

# Independent Management of Concomitant Pediatric Olecranon and Radial Neck Fractures: Challenging the Necessity of Both Bone Surgical Intervention

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## INTRODUCTION:

Pediatric olecranon fractures are rare but can occur in conjunction with radial neck fractures. It remains unclear whether surgical stabilization of both fractures is necessary to ensure elbow stability. The purpose of this study was to report clinical and radiographic outcomes of patients with associated radial neck and olecranon fractures.

## METHODS:

A retrospective review analyzed medical records and radiographs of children aged 0 to 15 with concomitant radial neck and olecranon fractures from 2002 to 2023. Radial neck angulation and intraarticular displacement of the olecranon was assessed using injury radiographs. Fractures were followed until radiographic healing. Radial neck fractures were classified using the Judet system. Patient Reported Outcomes Measurement Information System (PROMIS) data were collected.

## RESULTS:

Inclusion criteria were met by 53 children, with 31 (58.5%) being female at an average age of 6 years. In the cohort 36 (68%) were managed nonoperatively, 11 (21%) had isolated olecranon fixation, 5 (9.4%) had isolated radial neck management, and one (2%) had both-bone fixation. Increased intraarticular displacement had a 20fold increased odds of requiring surgery,  $P=0.021$ . Increased anteroposterior and lateral radial neck angulations increased odds of requiring surgery (1.04,  $P=0.064$ ; 1.05,  $P=0.084$ ). Olecranon displacement of  $<3\text{mm}$  was observed in 48 patients compared to 5 with  $\geq 3\text{mm}$ . All 5 patients underwent operative treatment compared to only 25% with  $<3\text{mm}$  of olecranon displacement,  $P<0.001$ . Angulation of  $<30$  degrees was observed in 36 patients compared to 17 with  $\geq 30$  degrees. Of patients with  $\geq 30$  degrees of angulation, 53% underwent operative treatment compared to only 22% in the  $<30$ -degree group,  $P=0.025$ . At follow up between 9 and 12 weeks, there were no differences across upper extremity and pain scores between the management groups.

## DISCUSSION AND CONCLUSION:

Most olecranon fractures with concomitant radial neck fractures can be effectively managed nonoperatively. Surgical intervention for these fractures can be approached separately. Operative management can be considered if radial head angulation exceeds 30 degrees or intraarticular displacement is greater than 3mm.

Table 1. Patient Demographics and Fracture Characteristics, N=53

Characteristic	Value
Age in Years, mean (SD)	6.2 (2.5)
Sex, n (%)	
Male	22 (41.5)
Female	31 (58.5)
Race, n (%)	
White	43 (81.1)
Black or African American	9 (17.0)
Height in Inches, mean (SD)	51.9 (5.3)
Weight in Kilograms, mean (SD)	22.4 (12.4)
Intraarticular Fracture Displacement in mm, mean (SD)*	1.5 (2.1)
AP Radial Neck Fracture Angulation in Degrees, mean (SD)*	25.2 (27.7)
Lateral Radial Neck Fracture Angulation in Degrees, mean (SD)*	23.4 (27.6)
Displacement Group, n (%)	
$<2\text{mm}$ displacement	48 (90.6)
$\geq 2\text{mm}$ displacement	5 (9.4)
Angulation Group, n (%)†	
$<30$ degrees	36 (67.9)
$\geq 30$ degrees	17 (32.1)
Operative Management, n (%)	
Olecranon Fracture Only	11 (20.8)
Radial Neck Fracture Only	5 (9.4)
Both Bone Fracture	1 (1.9)
Unlabeled Classification, n (%)	26 (49.2)
Class I	8 (15.3)
Class II	11 (20.8)
Class III	4 (7.5)
Class IV	3 (5.7)

SD, Standard Deviation; AP, Anteroposterior.

\*Unable to measure angulation for one patient secondary to a completely displaced radial neck fracture.

†Radial neck angulation group determined based on angulation measured on AP radiographs.

