

Toppled Pediatric Radial Neck Fracture Treated by Open Reduction with Good Functional Outcome: A Rare Case Report with Review of Literature

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Learning Point of the Article:

Greater angulated radial neck fracture (180°) can successfully be treated with good radiological and functional outcome with open reduction and K wire fixation and patient should be explained about risk of avascular necrosis of head of radius and growth arrest.

Abstract

Introduction: 180° rotated and displaced fracture neck of radius with displacement is rare case in pediatric age as the cartilaginous head absorbs the force and transmits it to the weaker physis or metaphysis of the neck. These fractures characteristically produce an angular deformity of the head with the neck.

Case Report: This case report describes a rare case of 180° rotated and displaced fracture neck of radius with displacement. A 12-year-old female presented to OPD with history of self-fall over right elbow while playing and started complaining of pain over right elbow for about 2 h. She underwent open reduction internal fixation with k wire fixation procedures. She made an uneventful recovery and reported full range of motion after a follow-up of 3 months.

Conclusion: The best treatment options in pediatric age suffering from a displaced (Judet classification type 4b) radial neck fracture with displacement in childhood is open reduction and fixation of fracture to avoid further joint stiffness and growth related deformity.

Keywords: 180° Rotation, fracture neck of radius, displacement.

Introduction

Most fractures of the proximal radius occur at the neck and after a fall on an outstretched arm with elbow extended. The immature radial head is primarily cartilaginous and ossifies around 10 years of age. Intra-articular radial head fractures in children and adolescents are rare and constitute around 1% of all fractures [1, 2, 3, 4]. The cartilaginous head absorbs the force and transmits it to the weaker physis or metaphysis of the neck. These fractures characteristically produce an angular deformity of the head with the neck [1, 2, 3, 4, 5, 6, 7]. The direction of angulation depends on whether the forearm is in a supinated, neutral, or pronated position at the time of the fall. In neutral position, the pressure is concentrated on the lateral portion of the head-and-neck. In

supination, the pressure is concentrated anteriorly, and in pronation it is concentrated posteriorly.

Proximal radial fractures also may occur in association with elbow dislocation. The fracture will occur either during the dislocation event, typically when displaced anterior. Alternatively, the fracture may occur during spontaneous reduction of the distal humerus, driving the displacement of the proximal radius posterior. Hence, in this present study, we are presenting a case review of rare (180°) angulated radial neck fracture with the review of literature.

Case Report

A 12-year-old girl presented to OPD after a fall over right elbow

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Figure 1: Displaced fracture neck of right radius (Judet Type IV B classification).

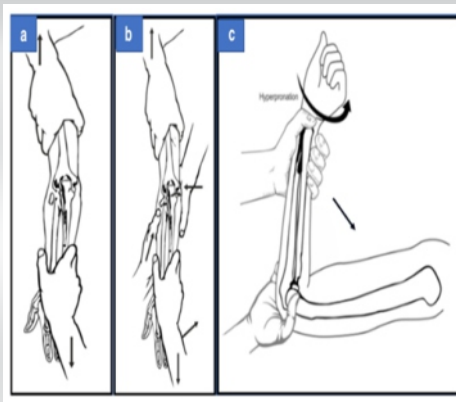


Figure 2: Closed manipulation technique as described by Patterson.



Figure 3: 5 cm incision (lateral Kocher's approach) made over lateral aspect of elbow joint.

while playing at home with pain and limitation of movements. On examination, we observed that pain aggravates on movement and there was tenderness over head of radius and it was aggravating on supination and pronation of forearm. We have also noted mild swelling over tender extremity. Range of motion was limited and painful in supination and pronation, flexion and extension with active finger movement, and distal pulse present. There was no distal neurovascular deficit. following which X-ray was taken and she was diagnosed with displaced fracture neck of Right (JUDET TYPE IV b CLASSIFICATION as shown in Fig. 1).

As closed reduction for Judet Type IV b always fails to reduce and it is important to achieve complete reduction as with mild angulation of radial head may lead to restriction of movement of the elbow joint, patient was planned for open reduction internal fixation with k wire/tens nailing right radius. Patient was placed in supine position. Under general anesthesia closed manipulation technique was tried as described by Patterson as given in (Fig. 2). An assistant was holding the arm proximally, with one hand placed medially against the distal humerus, and straight longitudinal distal traction was applied. Then, varus force was applied to the forearm and digital pressure directly over the tilted radial head to complete the reduction. Forearm is held in 90° of flexion and in pronation.

