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# Effect of Nonsurgical Versus Surgical Management on Geriatric Hip Fracture Mortality of Hispanic-American Male Veterans

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## Abstract

**Introduction:** The effect of surgical vs nonsurgical management on hip fracture mortality of Hispanic-American male veterans has not been rigorously studied**.** Hence, we examined the mortality and life expectancy effect of nonsurgical vs surgical management after hip fracture in a geriatric Hispanic-American male veterans' population. **Material and Methods:** This was a retrospective cohort study of Hispanic-American male veterans who were 65 years of age or older and suffered a femoral neck or intertrochanteric fracture from January 2008 to December 2015. Analysis between a surgical cohort (cannulated screw fixation, hemiarthroplasty, total hip arthroplasty, or cephalomedullary nail) and a non-surgical cohort was performed. In-hospital, 30-day, one-year, and two-year mortality were compared between both groups. **Results:** Out of 268 patients with hip fracture, 159 (59.2%) were treated surgically and 109 (40.8%) non-surgically. The overall in-hospital (9.2% vs 1.9%, $P = .009$), 30-day (17.4% vs 5.0%, $P = .002$), one-year (48.6% vs 23.3%, $P < .001$), and two-year (63.3% vs 36.5%, $P < .001$) mortality rate was found to be higher for the nonoperative group. The average life expectancy of the nonoperative cohort was significantly shorter than those who were managed surgically (216 days vs 260 days, $P < .001$). **Discussion and Conclusion:** This study shows a higher mortality rate and lower life expectancy in geriatric male patients who were treated nonsurgically in a Veterans Health Affair hospital facility that mostly serves Hispanic-American veterans. Our results provide an expansion to the findings of other geriatric studies on hip fracture with focus in a Hispanic-American veteran male population.

## Keywords

geriatrics, hip fracture, mortality, survival, Hispanic-American veteran

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## Introduction

Currently, hip fracture is a major cause of morbidity and mortality in the elderly population, affecting over 300,000 people annually in the United States.[1,2] Among geriatric patients, the mortality rates within 1 year after a hip fracture have been estimated to be more than 20%.[3] More than half (70%) of those who survived are usually institutionalized in a

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skilled nursing care following hip fracture repair, while another small percent (10%) of them remains in nursing homes for more than a year.[3,4] Therefore, these types of fractures can often lead to permanent functional impairment, immobility, institutionalization, and death.[2,4-6]

Even though the gold standard for hip fractures is surgery, a controversy toward its management remains in the geriatric population.[5] Patients with multiple comorbidities and functional limitations are often treated conservatively due to the expected high risks of a surgical procedure.[5] The reported one-year mortality rate in geriatric patients with hip fractures who are managed surgically ranges from 6.6% to 29.0%, while the rate for those who are treated conservatively span from 29.8% to 64.0%.[6-9] The current literature has shown that geriatric males have a higher mortality rate after a hip fracture, compared to females.[10-12] Infection, respiratory, and cardiovascular problems have been recognized as common risk factors for death that are more prominent in males after a hip fracture.[11,13] In 2008, Radcliff et al. showed that the biggest concentration of hip fracture repairs in American males occur in the Veterans Health Administration system, where it constitutes approximately 13% of the major orthopaedic procedures performed in their hospitals.[4]

In the past, studies have evaluated ethnic differences in mortality and morbidity following hip fractures among geriatric veterans.[4,12,14,15] However, the effect of surgical vs nonsurgical management on hip fracture mortality of Hispanic-American male veterans has not been rigorously studied. Hence, the purpose of this study was to compare the mortality rate of geriatric Hispanic-American veteran males who were treated nonoperative vs operative after hip fractures. We hypothesized that geriatric Hispanic-American veteran males with hip fractures who undergo nonsurgical treatment will have a higher mortality rate than those who undergo surgical management.

## Methods

This was a retrospective cohort study of 268 consecutive Hispanic-American veteran males who were treated for a diagnosis of hip fracture at the Veterans Affair Caribbean Healthcare System (VACHS) in XXXXX from January 2008 to December 2015. A subject list was generated by the Health Information Management Service (HIMS) using both ICD-9 and ICD-10 codification for proximal femur fractures including femoral neck and intertrochanteric fractures. Patients who were Hispanic-American veteran males; 65 years old or older; diagnosed at the emergency room (ER) with unilateral femoral neck or intertrochanteric fracture (OTA/AO 31A or 31B); and underwent definitive management at VAXXX were included in the study.[16] Patients who presented with a previous hip fracture treatment, poly-trauma, isolated fractures of greater or lesser trochanter, subtrochanteric, and pathologic or periprosthetic fractures were excluded from the study. Sample data were divided in 2 groups: 109 patients who underwent nonoperative management and 159 patients who underwent operative treatment. This study was approved by the institutional review board of the XXXX at XXX.

