

Nonsurgical versus Operative Treatment for Displaced Proximal Humerus Fractures in Adolescents: Results of a Prospective Multicenter Study

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INTRODUCTION: Pediatric proximal humerus fractures (PHFx) constitute around 2% of all pediatric fractures. Treatment choice mainly depends on age and remodeling potential. Nonsurgical management is generally preferred in younger children due to remodeling potential of these fractures although ideal management of displaced fracture in adolescents remain controversial. We have compared outcomes of surgical and nonsurgical treatment of these fractures in a multicenter prospective study.

METHODS: Adolescents (girls older than 10 and boys older than 11) with open proximal humerus physis presenting with displaced proximal humerus fractures (angulation>30 degrees of translation >50%) at 6 pediatric trauma centers were prospectively enrolled for this study. The decision for treatment was made by the treating physician. Data were collected during follow-up visits at 6 weeks, 3 months, and 6 months. Patients completed Patient-reported outcomes (PROs) including: PROMIS Depression, Physical Activity, Anxiety, Pain Interference, Upper Extremity; Shoulder Pain and Disability Index (SPADI); and QuickDASH questionnaires. Shoulder range of motion (ROM) was evaluated at follow-up visits. Patients were further grouped into a severe fracture cohort; defined as angulation > 40° or displacement > 75% on AP or lateral X-rays.

RESULTS:

We report 78 patients, 36 (46%) treated surgically. The severe fracture cohort had 33 patients, 21 (63.6%) treated surgically. In the complete cohort patients with surgical treatment were on average 1 year older 13.5 vs. 12.2(p<0.001). This difference was not seen for the severe fracture cohort.

All seven PROs metrics improved over time. In the entire cohort surgical treatment showed clinically superior PROMIS Upper Extremity scores at 6 weeks per MCID (44.4. vs. 36.8 p<0.05). No other metrics showed significant differences between treatment modality with all PROs achieving population norm values at 3 months in both the entire cohort and the severe fracture cohort. ROM metrics showed non-superiority between surgical and conservative treatments irrespective of fracture severity.

DISCUSSION AND CONCLUSION: We report the results of the first prospective multicenter study on displaced proximal humerus fractures in adolescents and report no differences between surgical and conservative treatments based on various PROs and ROM. If not contraindicated, conservative treatment reduces healthcare costs and risks associated with surgery and is recommended for adolescents with open proximal humerus growth plates with displaced proximal humerus fractures irrespective of fracture severity.

Table 1. Complete cohort demographic data

Characteristic	Number	Percentage
Age (mean)	12.8	
Gender		
Male	42	53.8%
Female	36	46.2%
Fracture Type		
Type I	15	19.2%
Type II	25	32.0%
Type III	38	48.8%

Table 2. Complete cohort demographic data

Characteristic	Number	Percentage
Age (mean)	12.8	
Gender		
Male	42	53.8%
Female	36	46.2%

Table 3. Complete cohort demographic data

Characteristic	Number	Percentage
Age (mean)	12.8	
Gender		
Male	42	53.8%
Female	36	46.2%

Table 4. Complete cohort demographic data

Characteristic	Number	Percentage
Age (mean)	12.8	
Gender		
Male	42	53.8%
Female	36	46.2%

Table 5. Severe fracture cohort demographic data

Characteristic	Number	Percentage
Age (mean)	13.5	
Gender		
Male	21	63.6%
Female	12	36.4%

Table 6. Severe fracture cohort demographic data

Characteristic	Number	Percentage
Age (mean)	13.5	
Gender		
Male	21	63.6%
Female	12	36.4%

Table 7. Severe fracture cohort demographic data

Characteristic	Number	Percentage
Age (mean)	13.5	
Gender		
Male	21	63.6%
Female	12	36.4%

Table 8. Severe fracture cohort demographic data

Characteristic	Number	Percentage
Age (mean)	13.5	
Gender		
Male	21	63.6%
Female	12	36.4%

Table 9. Severe fracture cohort demographic data

Characteristic	Number	Percentage
Age (mean)	13.5	
Gender		
Male	21	63.6%
Female	12	36.4%