

Mortality among Male Veterans with Hip Fractures

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Citation

H Kamel, A Bida, R Hoffmann. *Mortality among Male Veterans with Hip Fractures*. The Internet Journal of Geriatrics and Gerontology. 2003 Volume 1 Number 1.

Abstract

Objective: To study the mortality rate among male veterans with hip fractures.

Methods: This is a retrospective observational study of all male veterans who were admitted to one of the 7 Veterans Affairs (VA) Medical Centers of the Great Lakes Health Care System during the period from January 1st, 1998 to Dec 30th, 2000 with an International Classification of Diseases (ICD)-9 code of a hip fracture. Demographic, medical and mortality data were abstracted from the VA electronic medical records by a trained abstractor. Patients were followed until May 1st, 2002 (follow up period from 4 to 40 months).

Descriptive statistics were used to describe population demographics. Mortality rates were estimated using the Kaplan & Meier product-limit method. One-year mortality ratio was calculated based on the U.S. life table for men. Student's t-test was used to compare two independent population means. The Taylor's approximation for the variance of a ratio method was used to compare the one year mortality rate among subjects in this study to that reported among male patients with hip fractures who were not treated in the VA system.

Results: A total of 226 subjects were included in the study. Subjects' age ranged between 56 and 106 years (mean + SD = 79+9 years). By the end of the follow up period, 94 subjects have died (42%). Using the Kaplan & Meier product-limit method, the estimated proportion + SD surviving at 6 months was .77+.03 (mortality rate of 23%), at one year was .71+.03 (mortality rate of 29%), at 2 years was .66+.03 (mortality rate of 34%), and at 3 years was .57+.04 (mortality rate of 43%). Median duration to death was (M+SD) 326.6+37 days (range 1-1194 days). The mortality ratio of subjects at 1 year compared to that of men aged 79 years (which was equal to the mean age of subjects) from the U.S. life table for men was 4.4 (95% CI 3.32 to 5.48). In addition, the mortality rate among subjects in this study was significantly greater than that reported men with hip fractures who were not treated in the VA system. The mean age + SD (at time of hospital admission for an acute hip fracture) of subjects who died was greater than those who did not (82+9 vs. 77+ 9, $p < .001$).

Conclusion: Male veterans with hip fractures had excess mortality compared to U.S. men in general as well as to other men with hip fractures who were not treated in the VA system. Further work is needed to identify possible causes for this observation and to test interventions aimed at minimizing mortality and morbidity among male veterans who sustain hip fractures.

Osteoporosis formerly thought of as a disease of women, has recently gained recognition as an important public health issue in men. Approximately 30% of hip fractures occur in men aged 65 years or older. The incidence of hip fracture begins to increase when men reach their late 60s, and it parallels the increase that begins in women in their early 60s.¹ The estimated lifetime risk of hip fracture in a 50-year-old Caucasian man is 11% compared with a 23% risk for a 50-year-old woman, based on predicted mortality.²

Hip fractures have been linked to increased mortality. In a study of 300 elderly patients with hip fractures, Sexson and Lehner reported a one year mortality rate of 12.7% in patients who were cognitively intact.⁴ Magaziner and

colleagues reported three months, six months, and one year mortality rates of 8.2%, 12.6%, and 17.4%, respectively, in a series of 814 home-dwelling hip fracture patients.⁵

Aharonoff and others followed 612 elderly patients who sustained a non-pathologic hip fracture and reported one year mortality rate of 12.7%.⁶ Male sex has been reported to be an independent risk factor for increased mortality after hip fracture.^{5, 6, 8} An Australian study reported an age standardized mortality rate one year after hip fracture of 2.18 (95% CI 2.03-2.32) for women and 3.17 (2.9-3.44) for men.⁹

Only a small body of the literature addressed hip fractures among male veterans. Our prior work¹⁰ as well as that of others^{11,12} indicate that male veterans with hip fractures are

not adequately evaluated or treated for osteoporosis though they are at increased risk for subsequent fractures. A study from Durham Veterans Administration (VA) medical center investigated the mortality among 91 male veterans with hip fractures and reported a one-year mortality rate of 12%.¹¹ This mortality rate was surprisingly much lower than the mortality reported among non-veteran male and female patients. Considering that variation among centers exists, there is a need for a multi-center VA study to validate this finding. This study investigates the mortality among male veterans with hip fractures using a larger sample of male veterans with hip fractures from 7 VA medical centers.