### Surgical Management

Patients were initially evaluated at the ER by the orthopedic surgery service. Upon initial evaluation, all patients were referred to internal medicine service for further medical recommendations. Veterans who were not deemed fit for surgery were discharged or admitted for pain management. All patients managed conservatively were treated with a multipodus boot, deep vein thrombosis prophylaxis prescription, and early mobility instructions before being discharged. On the other hand, surgical management was performed in patients who were medically fit. Depending on the type of fracture and displacement, cannulated screw fixation, hemiarthroplasty, total hip arthroplasty, or cephalomedullary nail were performed. The type of fracture fixation method was determined by the on-call attending orthopaedic surgeon. Finally, physical medicine and rehabilitation service was consulted for postoperative therapy recommendations.

### Outcomes of Interest

Pre- and post-injury variables were collected and evaluated between both groups as a possible risk factor to increase the mortality rate in the sample data. Pre-injury variables included age, body mass index (BMI), number and type of medical comorbidities per patient, pre-injury living location (home or institution), and ambulatory status. Post-injury variables included hospital length of stay (LOS), post-injury living location, complications, and number of hospital readmissions up to 1 year after initial fracture. Finally, in-hospital, 30 day, one-, and two-year mortality rate was evaluated between both groups. The overall mortality data were assessed with the sources from the Veteran's Affair (VA) Mini Vital Status File; cross-checking with the Department of Veterans Affairs Beneficiary Identification and Records Locator Subsystem (BIRLS) Death File, as performed in previous studies.[4,14]

### Statistical Analysis

The analysis of continuous variables was analyzed with a Student t-test, while the differences of categorical variables were analyzed with Fisher's exact test. A Kaplan–Meier survival analysis was performed to determine the life expectancy in both cohorts, and a log-rank test was used to assess for differences in the survival curves of each cohort

as performed in a previous study.[5] An alpha of .05 with a 95% confidence interval was used to determine statistical significance. Microsoft Excel® and SPSS® software were used for all statistical calculations.

## Results

### Pre-Injury Characteristics

From a cohort of 268 Hispanic-American veteran males with a hip fracture, 159 (59.2%) were treated surgically and 109 (40.8%) conservatively. Out of 159 patients who were treated surgically, 72 (45.3%) patients presented with a femoral neck fracture and 87 (54.7%) patients presented with intertrochanteric (ITT) fractures. The majority of femoral neck fractures were treated with a hemiarthroplasty procedure (63/72 = 87.5%). A cephalomedullary nail construct was used in all ITT fractures who were managed surgically (87/87= 100.0%). Of the 109 patients treated nonoperatively, 55 (50.5%) sustained femoral neck factures and 54 (49.5%) ITT fractures.

A significantly higher age at initial trauma (85 years vs. 81 years, $P < .001$), presence of dementia (56.9% vs 36.3%, $P < .001$), and chronic kidney disease (33.0% vs 16.9%, $P = .003$) was seen in those patients who underwent nonoperative treatment compared to those treated surgically. In the same way, a significantly higher percentage of patients that were functionally dependent (25.7% vs 8.2%, $P < .001$) and came from nursing homes (32.1% vs 14.5%, $P = .001$) were treated nonoperatively. On the other hand, both groups were found to be similar regarding BMI, type of fracture, and number of medical comorbidities per patient. The pre-injury characteristic of the entire cohort is illustrated in Table 1.

### Post-Fracture Management

After definitive management, veterans who were treated nonoperatively had a shorter hospital LOS (7 days vs. 9 days, $P = .022$) compared to those who were treated surgically. The majority of patients who underwent operation were discharged to a rehabilitation facility (57.2% vs .9%, $P < .001$), whereas those treated nonsurgically were more likely to return home on discharge (51.4% vs 26.4%, $P < .001$). The presence of at least 1 complication within 1 year after initial trauma was seen more predominantly at the nonoperative group (78.9% vs 59.7%, $P < .001$).

