

# Fixation versus Arthroplasty for Proximal Humerus Fractures: An Analysis in 129,150 Inpatients Over Age 50

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## Introduction

Proximal humerus fractures have long posed a difficult treatment challenge for orthopedic surgeons. Historically, a high rate of complications was seen with fixation of these fractures, though newer implants have improved these results over the past 15 years. The use of hemiarthroplasty (HA) and reverse total shoulder arthroplasty (TSA) have also been advocated as treatment options for these fractures, though indications remain poorly defined. **We sought to determine the rates of operative and non-operative interventions for closed proximal humerus fractures on a population level, as well as analyze complication rates and charges for these interventions.**

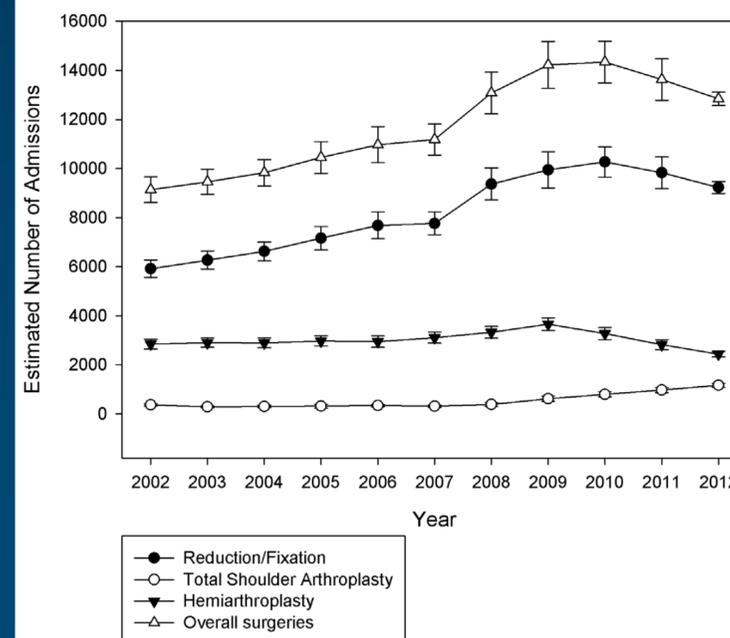
## Methods

- Patients with operatively-treated closed proximal humerus fractures were identified in the Nationwide Inpatient Sample, and demographics and hospital-related information were recorded.
- Outcomes queried included in-hospital composite complications, in-hospital mortality, length of stay, transfusion status, and hospital charges.
- Multivariable logistic regression determine variables associated with greater proportion of treatment types and variables associated with increased rates of complications, transfusions, and mortality, as well as in-hospital charges.

## Results

- For the 129,151 inpatients included, the number undergoing surgery increased over time, from 9,140 in 2002 to 12,840 in 2012 ( $p < 0.0001$ ), primarily driven by patients undergoing ORIF.
- Patients treated with ORIF had a shorter length of stay (6.1 vs. 6.5 days,  $p < 0.0001$ ) and a lower rate of complications (7.1% vs. 8.5%,  $p < 0.0001$ ) than those undergoing arthroplasty.
- ORIF had significantly fewer complications than either rTSA (8.8%) or HA (8.6%,  $p = 0.0003$ , Table 1). Charges were significantly lower with ORIF (\$55,096) than HA (\$60,976) and TSA (\$75,490).

Type of Surgery for Proximal Humerus Fracture, 2002-2012



## Demographics and Outcomes by Type of Surgery

	ORIF	Arthroplasty (HA + TSA)	Significance	Predictors of Arthroplasty Treatment [95% CI]
<b>Demographics</b>				
Patients	90,083	39,067		
Age (mean)	71.8 years	74.1 years	$P < 0.0001$	OR 1.013 per year [1.010-1.026]*
Female	74.9%	80.6%	$P < 0.0001$	OR 1.282 [1.199-1.370]*
CCI (mean)	0.95	0.95		OR 0.994 [0.974-1.014]
Proportion of fractures	2002: 64.8% 2012: 71.9%	2002: 35.2% 2012: 28.1%		OR 0.971 per year [0.961-0.81]
Rural setting	13.9%	12.9%	$P = 0.0455$	OR 0.855 [0.741-0.986]
<b>Outcome</b>				
Length of stay	6.1 days	6.5 days	$P < 0.0001$	
Complication	7.1%	8.5%	$P < 0.0001$	
Transfusion	22.5%	28.3%	$P < 0.0001$	
Mortality	1.04%	0.81%	$P < 0.0001$	
Charges	\$55,096	\$63,168	$P < 0.0001$	

\* = multivariable logistic regression

**Table 1.** Demographics and complications between surgical groups.

ORIF = open reduction, internal fixation. HA = hemiarthroplasty, TSA = total shoulder arthroplasty (includes reverse total shoulder arthroplasty). CCI = Charlson Comorbidity Index. OR = odds ratio.

## Significance

- From 2002-2012, both fixation and reverse total shoulder arthroplasty for proximal humerus fractures has become significantly more common, while the incidence of hemiarthroplasty decreased.
- Despite lower in-hospital charges and clinically similar demographics, patients undergoing fixation were less likely to have serious complications than those undergoing arthroplasty.
- Further study needed to determine clinically optimal and cost-effective treatment for proximal humerus fractures.