

## Outcomes, Length of Stay, and Charges Associated with Treatment of Geriatric Acetabulum Fractures

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**Background/Purpose:** The indications for treatment of geriatric acetabulum fractures are controversial. Recent studies question the use of open reduction and internal fixation, suggesting that total hip arthroplasty (THA) or nonoperative treatment may be more suitable treatment options. However, these studies are limited by small sample size, and no studies have examined perioperative outcomes and cost of treatment. In light of the scarcity of literature in this area, we examined outcomes associated with treatment of geriatric acetabulum fractures in a large nationally representative cohort.

**Methods:** The Nationwide Inpatient Sample from 1998 to 2010 was queried using ICD-9 diagnostic code 808.0 (closed acetabulum fracture) as a primary diagnostic code to identify patients with acetabulum fractures. These patients were clustered according to treatment by ICD-9 procedure codes: surgical fixation (ICD-9 procedure codes 79.19, 79.39 and 78.59), THA (ICD-9 procedure code 81.51), nonoperative treatment (ICD-9 procedure codes 79.09 and 79.75 as well as patients with no associated ICD-9 procedure code), and skeletal traction (ICD-9 procedure codes 93.44 and 93.46). Analysis was limited to geriatric patients (age 65 years or older). A weighted sample was generated as per the Healthcare Cost and Utilization Project guidelines. Outcomes evaluated included inpatient mortality, complications including cardiac, respiratory, vascular, gastrointestinal, genitourinary, wound, metabolic and neurologic, need for blood transfusion, length of stay, and charges. Generalized linear models fitted with generalized estimating equations controlling for clustering within the hospitals were utilized to estimate the association of treatment type with outcomes.  $P < 0.05$  was considered statistically significant.

**Results:** 54,579 patients were included in the weighted sample. After controlling for age, gender, race, Charlson Comorbidity Index, and hospital characteristics including teaching status, region, annual case load, and location, the mortality associated with nonoperative treatment was significantly lower (odds ratio [OR] 0.311,  $P < 0.001$ ) compared to surgical fixation (Table). In addition, cardiac, respiratory, vascular, genitourinary, gastrointestinal, and neurologic complications were significantly lower in patients treated nonoperatively compared to surgical fixation ( $P < 0.001$ ; Table). Administration of blood transfusion was lower in nonoperative treatment compared to surgical fixation (0.2% vs 32.5%,  $P < 0.001$ ). However, a higher proportion of THA patients had a blood transfusion compared to surgical fixation (46.3% vs 32.5%,  $P < 0.001$ ). Length of stay was longer in patients treated with surgical fixation compared to nonoperative treatment (median 9 days vs 4 days,  $P < 0.001$ ). In addition, the median charges for nonoperative treatment were lower than the charges associated with surgical fixation (median \$9206 vs \$54,447,  $P < 0.001$ ) while THA was the most expensive treatment option (\$70,524,  $P < 0.001$ ). No differences in mortality and length of stay were seen in THA compared to surgical fixation.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.

**Table. Outcomes associated with treatment of geriatric acetabulum fractures**

	THA			Non-operative treatment			Skeletal traction		
	Odds Ratio	95% CI	p value	Odds Ratio	95% CI	p value	Odds Ratio	95% CI	p value
<b>In-hospital mortality</b>	1.747	0.981 to 3.111	0.058	0.311	0.192 to 0.505	<0.001	1.385	0.731 to 2.624	0.317
<b>Complications</b>									
<b>Cardiac</b>	0.899	0.584 to 1.384	0.629	0.344	0.252 to 0.470	<0.001	0.439	0.247 to 0.780	0.005
<b>Respiratory</b>	1.027	0.698 to 1.510	0.892	0.203	0.161 to 0.256	<0.001	0.411	0.276 to 0.611	<0.001
<b>Vascular</b>	1.057	0.715 to 1.561	0.781	0.279	0.210 to 0.371	<0.001	0.500	0.297 to 0.841	0.009
<b>Wound</b>	1.065	0.579 to 1.961	0.839	0.032	0.014 to 0.072	<0.001	0.004	0.000 to 0.058	<0.001
<b>Genitourinary</b>	1.026	0.595 to 1.768	0.928	0.520	0.365 to 0.741	<0.001	0.023	0.007 to 0.079	<0.001
<b>Gastrointestinal</b>	1.013	0.686 to 1.497	0.947	0.203	0.151 to 0.273	<0.001	0.697	0.446 to 1.091	0.115
<b>Neurologic</b>	0.313	0.106 to 0.926	0.036	0.182	0.111 to 0.299	<0.001	0.246	0.086 to 0.703	0.009
<b>Metabolic</b>	1.495	1.110 to 2.013	0.008	0.412	0.332 to 0.512	<0.001	0.648	0.461 to 0.910	0.012
<b>Transfusion</b>	1.61	1.192 to 2.173	0.002	0.004	0.002 to 0.007	<0.001	0.179	0.122 to 0.264	<0.001
<b>Prolonged LOS</b>	1.062	0.819 to 1.378	0.649	0.092	0.077 to 0.109	<0.001	0.501	0.394 to 0.636	<0.001
<b>Excessive charges</b>	2.404	1.617 to 3.573	<0.001	0.026	0.020 to 0.032	<0.001	0.125	0.089 to 0.175	<0.001

Reference: Surgical fixation. Prolonged LOS, >75th percentile of the entire cohort for LOS. Excessive charges, >75th percentile of the entire cohort for charges.

THA, total hip arthroplasty; LOS, length of stay

**Conclusion:** After adjusting for multiple relevant confounders, we found that the non-operative treatment of geriatric acetabulum fractures is associated with lower mortality, complications, length of stay, and charges compared to surgical fixation. In addition, no differences in mortality and length of stay were seen between THA and surgical fixation. However, the charges associated with THA were increased compared to surgical fixation. We conclude that surgical fixation should be examined closely in this medically fragile patient population, given the higher rate of mortality and complications.