**Table 1.** Pre-Injury Data.

| Variable | Nonsurgical (N = 109) | Surgical (N = 159) | *P*-value |
|---|---|---|---|
| Age | | | |
| Mean ± standard deviation | 84.8 ± 6.9 | 81.0 ± 7.2 | .001 |
| Body mass index | | | |
| Mean ± standard deviation | 24.0 ± 4.1 | 24.2 ± 4.6 | .673 |
| Type of hip fracture | | | |
| Femoral neck | 55 (50.5) | 72 (45.3) | .455 |
| Intertrochanteric | 54 (49.5) | 87 (54.7) | |
| Comorbidities | | | |
| Hypertension | 96 (88.1) | 135 (85.0) | .589 |
| Presence of dementia | 62 (56.9) | 58 (36.3) | .001 |
| Diabetes mellitus | 57 (52.3) | 69 (43.1) | .171 |
| Chronic kidney disease | 36 (33.0) | 27 (16.9) | .003 |
| Neoplasm | 33 (30.3) | 38 (23.8) | .262 |
| History of arrhythmia | 28 (25.7) | 25 (15.6) | .061 |
| Myocardial infarct | 19 (17.4) | 21 (13.1) | .385 |
| Chronic obstructive pulmonary disease | 15 (13.8) | 24 (15.0) | .861 |
| Chronic liver disease | 1 (.9) | 4 (2.5) | .651 |
| Number of comorbidities per patient | | | |
| Zero to 2 | 12 (11.0) | 32 (20.1) | .064 |
| Three or more | 97 (89.0) | 127 (79.9) | |
| Pre-injury living location | | | |
| Home | 74 (67.9) | 136 (85.5) | .001 |
| Nursing home | 35 (32.1) | 23 (14.5) | |
| Pre-fracture ambulatory status | | | |
| Independent | 61 (56.0) | 92 (57.9) | .802 |
| Dependent | 28 (25.7) | 13 (8.2) | < .001 |
| Partially dependent | 20 (18.3) | 54 (34.0) | .005 |

Pneumonia (38.5% vs 21.3%, $P = .003$), myocardial infarction (10.1% vs 2.5%, $P = .013$), and cerebrovascular injury (4.6% vs .0%, $P = .011$) were significantly more common in patients treated nonoperatively. Finally, the readmissions at 1 year post injury showed no difference between both groups. The variables related to postinjury management are illustrated in Table 2.

### *Mortality Rates*

The overall in-hospital (9.2% vs 1.9%, $P = .009$), 30-day (17.4% vs 5.0%, $P = .002$), one- year (48.6% vs. 23.3%, $P < .001$), and two-year (63.3% vs 36.5%, $P < .001$) mortality rate was found to be higher for the nonoperative group. The Kaplan–Meier survival curve for each cohort is shown in Figure 1. The average life expectancy of patients in the nonoperative group was significantly shorter than those who were managed surgically (216 days vs 260 days, $P < .001$). The mortality differences at all time points between patients treated surgically and nonsurgically are illustrated in Table 3.

## Discussion

This is the first cohort study that describes the outcomes between 2 different treatments of Hispanic-American males with hip fracture in the VAXXX. In this study, there was a significant difference of in-hospital, 30-day, one-year, and two-year mortality rate between those veterans who were managed surgically and nonsurgically.

Tay et al. compared the one- and two-year mortality rates of 340[6] geriatric patients with hip fractures that were admitted to a single hospital.[6] In their study, those who were managed nonoperatively had a higher one- (29.8% vs 6.6%) and two-year (45.6% vs 13.7%) mortality rates,[6] when compared to patients treated surgically.[6] Similarly, Gregory et al.[17] illustrated in a study of 102 patients with intracapsular femoral neck fractures that patients who were