Reduction was found to be unsuccessful and elbow was found to be subluxating after closed reduction. Then open reduction was attempted. About 5 cm Incision (lateral Kocher's approach) made over lateral aspect of elbow joint. Skin, fascia, and subcutaneous tissue incised and retracted. Intramuscular plane identified between anconeus and extensor digitorum communis. After separating these two muscles radius, head was exposed as given in (Fig. 3). Fracture site found to be completely displaced by 180° (radial articular surface facing fracture site) as given in (Fig. 4). After removing interpositioned tissue, fracture site was freshened. After correcting anatomical reduction, the 1.25 mm Kirschner wire is passed from lateral to medial (taking care to protect the posterior interosseous nerve by hyper pronation) in elbow and flexed to 90° as shown in (Fig. 5). Reduction checked under c arm found to be satisfactory in flexion and extension (Fig. 6) of elbow and supination and pronation of forearm. Radiocapitellar line found to be intact throughout the range of motion. Thorough wound wash given. Wound closed in layers and sterile dressing done and above elbow slab applied. Immediate post-operative X-ray was taken and found to be satisfactory sequential monthly follow-up X-ray was taken and k wire was removed as shown in (Fig. 7). After 3-month postoperatively, she has good functional outcome of the right elbow joint as



Figure 4: Fracture site found to be completely displaced by 180° (radial articular surface facing fracture site).

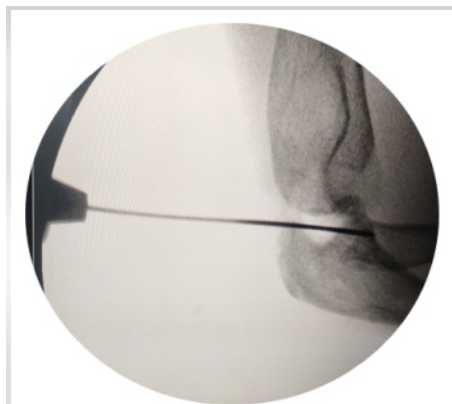


Figure 5: 1.25 mm Kirschner wire is passed from lateral to medial (taking care to protect the posterior interosseous nerve by hyper pronation) in elbow and flexed to 90°.



Figure 6: Reduction checked under c arm found to be satisfactory in extension.



Figure 7: (a) Immediate post-operative X-ray. (b) Post-operative 1-month follow-up. (c) Post-operative 2-month follow-up.



Figure 8: Clinical picture at 3-month follow-up (a) forearm in 90° flexion of elbow joint in supination and (b) forearm in 90° flexion of elbow joint in pronation. Clinical picture at 3-month follow-up (c) and (d) forearm in 90° flexion of elbow joint in 150°.

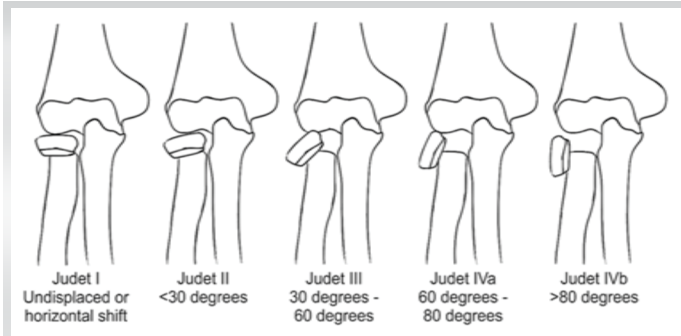


Figure 9: Judet classification for fracture neck of radius.

shown in (Fig. 8).

