

No Differences in Clinical or Functional Outcomes following Trial of Nonsurgical Management Prior to Open Reduction and Internal Fixation of Humeral Shaft Fractures

Melissa Rose Holloway, Urvi Patel, John P Ketz, Thomas Carroll

INTRODUCTION: Treatment for humeral shaft fractures remains controversial as many patients are faced with the choice of surgical versus nonsurgical management. Recent studies have shown primary osteosynthesis of humeral shaft fractures to be safe and superior to nonoperative treatment. While many studies have reviewed the clinical and functional outcomes of surgical versus nonsurgical management for humeral shaft fractures, none to our knowledge have evaluated outcomes following trial of nonsurgical treatment for humeral shaft fractures. We hypothesize that patients who trial nonsurgical management prior to surgical intervention will experience similar functional recovery, but poorer patient reported outcomes.

METHODS: We retrospectively reviewed patients who presented with humeral shaft fractures at our Level-I trauma center. Patients who trialed nonsurgical management were separately reviewed from patients who underwent open reduction and internal fixation as primary treatment for their humeral shaft fracture. Postoperative complications, elbow arc of motion, time to radiographic union, and patient-reported outcomes were investigated. Time to radiographic union was determined using the Radiographic Union Scores for Humeral fractures (RUSHu) scoring system. An intra-reader reliability score was measured to determine agreement between repeated evaluation of the radiographs and was calculated using the intraclass correlation coefficient (ICC). Statistical significance was set at a p-value of < 0.05.

RESULTS: Of the 138 included patients, 92 underwent primary osteosynthesis and 46 trialed initial nonsurgical treatment. No differences were found in the patient age or BMI between the two cohorts (p=0.20 and p=0.99, respectively). The average time to surgical intervention in the primary osteosynthesis group was 7 days, and 99 days in the trial of nonsurgical treatment group (p<0.01). No differences were found with regard to intraoperative blood loss, total operative time, or time to radiographic union [Table 1]. No difference was found in the overall postoperative complication rates, including radial nerve injuries (p=0.11 and 0.55, respectively). Patients reported similar PROMIS Pain Interference (PI) (p=0.83), Depression (D) (p=0.94), and Physical Function (PF) (p=0.84) scores at their 6-month post-surgical follow-up visits.

DISCUSSION AND CONCLUSION: Patients who attempted a trial of nonsurgical management for humeral shaft fractures prior to open reduction and internal fixation had similar clinical, functional, and patient-reported outcomes as those who underwent primary osteosynthesis. Patients who trialed nonsurgical therapy had similar union rates, complication rates, postoperative arc of motion, and patient-reported outcomes. Given our findings, surgeons can educate patients with humeral shaft fractures on the minimal risk associated with a trial of nonsurgical management, and similar clinical outcomes should they need or pursue surgical intervention at a later time.

Table 1: Demographic characteristics and outcomes data, operative vs non-operative group.

Patient Group	Primary Surgical Intervention (n=92)	Attempted Non-operative Treatment (n=46)	OR (95% CI)	p value	
Sex	Male	38	20	0.8559	
	Female	54	26		
Race	White	79	40	0.9997	
	Black	8	4		
	Other	4	2		
Age (years)	53.24 (19.06)	57.59 (17.66)		0.1978	
BMI	30.89 (6.59)	31.54 (8.66)		0.9999	
Time to Surgery (days)	6.98 (13.0)	99.33 (83.14)		0.0001	
OTA Fracture Classification	A	59	32	0.5140	
	B	17	5		
	C	16	9		
Injury Type	Fall	63	34	0.9026	
	MVC/MCC	20	9		
	cSW	3	1		
Intra-Operative Blood Loss (mL)		294.12 (255.90)	315.85 (207.50)	0.6366	
	Total Operative Time (min)	192.62 (56.69)	196.69 (42.51)		0.7586
Time to Radiographic Union (weeks)	17.55 (9.76)	17.76 (6.15)	0.55 (0.26-1.16)	0.8995	
Post-Operative Complications	Overall Complication Rate	43	15	0.55 (0.26-1.16)	0.1149
	Non-Union	3	4	2.83 (0.60-13.20)	0.1866
	Radial Nerve Injury	20	8	0.75 (0.31-1.88)	0.5501
	Severe Shoulder Pain/Stiffness	20	8	0.75 (0.31-1.88)	0.5501
PROMIS Score at 6-Month Follow-Up	Physical Function	38.82 (9.89)	39.29 (7.20)	0.8361	
	Pain Interference	59.18 (10.30)	59.73 (8.82)	0.8260	
	Depression	51.57 (13.15)	51.34 (10.70)	0.9416	
Elbow Arc of Motion at Follow up	127.31 (30.12)	123.07 (28.55)		0.5299	