Recovery Curve Following Nonoperative Management of Proximal Humerus Fractures

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Purpose: Despite increasing interest in proximal humerus fractures, investigations have primarily been focused on surgical 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 PROMIS (Patient-Reported Outcomes Measurement Information System) scores and range of motion (ROM).

Methods: Patients who underwent nonoperative management of a proximal humerus fracture were retrospectively identified. PROMIS physical function (PF), pain interference (PI), and depression domain surveys were completed at 2 weeks through 1-year follow-up visits. ROM data including active forward flexion (AFF), passive forward flexion (PFF), and external rotation (ER) were obtained from physical therapy documentation of goniometer measurements. Changes in PROMIS scores and ROM values were compared at each time point to the preceding time point. Outcomes at each time point were further stratified by AO/OTA fracture classification and compared between groups.

Results: A total of 202 patients with nonoperatively managed proximal humerus fractures were identified. The average age was 72 years (range, 55-94 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 detailed in Table 1. Significant improvements in PROMIS PF, PI, and Depression scores were obtained at 6-week, 3-month, and 6-month follow-up (P<0.05), but not at 1 year. In addition, significant increases in AFF, PFF, and ER were obtained at 6 weeks, 3 months, and 6 months (P<0.01). Type B fractures had greater PROMIS PF scores at 6 weeks, 3 months, and 6 months and lower PROMIS PI scores at 6 months than type A or C fractures (P<0.05). Type B fractures experienced greater ROM at 3 months followed by type A then type C fractures (P<0.05), but were similar between groups at other time points.

Conclusion: The results of this study demonstrated that significant gains in physical function and decreases in both pain and depression occurred within 6 weeks after nonoperative management of proximal humerus fractures. However, continued improvement occurs through the first 6 months after injury. Type B fractures experience better functional outcomes in the first 6 months compared to type A or C patterns. This provides helpful prognostic information for surgeons to educate patients on their anticipated recovery course.

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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

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