METHODS

This is a retrospective observational study of all male veterans admitted to one of the 7 VA medical centers of the Great Lakes Health Care System with an International Classification of Diseases (ICD)-9 code of an acute hip fracture during the period from January 1st, 1998 to December 31st, 2001. Mortality data was obtained as of May 1st, 2002 (follow up period from 4 months-40 months). The electronic medical records were accessed through the WebTop Internet site,¹³ and reviewed for demographic information, admitting hospital, discharging specialty, fracture date, occurrence of death and date of death. The study was approved by the Institutional Review Board of the Clement J. Zablocki Veterans Affairs Medical Center.

Descriptive statistics were used to describe the population demographics. Mortality rates were estimated from Kaplan-Meier survival curve. Mortality ratio was calculated based on mortality reported in the U.S. life table for men.¹⁴ Two sample Student's t-test was used to compare two independent population means. Significance was defined as $p < 0.05$. The Taylor's approximation for the variance of a ratio method¹⁵ was used to compare the one year mortality rate among subjects in this study to that reported among male patients with hip fractures who were not treated in the VA system. Analysis was performed using Statistica computer program (Stat Soft).¹⁶

RESULTS

A total of 232 subjects with acute hip fractures were identified (6 females and 226 males). Female subjects were excluded from the analysis. The age of subjects ranged between 56 years and 106 years. The mean age (\pm SD) of subjects was 79 ± 9 years. Table 1 shows the distribution of subjects by the admitting hospital and discharging specialty.

Figure 1

Table 1: Distribution of subjects by admitting hospital and discharging specialty

Admitting Hospital	N	%
Iron Mountain	6	3
Hines	54	24
Chicago	37	16.4
Milwaukee	71	31
Madison	52	23
Tomah	3	1.3
North Chicago	3	1.3
Total	226	100
Discharging Specialty		
Spinal Cord	5	2
Orthopedics	67	30
Surgery	5	2
Rehabilitation Unit	4	2
Internal Medicine	113	50
GEM* Unit	31	14
Neurology	1	0
Total	226	100

*GEM= Geriatric Evaluation and Management

As of May 1st, 2002, 94 (42%) subjects have died from the day of hospital admission. Figure 1 shows Kaplan-Meier estimated survival curve for subjects. Estimated proportion \pm SD surviving at 6 months was $.77 \pm .03$ (mortality rate of 23%), at one year was $.71 \pm .03$ (mortality rate of 29%), at 2 years was $.66 \pm .03$ (mortality rate of 34%), and at 3 years was $.57 \pm .04$ (mortality rate of 43%). Mean duration (\pm SD) to death was 326.6 ± 37 days (range 1-1194 days). Mortality ratio of subjects at 1 year compared to that of men aged 79 years (mean age of subjects) from the U.S. life table for men¹⁴ was 4.4 (95% CI 3.32 to 5.48). Using Taylor's approximation for the variance of a ratio method, the relative risk of dying at one year for this VA cohort compared to a comparable aged adults with hip fractures who were not treated in the VA system was calculated based on Sexon's⁴ one year results and Magaziner's⁵ one year results (table 2). Using either of these as a reference rate shows a significantly higher mortality rate in the VA hip fracture patients. The one-year mortality rate was also much greater than that of a Baltimore cohort of 118 non-veteran men with hip fractures (19%).¹¹ The mean age \pm SD (at time of fracture) of subjects who died was greater than those who did not (82 ± 9 vs. 77 ± 9 , $p < .001$).

