

# Case Report: Radial Neck Fracture With 180° Rotational Displacement in Pediatrics: A Case Report of a 6-Year-Old Child



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## ABSTRACT

**Introduction:** Radial neck fracture is one of the rare traumas in the upper extremity among the children accounting for 5%-10% of the pediatric elbow injuries. The valgus strain-induced radial neck displacement often ranges from 10° to 90. Rotational displacement with 180° rotation is very rare.

**Case Presentation:** In this case report, we present a 6-year-old child who had radial neck fracture with 180 rotation and joint surface tilt toward the distal direction after falling on her outstretched hand. The close reduction was conducted under the fluoroscopic guide and the radial neck-shaft was restored with 15 angulation. The elbow was immobilized by a long forearm cast for 3 weeks. Based on conventional radiography taken after 3 weeks, a complete union was achieved. Six-month follow-up showed no radial growth disturbance and radial head avascular necrosis.

**Conclusions:** The radial head could be displaced in the form of 180° rotation during the radial neck fracture. In this regard, careful attention to the joint surface is important to minimize the lateral displacements or angulation and to avoid any misdiagnosis. The closed reduction was a successful treatment and caused no complications.

## 1. Introduction

**A** Radial neck fracture is one of the rare pediatric upper extremity traumatic injuries accounting for 5%-10% of the elbow injuries among children [1]. The common displacement mechanism is the valgus strain in the elbow which induces lateral angulation from 10° to 90. The treatment of radial neck fracture is highly challenging and depends on the radial neck-shaft and displacement distance which are among the prominent prognostic factors [1, 2].

Blood supply of radial neck may be damaged due to severe trauma or open reduction [1, 2] In this regard, non-surgical treatment and closed reduction would be the treatment of choice [1, 2]. This report presents a 6-year-old child who experienced a radial neck fracture with 180° rotational displacement due to falling on her elbow.

## 2. Case Presentation

The patient was a 6-year-old girl suffering from radial neck fracture as a result of falling on her outstretched hand

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Figure 1. Conventional radiography, including anteroposterior and lateral views immediately after the injury

in forearm supination. Initial examination showed that the radial neck fracture had minimal lateral displacement with 50% translation but the radial neck-shaft angle was nearly normal. Radiographic images, however, revealed that the joint surface has a 180° rotational displacement in a way that the radial neck was directed toward the distal direction (Figure 1). Elbow was swelled; neurovascular examinations were normal. The forearm range of motion in supination and pronation was disrupted. Closed reduction was conducted under general anesthesia.

Firstly, Neher torch was employed with the elbow extended and forearm supinated. Then, two thumbs stabilized the radial shaft (laterally directed force) with sub-

sequent varus elbow stress and the pressure was laterally applied on the radial head, which was not successful [3]. Next, the Monson et al. approach was applied with the elbow flexed and forearm supinated, then posteriorly direct pressure was applied to the radial shaft [4]. The reduction was carried out under the fluoroscopic guide which was acceptable in a way that the radial neck-shaft angle was stable at about 15. The forearm supination and pronation were retained and the elbow was immobilized by a long forearm cast for 3 weeks. Three weeks later, a complete union was achieved (Figure 2).

The patient started early active exercises for flexion-extension and pronation-supination. Radial neck fracture



Figure 2. The last follow-up radiography with the complete union of the radial neck

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Figure 3. Clinical photos of the patient showing good supination and pronation

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union occurred without osteonecrosis or heterotopic ossification. Additionally, radiographic findings revealed no avascular necrosis, collapse, or deformity of the radial head. In clinical findings, there was no restriction in the range of motion (Figure 3).

### 3. Discussion

Cartilaginous radial head in children has provided a high resistance against the external forces resulting in radial neck fractures rather than the radial head. The valgus strain-induced displacement often ranges from 10° to 90° and 180° rotation is very rare.<sup>1,2</sup> In the cases with minimal radial head translation and normal radial neck-shaft angle, the status of the joint surface is of crucial significance since 180° rotation is probable in such cases.<sup>5</sup> Navali et al. (2006), reported a 180° displacement of the radial head due to closed reduction [5]. Based on the literature, only 5 cases of 180° rotation have been observed following radial neck fracture [5-8]. In all these cases, the fracture occurred after falling on the outstretched hand where reduction attempts finally led to 180° rotation in the radial head. Thus all these reports had occurred due to the iatrogenic malposition causes [5-8] Avascular necrosis was observed in 4 cases probably due to damaged blood supply due to open reduction [5, 7, 8] In one of these cases, fixation with k-wire led to osteomyelitis.<sup>6</sup> In our patient, avascular necrosis did not occur as we employed closed reduction.

### 4. Conclusion

The radial head could experience 180° rotation as the result of radial neck fracture; thus attention to the joint surface is of crucial significance in the cases with minimal lateral displacements or angulations to avoid any misdiagnosis. The closed reduction seems to be a successful treatment with no complications.

### Ethical Considerations

#### Compliance with ethical guidelines

The report was confirmed by the Ethics Committee of Urmia University of Medical Sciences and All ethical principles were considered in this article.

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#### Authors' contributions

All authors contributed in preparing this article.

#### Conflict of interest

The authors declared no conflict of interest.

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