

## An Unexpected Outcome following Radial Head Excision for Jeffrey Type II Fracture-Dislocation of the Proximal Radius in a Child

### Dear Editor,

We present a case of a 10-year-old child who sustained a traumatic fracture-dislocation of his proximal radius and subsequently underwent surgical removal of the radial head. At 3 years of follow-up, he had regained full painless flexion and extension with loss of pronosupination. Radiographs showed an interesting overgrowth of the proximal radius.

### Case Report

A right-hand dominant 10-year-old boy fell onto his outstretched hand and twisted his left elbow while jumping over a drain. He was only seen four days after the injury and presented with a swollen left elbow with a severely limited range of motion. There was no pain or tenderness over the distal forearm or wrist. There were no associated open wounds or neurovascular deficits. Radiographs revealed disruption of the radiocapitellar joint and a posteriorly displaced proximal radial epiphysis with the capitellum interposed within the fracture site (Fig. 1a).

Surgery was undertaken through a posterolateral approach to the elbow where the free-floating radial head, devoid of

soft-tissue attachments, was found behind the distal humerus. An intraoperative decision was made to discard the radial head due to the high probability of subsequent avascular osteonecrosis. Postoperatively, the patient was placed in a backslab and subsequently started on a rehabilitation programme.

Follow-up at three years revealed that he had regained full stable flexion-extension but with no supination and very limited pronation. This was associated with a cubitus valgus deformity. He was otherwise pain free and had returned to playing basketball. Radiographs interestingly revealed persistent posterior subluxation of the radiocapitellar joint with a bony overgrowth and “olecranonisation” of his proximal radius, articulating with his capitellum (Fig. 1b).

### Discussion

Fractures of the proximal radius can occur either through the radial neck (metaphysis), physis, less commonly through the radial head (epiphysis) or in combination. These fractures may occur in isolation, with other bony injuries or with an elbow dislocation.



Fig. 1a. Displaced radial head with capitellum interposed.

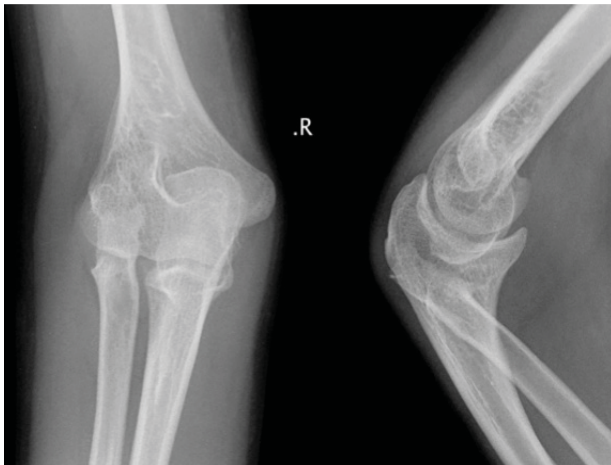


Fig. 1b. Bony overgrowth of proximal radius post-excision.

Chambers classified injuries to the proximal radius into 3 groups – Group 1 with primary displacement of the radial head, Group 2 with primary displacement of the radial neck and Group 3 that comprises of stress injuries such as osteochondritis dissecans of the radial head. Group 1 injuries are further sub-divided into either valgus fractures or fractures associated with elbow dislocations. Radial head displacement fractures associated with elbow fractures are then classified into either a reduction or dislocation type injury depending on the location of the proximal head fragment. In a reduction type injury as described by Jeffrey in 1950, he proposed that the proximal radius initially dislocates or subluxes posteriorly after a fall on the outstretched hand and a subsequent direct force against the tip of the elbow causes the proximal radial epiphysis to fracture off against the inferior aspect of the capitellum. The proximal radius then spontaneously reduces leaving behind the radial head posterior to the elbow joint – also termed the Jeffrey Type 2 fracture.<sup>1</sup> In a dislocation type injury as described by Newman, the radial head is sheared off as the proximal radius dislocates posteriorly and hence is left anterior to the elbow joint.<sup>2</sup>

Our patient sustained a Salter-Harris Type 1 fracture that was entirely transphyseal without metaphyseal extension. The posterior position of the proximal radial epiphysis along with interposition of the lateral condyle in the fracture was consistent with a Jeffrey Type II injury. Literature of this injury pattern is rare with the largest case series of 4 patients being reported by Chotel et al.<sup>3</sup> Results of closed reduction in the literature have been generally unsuccessful with a possibility of complete reversal of radial head after reduction.<sup>3,4</sup> As such most authors recommend open reduction with or without internal fixation.

Complications after paediatric neck fractures are common and occur in up to 20% to 60% of cases overall. These occur either due to the severity of the initial injury or secondary to surgical intervention. The common complications include elbow stiffness and pain, avascular necrosis, premature physeal closure and periarticular ossification. In particular, avascular necrosis has been reported to occur in 7% to 44% of cases.<sup>5</sup> Generally, preservation of the radial head is recommended to avoid problems of angular deformities of the elbow and wrist and axial instability of the forearm.

In our patient, as the radial head fragment was stripped of all capsulo-periosteal attachments and had been dislocated and free-floating for 4 days, the decision for excision over preservation was made on the basis of the high probability of avascular necrosis that could result in subsequent collapse and fragmentation of the radial head and degeneration of the radio-capitellar joint.

Continuous bony growth from the proximal end of the radius was observed in our patient after removal of the radial head fragment. Transphyseal fractures tend to occur through the hypertrophic or endochondral ossification zones. The germinal or proliferative zones of the proximal radius are removed with excision of the radial head and hence there should be no potential for longitudinal growth. In all likelihood, a remnant capsular-periosteal sleeve permitted continuous growth of the proximal radius. This was similarly postulated by Chotel<sup>6</sup> who, to our best knowledge, described the first and only prior case of “olecranonisation” in a case of neglected Jeffrey type II fracture. The posterior position of the radial shaft in relation to the capitellum permitted bony growth and remodeling to proceed along the back of the capitellum giving it a shape and position that closely resembled the neighbouring olecranon with a suggestion of a “semilunar notch” and even a “coronoid process”. This “olecranonisation” articulated with the capitellum and correlated with the clinical finding of retained motion in the sagittal plane with full flexion and extension but loss of axial rotation.

As the patient did not complain of pain, had acceptable function and was able to participate fully in basketball, no further surgical intervention was undertaken.

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