Review of literature

Discussion

In this present review, 12-year-old girl with 180° angulated radial neck fracture case operated by open reduction and K wire internal fixation. The classification and treatment of these fractures depends on the angulation. Original and most widely used classification was given by the Judet as shown in (Fig. 9). According to this classification, Type 1 is non-displaced, Type 2 has <30° angulation, Type 3 has between 30° and 60°, and Type 4 has two sub-types. Type 4a has between 60° and 80° and Type 4b has >80° of angulation. Majed and Baco [8] reported a case report of closed reduction with intramedullary elastic nailing. They concluded that fixation with intramedullary wires is safe and effective even when the presentation is delayed. Bastard et al. [9] also observed similar finding, that is, greater displaced radial neck fractures best managed by open reduction but also reported that it could be associated with the loss of supination-pronation and other complication of open surgeries. In our case report, we did not observe any such complications. This may be due to intra-medullary nailing with K wire that is a minimally

References	Radial neck fracture	Radioepitellar dislocation	Radial head displacement	Number of cases	Age	Type of management
Golkus <i>et al.</i>	+	+	+	2	7 and 12 years	Closed reduction with K wire fixation.
Massetti <i>et al.</i>	+	-	-	1	7 years	Open reduction with K wire fixation.
Turan <i>et al.</i>	+	+	+	1	13	Open reduction with K wire fixation.
Ikram <i>et al.</i>	+	+	+	2	12 and 7 years	Métaizeu method with percutaneous reduction as a method for closed reduction and K wire fixation.
Rouhani <i>et al.</i>	+	+	+	23	<15 years	Closed reduction as primary treatment followed by Open reduction with K wire fixation in unsuccessful cases.

invasive, simple, and reproducible technique with a low rate of complication. Consistently, Pogorelic *et al.* [10] reported that use of flexible intra-medullary nailing for treating fractures of the radial neck in children shows very good functional and cosmetic results with early mobilization and rapid pain reduction. Rouhani *et al.* [11] in their study also reported that most patients accept the closed reduction as a primary method of treatment, but an open-reduction approach has been associated with optimal therapeutic outcomes for patients in whom closed reduction was not satisfactory or indicated.

Conclusion

Radial neck fracture of 180°, that is, Judet Type 4b (angulated >80°) fails to heal satisfactorily but can be treated with satisfactory results with open reduction and K wire fixation.

Clinical Message

Greater angulated radial neck fracture (180°) can successfully be treated with good radiological and functional outcome with open reduction and K wire fixation and patient should be explained about risk of avascular necrosis of head of radius and growth arrest.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None



References

1. Métaizeau JP. Reduction and osteosynthesis of radial neck fractures in children by centromedullary pinning. *Injury* 2005;36:A75-7.
2. Métaizeau JP, Prevot J, Schmitt M. Reduction and fixation of fractures of the neck of the radius by centromedullary pinning. Original technique. *Rev Chir Orthop Reparatrice Appar Mot* 1980;66:47-9.
3. Métaizeau JP, Lascombes P, Lemelle JL, Finlayson D, Prevot J. Reduction and fixation of displaced radial neck fractures by closed intramedullary pinning. *J Pediatr Orthop* 1993;13:355-60.
4. Prathapkumar KR, Garg NK, Bruce CE. Elastic stable intramedullary nail fixation for severely displaced fractures of the neck of the radius in children. *J Bone Joint Surg* 2006;88:358-601.
5. Klitscher D, Richter S, Bodenschatz K, Hückstädt T, Weltzien A, Müller LP, et al. Evaluation of severely displaced radial neck fractures in children treated with elastic stable intramedullary nailing. *J Pediatr Orthop* 2009;29:698-703.
6. Neher CG, Torch MA. New reduction technique for severely displaced pediatric radial neck fractures. *J Pediatr Orthop* 2003;23:626-8.
7. Al-Aubaidi Z, Pedersen NW, Nielsen KD. Radial neck fractures in children treated with the centromedullary métaizeau technique. *Injury* 2012;43:301-5.
8. Majed A, Baco AM. Late diagnosis and treatment of a paediatric radial neck fracture. *Inj Extra* 2006;37:322-4.
9. Bastard C, Lee Hanneur M, Pannier S, Fitoussi F. Radial neck fractures in children secondary to horse-riding accidents : A comparative study. *Orthop Traumatol Surg Res* 2020;106:1293-7.
10. Pogorelić Z, Capitain A, Jukić M, Žufić V, Furlan D. Flexible intramedullary nailing for radial neck fractures in children. *Acta Orthop Traumatol Turc* 2020;54:618-22.
11. Rouhani A, Chavoshi M, Sadeghpour A, Aslani H, Mardani-kivi M. Outcome of open reduction and Kirschner wire fixation in pediatric radial neck fracture. *Clin Shoulder Elb* 2021;24:239-44.

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Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

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