**Table 2.** Post-Injury Data.

| Variable | Nonsurgical (N = 109) | Surgical (N = 159) | *P*-value |
|---|---|---|---|
| Hospital length of stay | | | |
| Mean ± standard deviation | 6.9 ± 9.2 | 9.3 ± 7.6 | .022 |
| Post-injury living status | | | |
| Home | 66 (60.6) | 44 (27.7) | < .001 |
| Nursing home | 23 (21.1) | 18 (11.3) | .038 |
| Deceased | 10 (9.2) | 3 (1.9) | .009 |
| Hospice | 9 (8.3) | 3 (1.9) | .017 |
| Rehab facility | 1 (.9) | 91 (57.2) | < .001 |
| Number of complications per patient | | | |
| At least 1 complication | 86 (78.9) | 95 (59.7) | < .001 |
| Zero | 23 (21.1) | 64 (40.3) | |
| One | 44 (40.4) | 36 (22.6) | .003 |
| Two | 19 (17.4) | 38 (23.9) | .227 |
| Three or more | 23 (21.1) | 21 (13.2) | .095 |
| Post-fracture complications | | | |
| Pneumonia | 42 (38.5) | 34 (21.3) | .003 |
| Urinary tract infection | 25 (22.9) | 41 (25.6) | .666 |
| Stress ulcers | 16 (14.7) | 15 (9.4) | .243 |
| Myocardial infarction | 11 (10.1) | 4 (2.5) | .013 |
| Deep vein thrombosis | 6 (5.5) | 12 (7.5) | .623 |
| Cerebrovascular injury | 5 (4.6) | 0 (.0) | .011 |
| Pulmonary embolism | 3 (2.8) | 8 (5.0) | .533 |
| Revision | 2 (1.8) | 3 (1.9) | 1.000 |
| Wound infection | 0 (.0) | 4 (2.5) | .149 |
| Number of readmission 1 year | | | |
| Mean ± standard deviation | .9 ± 1.3 | .9 + 1.2 | .697 |
| Zero | 55 (50.5) | 85 (53.5) | .709 |
| One | 30 (27.5) | 38 (23.9) | .568 |
| Two | 12 (11.0) | 21 (13.2) | .706 |
| Three or more | 12 (11.0) | 15 (9.4) | .684 |

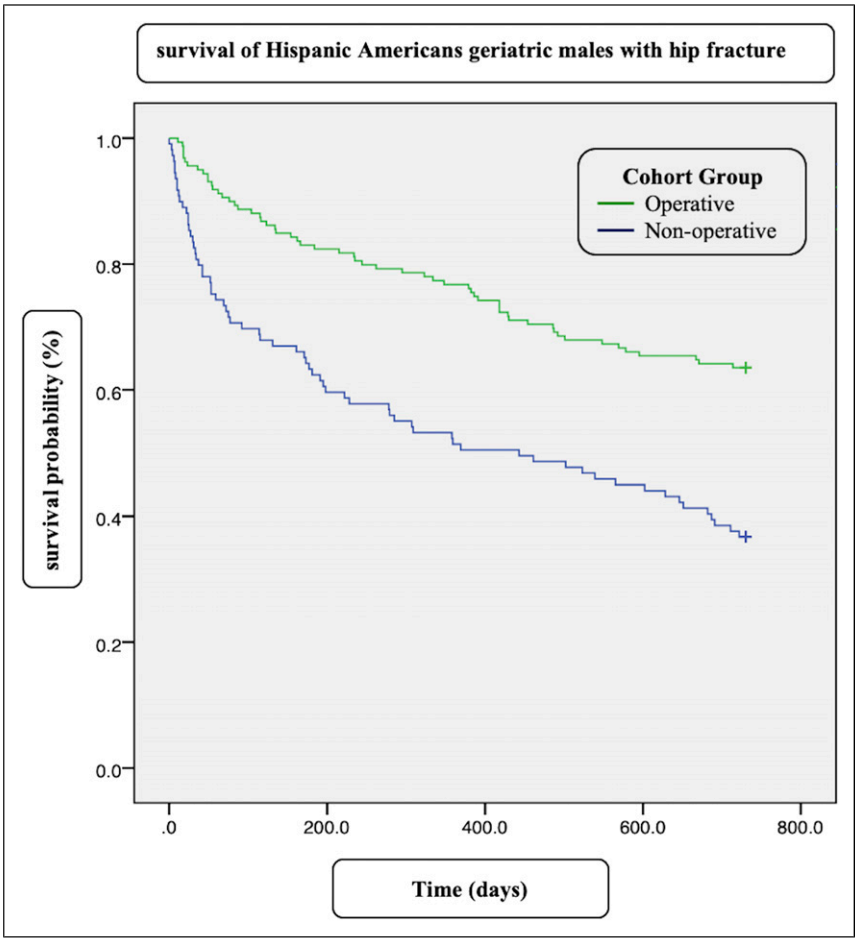


**Figure 1.** Kaplan–Meier survival curves for the comparaitive cohorts from the time of injury up to 2 years.

**Table 3.** Mortality Data.

| Variable | Non-surgical (N = 109) | Surgical (N = 159) | *P*-value |
|---|---|---|---|
| Unadjusted mortality data | | | |
| Within 30 days | 19 (17.4) | 8 (5.0) | .002 |
| Within one year | 53 (48.6) | 37 (23.3) | < .001 |
| Within two years | 69 (63.3) | 58 (36.5) | < .001 |
| Time to death (days) | | | |
| Mean ± standard deviation | 216.3 ± 29.5 | 260.0 ± 20.4 | < .001 |

managed nonoperatively had a greater one-year mortality rate (50%) when compared to the operative group (29%). Lastly, Chlebeck et al. reported a lower in-hospital (3.9% vs. 28.6%), 30-day (11.0% vs. 63.6%), and one-year mortality rate (36.4% vs 84.4%) in 154 geriatric hip fractures treated operatively compared to 77 geriatric hip fractures treated nonoperatively.[5] In their retrospective study, authors recognized that despite being a match cohort study, residual confounding may still exist.[5] Even though the comparison of surgical vs nonsurgical management has been discussed in the general geriatric population, no study has transported this comparison in Hispanic-American veteran males.

