

**Not All Proximal Humerus Fractures Do Well Without Surgery:  
Anterior Translation Predicts the Need for Surgery**

*Amir Shahien, MD; Paul Tornetta III, MD; Brian Mullis, MD Elive F. Likine, MD; Gillian Soles, MD; Steven Samborski, MD; Clay A. Spitler, MD; Siddhant K. Mehta, MD, PhD; Scott P. Ryan, MD; Taryn E. Leroy, MD*  
*Boston University Medical Center, Boston, MA, United States*

**Purpose:** Proximal humerus fractures from low-energy mechanisms are commonly treated without surgery. While angulation, in particular valgus and varus, has been evaluated, little attention has been paid to translation. We hypothesized that substantial anterior translation of the shaft may have a negative impact on union and outcome due to impingement with the biceps and physical prominence. The purpose of this study was to evaluate the effect of translation on a large series of low-energy proximal humerus fractures initially treated nonoperatively.

**Methods:** We performed a multicenter analysis of isolated low-energy proximal humerus fractures (OTA 11-A-C) treated nonoperatively at 5 centers. Radiographic translation in the sagittal and coronal planes was measured at presentation and at union. Patients with anterior translation were compared to those with posterior or no translation. Patients with  $\geq 80\%$  anterior humeral translation were compared to those with  $< 80\%$  translation. The primary outcome was failure of nonoperative treatment resulting in surgery and the secondary outcome was symptomatic malunion. Patients with less than 3 months of follow-up were excluded even if they united.

**Results:** 210 patients (152F; 58M), average age 64 years, with 112 left and 98 right-sided proximal humerus fractures initially treated nonoperatively were followed for average 231 days (or until surgery was required). 171 (81%) were injured in a fall from standing. Average body mass index was 27 kg/m<sup>2</sup>. Nine patients (4%) had surgery, 8 for nonunion and 1 for malunion. All 9 patients (100%) had anterior translation. Additionally, 5 had medial translation and 4 had lateral translation (not significant). Anterior translation as compared with posterior or no sagittal plane translation was associated with failure of nonoperative management requiring surgery ( $P = 0.012$ ). Additionally, of those with anterior translation, having  $\geq 80\%$  anterior translation as compared with  $< 80\%$  was also associated with surgery ( $P = 0.001$ ). Finally, 26 patients were diagnosed with symptomatic malunion, of whom translation was anterior in 24 and posterior in 2 ( $P = 0.0001$ ). Importantly, the presence of anterior translation did not change over time and in all cases was present on the initial radiographs.

**Conclusion:** In a multicenter series of proximal humerus fractures, anterior translation of  $> 80\%$  was associated with failure of nonoperative care resulting in symptomatic malunion and secondary surgery. While the vast majority of proximal humerus fractures can be treated nonoperatively, this pattern of displacement should be considered at risk for failure. This relationship has not been evaluated in any large trial and its association with symptomatic malunion has not been previously reported. Most importantly, the displacement is present on the initial Y view and can be addressed early.