Recovery Curve Following Nonoperative Management of Proximal Humerus Fractures

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INTRODUCTION:

Proximal humerus fractures are a common injury in older adults, the majority of which are managed nonoperatively. Despite increasing interest, investigations of these injuries have primarily been focused on surgical management with only 4% of proximal humerus fracture literature examining the efficacy of nonoperative management. The purpose of this study is to evaluate the recovery curve over the first year after nonoperative management of proximal humerus fractures according to patient reported outcomes measurement information system (PROMIS) scores and range of motion (ROM).

METHODS:

Patients >55 years old who underwent nonoperative management of a proximal humerus fracture from 2015-2018 with at least 1 year of follow up were retrospectively identified. Baseline characteristics were recorded including age, sex, smoking status, body mass index, Charlson comorbidity index, presence of diabetes mellitus. Injury radiographs were reviewed to determine AO/OTA fracture classification. PROMIS physical function (PF), pain interference (PI), and depression domain surveys were completed at 2-week, 6-week, 3-month, 6-month, and 1-year follow up visits. ROM data including active forward flexion (AFF), passive forward flexion (PFF), and external rotation (ER) was also obtained. Changes in PROMIS scores and ROM values were compared at each timepoint to the preceding timepoint using paired t-tests. Statistical significance was set at $p<0.05$.

RESULTS:

A total of 202 patients with nonoperatively managed proximal humerus fractures were identified. The average age was 72 years and the majority of patients were female (80.7%). The most common fracture pattern was AO/OTA type 11A (44.6%) followed by type B (35.6%), and type C (19.8%). Recovery over the first year is illustrated in **Table 1**. Significant improvements in PROMIS PF, PI, and Depression scores were obtained at 6-week, 3-month, and 6-month follow up timepoints ($p<0.05$ for all), but not at 1-year follow up. In addition, significant increases in AFF, PFF, and ER were obtained at 6 weeks, 3 months, and 6 months ($p<0.01$ for all).

DISCUSSION AND CONCLUSION:

The results of this study demonstrated that significant gains in physical function and decreases in both pain and depression occur within 6 weeks after nonoperative management of proximal humerus fractures. However, continued improvement occurs throughout the first 6 months after injury. This provides helpful prognostic information for surgeons to educate patient on their anticipated recovery course.

Table 1. Changes in Outcomes After Nonoperative Management of Proximal Humerus Fractures

	Mean ± SD	Mean Difference ± SD	†p-value*
PROMIS PF (mean ± SD)			
2-week	30.3 ± 8.3	-	-
6-week	**33.7 ± 8.0**	**3.4 ± 7.7**	**<0.01**
3-month	**38.4 ± 8.4**	**4.2 ± 6.2**	**<0.01**
6-month	**40.2 ± 8.8**	**2.4 ± 6.1**	**<0.01**
1-year	41.6 ± 7.6	0.3 ± 5.5	0.67
PROMIS PI (mean ± SD)			
2-week	67.7 ± 6.7	--	-
6-week	**60.8 ± 7.2**	**-6.3 ± 7.0**	**<0.01**
3-month	**57.6 ± 7.7**	**-3.3 ± 6.9**	**<0.01**
6-month	**55.6 ± 9.0**	**-2.5 ± 6.9**	**<0.01**
1-year	55.8 ± 7.9	-0.2 ± 6.5	0.81
PROMIS Depression (mean ± SD)			
2-week	53.7 ± 9.9	--	-
6-week	**51.1 ± 9.4**	**-3.1 ± 8.0**	**<0.01**
3-month	**49.5 ± 9.4**	**-1.4 ± 6.9**	**0.03**
6-month	**49.0 ± 10.3**	**-1.8 ± 7.5**	**0.03**
1-year	49.0 ± 8.5	0.2 ± 7.5	0.84
Active Forward Flexion (mean ± SD, °)			
2-week	1.4 ± 12.2	--	-
6-week	**23.0 ± 35.4**	**21.5 ± 37.6**	**<0.01**
3-month	**78.4 ± 52.8**	**53.2 ± 59.0**	**<0.01**
6-month	**113.0 ± 32.4**	**27.3 ± 33.9**	**<0.01**
Passive Forward Flexion (mean ± SD, °)			
2-week	4.0 ± 18.4	--	-
6-week	**61.3 ± 41.6**	**57.3 ± 43.9**	**<0.01**
3-month	**91.5 ± 56.9**	**32.3 ± 51.3**	**<0.01**
6-month	**127.1 ± 29.1**	**19.1 ± 29.2**	**<0.01**
External Rotation (mean ± SD, °)			
2-week	1.0 ± 6.6	-	-
6-week	**18.6 ± 18.9**	**17.4 ± 20.1**	**<0.01**
3-month	**33.2 ± 25.7**	**13.9 ± 21.9**	**<0.01**
6-month	**46.5 ± 20.6**	**10.2 ± 21.2**	**<0.01**

SD = Standard Deviation; PROMIS = Patient Reported Outcomes Measurement Information System, PF = Physical Function domain, PI = Pain Interference domain
***Boldface** indicates statistical significance.
†p-value is calculated using paired t-test comparing scores at each timepoint to preceding timepoint