Figure 2

Figure 1: Kaplan-Meier estimated survival curve for subjects

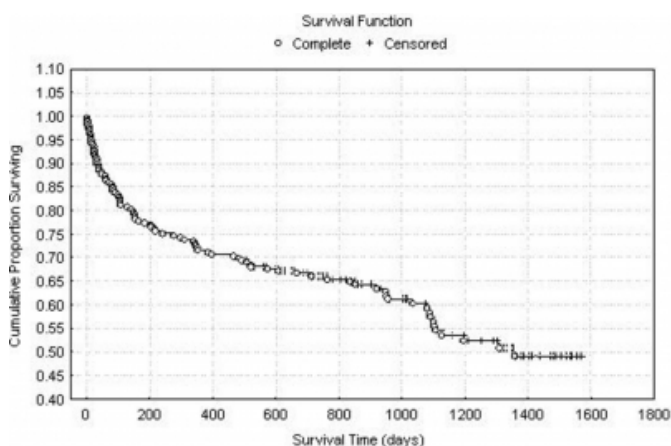


Figure 3

Table 2: Relative risk of dying at one year for VA male patients with hip fractures compared to non-VA male patients with hip fractures from two studies

Source	1 year mortality	Number of subjects	Relative Risk	95% CI
Seaton ⁴	14.8%	300	1.96	1.26-2.66
Magaziner ⁵	17.4%	698	1.67	1.23-2.11
VA patients	29.0%	226		

DISCUSSION

The current study demonstrates that the one-year mortality rate among male veterans who sustain a hip fracture (29%) is about 2.5 times that previously reported (12%).¹¹ A possible reason for this discrepancy may be that the previous study excluded subjects with pathological or traumatic fractures while in this current study such information was not accessible on WebTop Internet site.¹³ Only 11% of subjects had a pathological or traumatic fracture in the study conducted in the Durham VA medical center. Consequently, the authors do not believe that this issue by itself can fully explain the observed excess mortality in the current study. Another possible explanation for the excess mortality noted in our study is that the mortality reported in the Durham VA study was based on data abstracted from paper medical records while that in this current study depended on data abstracted from electronic medical records. Electronic medical records are probably more currently updated than paper medical records.¹⁷ There was no difference in mean age of subjects between both studies, 73 years in the study conducted in the Durham VA medical center compared to 78 years in this current study. Available data from both studies limited the ability to compare other factors that may have impacted mortality rates in both cohorts.

The data from this study also showed that male veterans who

sustained a hip fracture had greater than 4 times the risk of dying over a year compared to age-matched U.S. men. In addition the one year mortality rate in this VA cohort was significantly greater than that of a comparable cohort of men with hip fractures not treated in the VA (table 2). The reasons for the observed excess mortality among male veterans with hip fractures warrant further investigation. One possible explanation is that veteran males with hip fractures may have greater co-morbidity than their non-veteran counterparts.¹⁸ Veterans have also been shown to be more likely to develop recurrent fractures compared to non-veterans.¹¹ Despite that, published data indicate that veteran patients with hip fractures are often not adequately evaluated or treated for osteoporosis.¹⁰

While the best approach to limit morbidity and mortality from hip fractures is primary prevention, when fractures do occur, there is a need to develop interventions that minimize fracture-related morbidity and mortality. Several factors have been linked to increased mortality after a hip fracture. These include old age (>85 years), pre-injury dependency in one or more of the basic activities of daily living, a history of malignancy other than skin cancer, American Society of Anesthesiologists rating of 3 or 4 indicating increased operative risk, the development of one or more in hospital postoperative complications, presence of delirium on admission, and operative delay.^{5, 6, 19, 20} The best approach to tackle such a wide range of risk factors is to adopt an interdisciplinary approach to manage this high risk group of patients. A small body of literature indicates that the use of a joint orthopedics-geriatrics team that utilizes an interdisciplinary approach may optimize short and long-term outcomes after a hip fracture.^{21, 22, 23, 24} In addition, an interdisciplinary approach to manage frail elderly veterans with multiple functional deficits (Geriatric Evaluation and Management units) improved functional and psychological outcomes in this patient population.²⁵ Similar findings were demonstrated in stroke patients.²⁶

The results from this study should be interpreted within the context of several limitations. Some subjects may have died outside the VA system and their mortality data may have not been updated in their VA electronic records. In addition, information on comorbid health status was not available and, therefore, we could only assess total mortality rather than cause specific mortality. However, the majority of studies that investigated mortality rate after a hip fracture reported total mortality rather than cause specific mortality.

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