Survivorship After High-Energy Geriatric Trauma

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Purpose: The frequency of geriatric high-energy trauma is expected to increase as the population ages and older people increasingly participate in high-risk activities. However, there are no studies looking at survivorship beyond hospital discharge in this patient population. Many studies exist on survivorship from low-energy falls, particularly following proximal femur fractures. However, it is unclear how these compare to mortality after high-energy geriatric fractures because although the energy level is higher, these patients may have better baseline health than patients with low-energy injuries, such as hip fractures. The purpose of this study was to document survivorship after high-energy trauma and to identify predictors for mortality.

Methods: After IRB approval, review of a prospective trauma database at a Level I trauma center was performed to identify patients 65 years and older who sustained high-energy trauma (fall from height, motor vehicle collision (MVC), motorcycle collision (MCC), pedestrian struck) from 2004-2015. Survivorship was determined using the Social Security Death Index. Demographic and admission clinical data were obtained from medical records and the trauma registry. Multiple variable regression analyses were performed to identify independent predictors for survival. Our study group consisted of 1931 patients with a mean age 71 years and a mean ISS of 19.

Results: Overall, inpatient mortality was 8% (95% CI 6.6%-9%), 1-year mortality was 15.4% (95% CI 13.9%-17.1%), and 5-year mortality was 27.8% (95% CI 25.7%-30.1%). The table shows the results for four separate models: a logistic regression model of inhospital mortality, and three Cox proportional hazards (CPH) models of survival after hospital discharge stratified by ISS grouping. Results are presented as odds ratios (OR) for the logistic model and hazard ratios (HR) for the CPH model, both with 95% confidence intervals. Significance levels of $P < 0.1$, $P < 0.05$, and $P < 0.01$ are designated by single, double, and triple asterisks, respectively.

Conclusion: To our knowledge this is the first study to evaluate survivorship beyond hospital discharge in the setting of high-energy trauma in geriatric patients. We found that inhospital mortality was 8%, and the 1- and 5-year mortality in this patient population was 15% and 28%, respectively, which is statistically significantly lower than geriatric patients who sustained low-energy proximal femur fractures (30% and 45% in prior studies) at $P < 0.0001$ when evaluated using a binomial test. In our study group, both inhospital mortality and mortality after hospital discharge in geriatric victims of high-energy trauma was lower than that previously reported for geriatric patients sustaining fractures secondary to a low-energy ground-level falls. This may reflect that baseline health and higher level of preinjury function influence survival more than increased energy of the injury.

Multiple regression analysis for post-discharge mortality

	Logistic Regression For Hospital Death	Stratified CPH Models Beyond Hospital Discharge		
		ISS: 0-8 (N=225)	ISS: 9-15 (N=675)	ISS: 16+ (N=871)
	OR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Age	1.09 *** (1.06, 1.12)	1.03 (0.97, 1.08)	1.09 *** (1.07, 1.11)	1.07 *** (1.06, 1.09)
Male	2.10 *** (1.34, 3.35)	1.01 (0.49, 2.05)	1.22 (0.86, 1.72)	1.19 (0.91, 1.57)
BMI	1.00 (0.98, 1.01)	0.98 (0.96, 1.01)	0.98 ** (0.97, 1.00)	0.99 ** (0.98, 1.00)
Fracture Count	1.23 * (0.96, 1.56)	0.62 * (0.35, 1.08)	0.99 (0.79, 1.24)	0.88 * (0.77, 1.02)
GCS	0.83 *** (0.79, 0.87)	0.66 (0.31, 1.39)	0.91 (0.80, 1.04)	0.97 (0.93, 1.02)
LOS (Days)	0.99 (0.97, 1.00)	1.04 ** (1.01, 1.07)	1.03 *** (1.01, 1.05)	1.03 *** (1.02, 1.04)
Mechanism (MVC/MCC)	1.52 (0.88, 2.73)	2.04 * (0.96. 4.30)	1.35 (0.93, 1.96)	1.45 ** (1.04, 2.01)
Pelvic Fracture	1.59 ** (1.02, 2.46)	1.30 (0.51, 3.34)	1.04 (0.64, 1.68)	0.78 (0.57, 1.07)
Acetabula Fracture	1.70 * (0.93, 3.01)	0.45 (0.06, 3.34)	0.63 (0.36, 1.10)	1.05 (0.68, 1.64)
ISS	1.08 *** (1.07, 1.10)	Not Applicable	Not Applicable	Not Applicable

See pages 49 - 106 for financial disclosure information.