

Treatment of Humeral Shaft Fractures (OTA Type 12): What the Patient Needs to Know for Shared Decision Making

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INTRODUCTION: The purpose of this study is to determine differences in functional outcomes, return to work, and complications, in operative vs. nonsurgically treated diaphyseal humeral shaft fractures to facilitate shared decision making.

METHODS: A total of 241 consecutive patients with 241 humerus shaft fractures (OTA type 12) that presented to our academic medical center were retrospectively reviewed. Data collected included patient demographics, initial injury and surgical information, and follow-up information including: elbow and shoulder range of motion, healing complications, and time to radiographic healing. Patients were seen at 2 weeks, 6 weeks, 3 months, 6 months, 12 months, and subsequent encounters. Outcomes were analyzed using univariate and multivariate regression tests to determine differences in outcomes based on treatment option.

RESULTS: A total of 150 patients mean age of 52.7 years old (19 to 94) who had a mean 24.4 months (12 to 60 months) follow up and complete radiographic and functional data were included for analysis. In total, 83 (55.3%) patients were treated with nonsurgical care in a functional brace. The rest were treated surgically with either a plate and screw construct or an intramedullary (IM) nail. The mean time to healing did not differ between the operative and nonsurgical cohorts (5.8 ± 3.8 months vs. 5.1 ± 2.4 months, P>0.05). Patients treated surgically recovered faster with regard to elbow ROM by 6 weeks (P=0.039), were more likely to be back at work by 8 weeks after injury (P=0.001), and demonstrated earlier mean time to return-to-daily activities (P=0.005). Incidence of nonunion was higher in the nonsurgical cohort (10.84% vs. 0%, P=0.031) Three (4.5%) patients in the operative group developed iatrogenic, postoperative nerve palsy, from which two (66.6%) resolved and one required a secondary operation to address function. Two patients in the operative group (4%) had a superficial surgical site infection; both resolved with antibiotics and no subsequent surgery.

DISCUSSION AND CONCLUSION:

All patients recovered clinically and functionally in both cohorts. Time to recovery was 6 weeks faster in the surgically treated group of humeral shaft fractures. Functional gains should be weighed by the patient and surgeon against risk of surgery, nonunion, nerve injury, and infection when considering various treatment options to better accommodate patients' needs.

Demographics	Operative n (%)	Non-Operative n (%)	P-Value
N	67 (44.7%)	83 (55.3%)	
Variables			
Age (years; mean ± std.)	56.40 ± 22.57	49.71 ± 22.75	0.074
Body Mass Index	27.71 ± 7.4	26.04 ± 5.07	0.175
Gender			
Male	26 (38.80%)	37 (44.58%)	
Female	41 (61.20%)	46 (55.42%)	
Race			
White	49 (73.13%)	59 (71.08%)	
Black	2 (2.99%)	2 (2.41%)	
Hispanic	1 (1.49%)	0 (0%)	
Asian	6 (8.96%)	6 (7.23%)	
Other	6 (8.96%)	10 (12.05%)	
Unknown	3 (4.47%)	6 (7.23%)	
Employment			
Employed	30 (44.78%)	44* (55.70%)	
Not Employed	37 (55.22%)	35* (44.30%)	

*Employment information not provided for four patients

Injury Characteristics	Operative n (%)	Non-Operative n (%)	P-Value
N	67 (44.7%)	83 (55.3%)	
Injury Laterality			
Left	39 (58.21%)	41 (49.40%)	0.282
Right	28 (41.49%)	42 (50.60%)	
OTA Fx Clas.			
12A	33 (49.25%)	53 (63.86%)	0.157
12B	26 (38.81%)	25 (30.12%)	
12C	8 (11.94%)	5 (6.02%)	
Energy Mechanism			
High	11 (16.42%)	3 (3.61%)	0.007
Low	56 (83.58%)	80 (96.39%)	
Injury Type			
Open	2 (2.99%)	0 (0%)	0.113
Closed	65 (97.01%)	83 (100%)	

Outcomes	Operative n (%)	Non-Operative n (%)	P-Value
N	67 (44.7%)	83 (55.3%)	
Events			
Fracture Related Infection	2 (2.99%)	0 (0%)	0.041
Non-Union	0 (0%)	9 (10.84%)	0.031
Post-Operative Nerve Palsy	3 (4.48%)	N/A	
# of Revisions/Other Procedures	0.06 ± 0.32	0.19 ± 0.42	0.041
Healing			
Time to Healing (Months)	5.8 ± 3.8	5.1 ± 2.4	0.298
Functional Elbow ROM by 6 Weeks	17 (25.37%)	12 (14.46%)	0.039
Functional Elbow ROM by 3 Months	31 (46.27%)	44 (53.01%)	0.282
# Return to Work by 8 Weeks	14 (46.67%)*	5 (11.26%)*	0.001
Time to Return to Work (Weeks)	8.40 ± 5.33	12.40 ± 8.78	0.102
Time to Restrictions Lifted (Weeks)	13.16 ± 7.18	16.22 ± 9.98	0.153
Time to Full Activities (Weeks)	15.25 ± 10.12	22.5 ± 14.75	0.005

*Percentage calculated from employed patients