Table 2. Radiographic Parameters and Classification Across Management Groups, N=53

Parameter	Nonoperative (n=36)	Operative (n=17)	P-value
AP Radial Neck Fracture Angulation (°)	24.0 (26.0)	26.5 (29.0)	0.889
Lateral Radial Neck Fracture Angulation (°)	23.0 (25.0)	24.0 (26.0)	0.985
Intraarticular Displacement (mm)	1.5 (2.0)	1.5 (2.0)	0.985
Olecranon Displacement (mm)	1.5 (2.0)	1.5 (2.0)	0.985

Table 3. Management Distributions

Management	Nonoperative (n=36)	Operative (n=17)	P-value
Nonoperative Treatment, n (%)	36 (67.9)	1 (1.9)	0.007
Olecranon Fracture Only	11 (20.8)	1 (1.9)	
Radial Neck Fracture Only	5 (9.4)	1 (1.9)	
Both Bone Fracture	1 (1.9)	1 (1.9)	
Operative Treatment, n (%)	17 (32.1)	16 (29.1)	0.003

Nonoperative Treatment, n (%)

Operative Treatment, n (%)

Both Bone Fracture, n (%)

Unlabeled Classification, n (%)

Class I, n (%)

Class II, n (%)

Class III, n (%)

Class IV, n (%)

Class V, n (%)

Class VI, n (%)

Class VII, n (%)

Class VIII, n (%)

Class IX, n (%)

Class X, n (%)

Class XI, n (%)

Class XII, n (%)

Class XIII, n (%)

Class XIV, n (%)

Class XV, n (%)

Class XVI, n (%)

Class XVII, n (%)

Class XVIII, n (%)

Class XIX, n (%)

Class XX, n (%)

Class XXI, n (%)

Class XXII, n (%)

Class XXIII, n (%)

Class XXIV, n (%)

Class XXV, n (%)

Class XXVI, n (%)

Class XXVII, n (%)

Class XXVIII, n (%)

Class XXIX, n (%)

Class XXX, n (%)

Class XXXI, n (%)

Class XXXII, n (%)

Class XXXIII, n (%)

Class XXXIV, n (%)

Class XXXV, n (%)

Class XXXVI, n (%)

Class XXXVII, n (%)

Class XXXVIII, n (%)

Class XXXIX, n (%)

Class XL, n (%)

Class XLI, n (%)

Class XLII, n (%)

Class XLIII, n (%)

Class XLIV, n (%)

Class XLV, n (%)

Class XLVI, n (%)

Class XLVII, n (%)

Class XLVIII, n (%)

Class XLIX, n (%)

Class L, n (%)

Class LI, n (%)

Class LII, n (%)

Class LIII, n (%)

Class LIV, n (%)

Class LV, n (%)

Class LVI, n (%)

Class LVII, n (%)

Class LVIII, n (%)

Class LIX, n (%)

Class LX, n (%)

Class LXI, n (%)

Class LXII, n (%)

Class LXIII, n (%)

Class LXIV, n (%)

Class LXV, n (%)

Class LXVI, n (%)

Class LXVII, n (%)

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Class LXXXXII, n (%)

Class LXXXXIII, n (%)

Class LXXXXIV, n (%)

Class LXXXXV, n (%)

Class LXXXXVI, n (%)

Class LXXXXVII, n (%)

Class LXXXXVIII, n (%)

Class LXXXXIX, n (%)

Class LXXXXX, n (%)

Class LXXXXXI, n (%)

Class LXXXXXII, n (%)

Class LXXXXXIII, n (%)

Class LXXXXXIV, n (%)

Table 4. Likelihood of Surgical Management

Management	Value	95% CI	P-value
AP Radial Neck Angulation, Odds Ratio*	1.04	1.00-1.09	0.064
AP Radial Neck Angulation, Odds Ratio*	0.416	-	0.002
AP Radial Neck Angulation, Odds Ratio*	1.05	0.99-1.11	0.084
Lateral Radial Neck Angulation, Odds Ratio*	1.05	0.99-1.11	0.084
Lateral Radial Neck Angulation, Odds Ratio*	0.416	-	0.002
Intraarticular Displacement, Odds Ratio	2.03	1.16-3.55	0.021
Intraarticular Displacement, Odds Ratio	0.416	-	0.002

Intraarticular Displacement, Odds Ratio

Intraarticular Displacement, Odds Ratio