

Flexible Intramedullary Nailing for a Segmental Radial Fracture of the Neck and Shaft in a Child

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Although fractures of the midshaft radius and ulna are not uncommon in children, with a number of treatment options available and satisfactory outcome being the rule, displaced fractures of the radial neck are less common and the prognosis is guarded, especially in those with significant displacement or angulation.

In recent years, reduction and fixation of radial shaft fractures in children using flexible intramedullary nails has been gaining in popularity.¹⁻³ A technique of reduction and fixation of radial neck fractures has also been described.⁴⁻⁶ We have not found descriptions of treatment of double or segmental fractures with this technique.

We present a patient with displaced fractures of the radial and ulnar shafts with a concomitant fracture of the ipsilateral radial neck, treated by intramedullary reduction and fixation using a single flexible nail for each bone.

CASE REPORT

A 5½-year-old boy presented to our emergency department after being hit by a car and falling on his right side. On examination, a deformity of the right forearm was present with local swelling and tenderness, and distal pulses and sensation were preserved. Swelling and tenderness were also present around the right elbow, and tenderness was also present at the right iliac wing. No other injuries were sustained. Radiographs demonstrated midshaft radial and ulnar fractures angulated at about 30° and a fracture of the radial neck with the head angulated at approximately 65° (Figure 1). Pelvic plain films demonstrated a nondisplaced fracture of the right iliac wing (Duverney).

The patient was admitted and referred for surgery. Under general anesthesia, a flexible intramedullary nail (2-mm

Nancy nail, DePuy, Warsaw, Ind.) was inserted retrograde from the distal radial metaphysis, under image intensifier control, as described by Metaizeau and colleagues,⁵ initially reducing the midshaft fracture. Upon reaching the radial neck fracture, the nail was rotated to bring the distal curve of the nail laterally to lever the proximal fragment into position, as described by Metaizeau and colleagues⁵ (Figure 2).

Subsequently, the ulna was reduced using a flexible intramedullary nail inserted antegrade from the proximal ulnar metaphysis. Postoperatively, the patient was placed in a posterior splint. Recovery was unremarkable.

At 3 weeks, callus was observed on radiographs, the splint was removed, and range of motion exercises were begun. By 5 months, solid union was evident both radiographically and clinically (Figure 3), and range of motion was equal to the contralateral arm. Nails were removed at 6 months.

At 2 years (Figure 4), the patient is pain free and has full range of motion of the elbow, wrist, and forearm.



Figure 1. Anteroposterior (A) and lateral (B) radiographs demonstrate the diaphyseal fractures. Note the additional radial neck fracture.

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Figure 2. Postoperative radiograph of the radial neck demonstrating reduction.

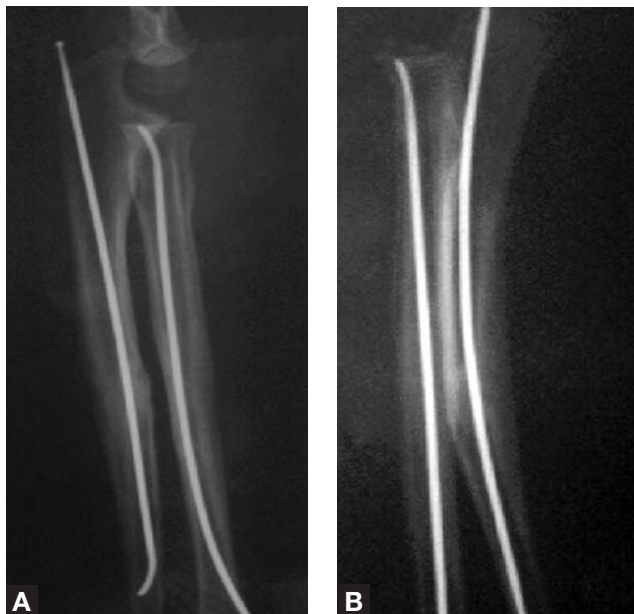


Figure 3. Anteroposterior (A) and lateral (B) radiographs at 5 months demonstrating union. Slight angulation of the radius is present; however, function is unaffected.

DISCUSSION

Recent publications^{4,7,8} have expressed dissatisfaction with results of open reduction and internal fixation of radial neck fractures. Holdsworth and Sloan⁷ restated the widely held view that there is little place for open reduction and internal fixation of proximal forearm fractures in children under 12 years, and Vocke and Von-Laer⁸ expressed a similar opinion regarding open reduction and internal fixation of pediatric radial neck fractures.

Previous publications¹⁻³ have described flexible nailing of diaphyseal fractures in children. The classic approach of Metaizeau and colleagues⁵ for flexible nailing of forearm fractures in children also allows flexible nailing of radial neck fractures. This technique has been widely accepted, especially in the European centers.^{6,9,10} Some authors¹¹ describe use of this technique for treatment of radial neck



Figure 4. Anteroposterior (A) and lateral (B) radiographs of the forearm.

fractures in adults as well, with satisfactory results.

Our patient was unique in the combination of displaced fractures of the radial shaft and neck. We did not succeed in finding previous reports detailing treatment of this type of fracture or any type of segmental fracture.

At first, this seemed to be a severe injury with guarded prognosis regarding forearm function. However, we decided on using flexible nails for both procedures, despite the work of Biyani and colleagues¹² warning that this technique may not be suitable for radial neck fractures with major translation. The operative procedure was straightforward. The radial shaft reduced easily, and we were able to jockey the radial head back into position using the bent, leading edge of the flexible nail, assisted by additional Kirschner wires for leverage, as described in previous reports.^{4,13,14}

CONCLUSIONS

It seems presumptuous to draw conclusions from a single case of an uncommon fracture combination, but due to the uneventful postoperative course and the impressive functional recovery, we think this technique should be considered in any radial segmental fracture, even those involving the neck. Additionally, the excellent clinical result reemphasizes the value of this technique in displaced radial neck fractures.

AUTHORS' DISCLOSURE STATEMENT AND ACKNOWLEDGMENTS

The authors report no actual or potential conflicts of interest in relation to this article.

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