In 2007, Bass et al.[15] reported that male veterans with hip fracture had 2 times more probability of dying within 1 year of trauma when compared to females.[15] They concluded that 1 out of 3 geriatric male veterans who suffered a hip fracture died within 1 year; and the chance of mortality continues to increase after 6 months of initial injury.[15] Likewise, Radcliff et al. evaluated the 30-day mortality rate of geriatric male veterans who were treated surgically

for a hip fracture in one of the Veterans Health System (VHA) hospitals in the United States.[4] In their study, the overall 30-day mortality rate was 8 percent, where 80% died during hospitalization.[4]

Pre-existing comorbidities (e.g., dementia, cardiovascular, renal and respiratory problems), and ambulatory and living status before fracture have been presented as possible variables that can affect the overall survival rate among geriatric veterans.[4,12,14,15] In our study, veterans who were treated nonoperatively had a higher age, had presence of dementia, had presence of chronic kidney disease, lived in a nursing home, and were fully dependent compared to those treated operatively before the trauma.

More than half of our entire sample data (181/268 = 67.5%) developed at least 1 complication after fracture, affecting primarily the respiratory and cardiovascular systems. Tan et al.[18] compared the clinical outcomes of geriatrics with hip fracture who were managed surgically vs nonsurgically. Pneumonia (3.4% cases), cardiovascular (2.6% cases), and cerebrovascular (2.1% cases) problems were significantly more associated with patients who underwent nonsurgical treatment in their study. In our study, the majority percentage of complications were reported among those patients who had a nonsurgical management. Similar to Tan et al., we found a higher incidence of pneumonia, myocardial infarction, and cerebrovascular injury among patients treated nonsurgically.

Previous literature has suggested that ethnicity may play an important role in the risk of death among the geriatric veterans who suffer a hip fracture.[4,12,14] Bass et al.[12] evaluated the proportion of hip fractures by race in a VHA hospital of Texas from 1998 to 2002. In their study, Hispanic-Americans were the largest minority group who suffered a hip fracture. However, due to the limited representation of minorities, they were not able to draw general conclusions about their mortality rates. Years later, Hutt et al.[14] compared the survival rates of veterans who were operated in VHA and non-VHA facilities by their ethnic background. In their study, African Americans had the highest ethnic representation of minorities. Yet, Hispanic-Americans along with American Indians were grouped as others, limiting the understanding of these 2 groups in their study. Currently, 22.6% of US veterans are minorities.[19] Out of these groups, Hispanic-Americans form the second-largest minority group behind African Americans.[19] In our study, the VAXXX provides inpatient services to more than 10,000 veterans in XXX XXXX.[20] The selection of a specific sex and ethnic group in our study relied on the context that the majority of geriatric veterans who receive care under our facility are Hispanic-American males.

Our study had several limitations. First, based on the retrospective design of our study, we cannot conclude that fracture management was the sole main factor responsible for the increased mortality among those patients treated nonoperatively. Second, we could not disregard that some of the patients may have been readmitted to non-VHA hospitals during the study period.[4] The inclusion of post-injury trajectories outside the VHA system could be included in future studies. Finally, the population in our study is very specific, mostlycomprising Hispanic-American veteran males. Therefore, the results obtained may not be generalizable to the general geriatric population.

This study demonstrates a higher mortality rate in geriatric Hispanic-American veteran males who were treated nonsurgical compared to those managed surgically. Our results provide an expansion to the findings of other geriatric studies with a focus on a Hispanic-American population. We explored the outcomes and mortality rates of geriatric hip fractures in a VHA hospital facility that mostly serves Hispanic-American male veterans within a two-year follow-up study. Patient characteristics such as age, presence of dementia, presence of chronic kidney disease, living status, and functionality were more likely to be related in patients treated nonoperatively. Our findings provide valuable information to clinicians who manage Hispanic-American geriatric veteran males with hip fractures when discussing the operative and nonoperative management with patients and family members.

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