

Ambulation Distance within 72 Hours is a Predictor of 90-Day Ambulatory Capacity in Elderly Patients

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INTRODUCTION:

The inability to mobilize following surgical intervention for hip fractures in the elderly is established as a risk factor for associated morbidity and mortality. Previous studies have evaluated the correlation between the timing and distance of ambulation in the postoperative acute care phase with postoperative complications. The purpose of this study was to evaluate the association between patient ambulatory distance ability during the acute postoperative inpatient setting and ambulatory capacity at 90 days.

METHODS:

Patients aged 65 and older who were ambulatory at baseline and underwent surgical intervention for hip fractures from 2014-2019 were retrospectively reviewed. Patient demographics, injury characteristics, fixation technique, and ambulatory data were recorded. Consistent with previous literature, patients were divided into two cohorts: those who were able to ambulate 5 feet within 72 hours after surgical fixation (early ambulatory) and those who were not (minimally ambulatory).

RESULTS:

In total, 170 patients (84 early ambulatory and 86 minimally ambulatory) were available for analysis. The minimally ambulatory group was older than the early ambulatory group (82.5 vs. 78.0; $p < 0.001$), but there were no significant differences in gender or Charlson Comorbidity Index (CCI). Using a multivariable ordinal logistic regression model, variables found to be statistically significant predictors of ambulatory status at 90 days were the ability to ambulate five feet in 72 hours ($p < 0.0001$), ambulatory distance at discharge ($p = 0.012$), and time from presentation to surgery ($p = 0.039$). Patients that were able to ambulate 5 feet within 72 hours had 8.85 times the odds of being independent ambulators rather than a lower ambulatory class (cane, walker, non-ambulatory). Each additional day from presentation to surgery was associated with a 0.79 times lower odds of independent ambulation at 3 months. When stratifying by fracture type, femoral neck injuries had a greater proportion of patients that were independently ambulatory at 3 months when compared to pertrochanteric fracture patients (42.3% vs. 17.2%; $p = 0.0006$).

DISCUSSION AND CONCLUSION: Ambulating 5 feet within 72 hours following hip fracture surgery is associated with an increased likelihood of independent ambulation at 90 days postoperatively. Furthermore, delay from patient presentation to surgery negatively impacts ambulatory status and pertrochanteric fractures are less likely to be independent ambulators at 3 month follow up. This simple and clear goal may be used to help enhance postoperative mobility and independence, while providing a measure to guide therapy and help counsel patients and families.

Table 1. Patient Characteristics Stratified According to Ambulating 5 feet within 72 hours

	Time to Ambulate 5 feet Less ambulatory (n=86)	Minimally ambulatory or more (n=84)	p
Age	78 (8.75)	82.5 (9)	0.001*
Male:SD			0.354
Sex	49 (56.7%)	51 (60.7%)	
Male	49 (56.7%)	51 (60.7%)	
Female	37 (43.3%)	33 (39.3%)	
Charlson Comorbidity Index Mean (SD)	5.53 (2.29)	5.59 (2.14)	0.227
Fracture Type			0.000*
Femoral Neck	41 (47.8%)	30 (35.7%)	
Pertrochanteric	45 (52.2%)	54 (64.3%)	
Site			0.001*
Cephalomedullary Nail	36 (41.9%)	50 (59.5%)	
Proximal Femoral Nail	24 (27.9%)	18 (21.4%)	
Sliding Hip Screw	10 (11.6%)	11 (13.1%)	
Arthroplasty	14 (16.3%)	21 (25.1%)	0.416
Pertrochanteric Fracture Fixation	36 (41.9%)	50 (59.5%)	
Cephalomedullary Nail	7 (8.1%)	8 (9.6%)	
Sliding Hip Screw	29 (33.7%)	40 (47.8%)	0.001*
Femoral Neck Fracture Fixation	24 (27.9%)	31 (36.9%)	
Proximal Femoral Nail	17 (19.8%)	11 (13.1%)	
Arthroplasty	14 (16.3%)	21 (25.1%)	0.000*
Bioptic Ambulatory Status			0.000*
Ambulatory	69 (79.1%)	41 (48.8%)	
Cane	7 (8.1%)	11 (13.1%)	
Walker	17 (19.8%)	29 (34.5%)	
Ambulatory Status 3 months after Surgery			<0.00001*
Independent	69 (79.1%)	7 (8.3%)	
Cane	12 (14.0%)	0 (0%)	
Walker	11 (12.9%)	20 (23.9%)	
Non-ambulatory	4 (4.7%)	13 (15.5%)	
Days from Injury to Surgery Mean (SD)	2.82 (4.76)	1.93 (2.36)	0.225
Days from Presentation to Surgery Mean (SD)	1.95 (2.99)	0.84 (1.02)	0.342
Days from Surgery to Last Follow-Up Mean (SD)	183 (169.8)	206.8 (251.7)	0.125
Ambulatory Distance (ft) at Final Postoperative Requires Physical Therapy Session Mean (SD)	26.1 (48.5)	6.36 (6.88)	<0.00001*
Ambulatory Distance (ft) at Discharge Mean (SD)	62.1 (65.3)	6.71 (11.4)	<0.00001*

Table 2. Multivariable Ordinal Logistic Regression Model for Ambulatory Status at 3 months

Variable	Coefficient	SE	P > z	95% CI
Sex - Female	1.127	0.373	0.003	[0.384, 1.870]
Arthroplasty or ORIF	0.688	0.47	0.261	[-1.17, 0.425]
5 ft within 72 hours - No	0.112	0.498	0	[-3.138, -1.204]
Respectively - No	1.823	0.687	0.002	[0.466, 3.180]
Age	-0.079	0.012	0.17	[-0.073, 0.013]
CCI	0.066	0.086	0.688	[-0.103, 0.134]
Postoperative Ambulatory Distance	0.992	0.056	0.21	[-0.02, 0.044]
Ambulatory Distance at Discharge	1.012	0.065	0.012	[0.003, 0.023]
Time from Injury to Surgery	1.012	0.051	0.815	[-0.088, 0.112]
Time from Presentation to Surgery	0.787	0.116	0.039	[-0.466, -0.012]
Pre-Injury Functional Status	1.417	0.227	0.125	[-0.097, 0.793]

Table 3. 3 Month Ambulatory Status Between Femoral Neck and Pertrochanteric Fractures

Ambulatory Status	Femoral Neck (n=71)	Pertrochanteric (n=99)	p
Independent	30 (42.3%)	17 (17.2%)	0.0006*
Cane	2 (2.8%)	10 (10.1%)	
Walker	31 (43.6%)	68 (68.7%)	
Non-ambulatory	0 (0.0%)	4 (4.0%)	