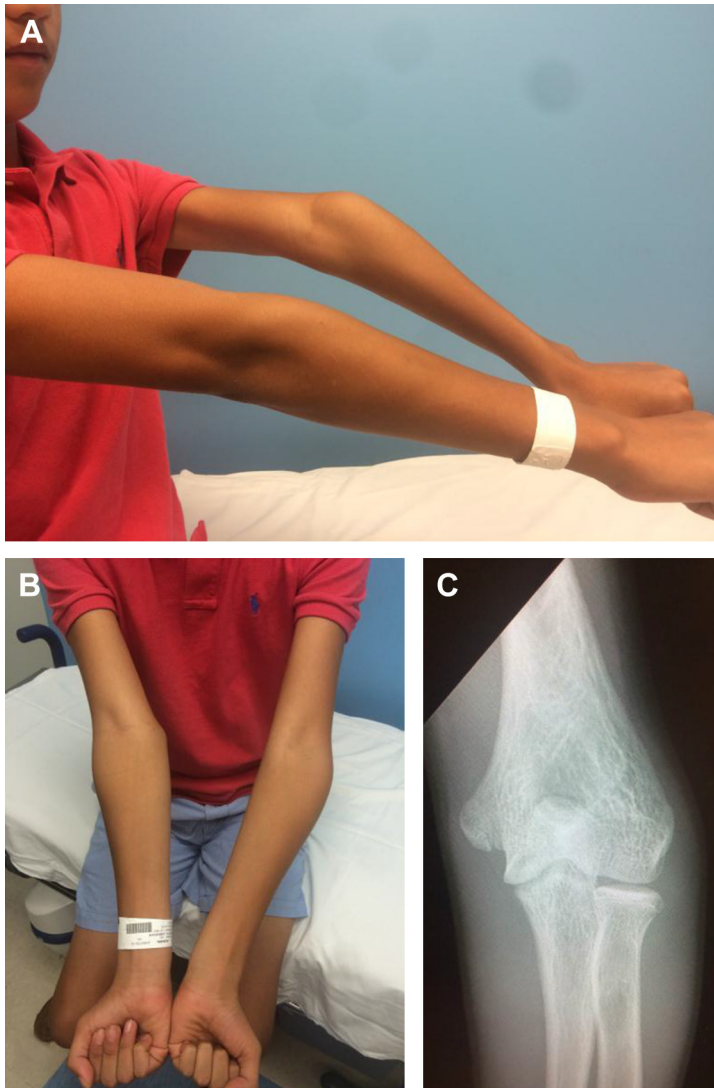
\* Corresponding author.

E-mail address: [jeremy.k.rush.mil@mail.mil](mailto:jeremy.k.rush.mil@mail.mil)

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**Fig. 1.** (A, B) Clinical photographs and (C) anterior-posterior (AP) radiograph showing left cubitus varus malunion following supracondylar humerus fracture.

Cubitus varus has traditionally been regarded as a cosmetic concern but recent studies have shown the potential for functional complications. Two recent studies have identified cubitus varus as a risk factor for subsequent fracture.<sup>10,11</sup> Davids and colleagues<sup>10</sup> reported on 6 children who sustained lateral condyle fractures at an average of 32 months after their initial elbow fracture. These patients had cubitus varus as a sequela of their initial injury (supracondylar fracture in 5 and lateral condyle in 1), and the investigators suggest that varus deformity increases both the shear force and torsional moment generated by a fall. In a similar study, Takahara and colleagues<sup>11</sup> described 9 patients with previous supracondylar fractures

who sustained epiphyseal injuries (8 lateral condyle fractures and 1 physeal separation). These patients all had cubitus varus deformity following their initial fracture, and sustained the second fracture at an average of 18 months after the first.

Cubitus varus from remote fracture was also identified as a contributing factor in 18 patients with posterolateral rotatory instability (PLRI).<sup>12</sup> The average varus was 15° and the tardy PLRI presented more than 20 years following the fracture. The investigators illustrate the mechanism whereby cubitus varus leads to chronic attenuation of the lateral collateral ligament complex.

Multiple studies have also identified cubitus varus as a precursor to tardy ulnar nerve palsy,

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