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Research Article

Comparison of the 30-Day Mortality Rate of Hip Fracture Surgery in Patients Over 50 Years Old with the Underlying Disease who Underwent General and Neuraxial Anesthesia in a General Hospital for 4 Years

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Abstract

Introduction: Hip fractures are a critical issue among the elderly, often resulting from osteoporosis, and pose a significant global health challenge. With an estimated 10 million cases annually, the complexity of anesthesia choice is heightened by the elderly's prevalent comorbidities.

Methods: This retrospective cohort study, conducted at Rasool Akram Hospital from April 2017 to April 2021, investigates the 30-day postoperative mortality rates in over 50 patients undergoing hip fracture surgery. It compares outcomes between general and neuraxial anesthesia and examines the influence of comorbidities and fracture types on mortality.

Results: The study encompassed 437 patients, with a notable difference in mortality rates: 5.6% for general anesthesia versus 13.8% for neuraxial anesthesia (P = 0.006). A propensity for neuraxial anesthesia was observed in patients over 75 and those with cardiac conditions (P = 0.004 and P = 0.006, respectively). Smokers and patients with intertrochanteric fractures also exhibited higher mortality under neuraxial anesthesia. The mortality rates did not significantly vary among neuraxial anesthesia subtypes.

Conclusions: The anesthesia method significantly impacts the 30-day mortality rate in elderly hip fracture patients with comorbidities. General anesthesia is associated with lower mortality than neuraxial anesthesia. These findings highlight the importance of meticulous preoperative evaluation and tailored anesthesia strategies to enhance patient outcomes. The study advocates for personalized care to navigate the complexities of anesthesia selection and improve surgical success rates in this vulnerable population.

Keywords: Hip Fractures; Neuraxial Anesthesia; General Anesthesia; Mortality; Intertrochanteric Fracture.

Introduction

Hip fractures in the elderly, primarily due to osteoporosis, have become a pressing health concern globally. Each year, these fractures affect an estimated 10 million people, significantly impacting patients, their families, and healthcare systems. In Germany, the incidence of hip fractures among elderly patients utilizing home nursing services is reported at 50.6 per 1,000 patients annually [1]. The mortality rate for these patients surges by 5 to 8 times within the first three months following the fracture [2]. Surgical treatment, while essential, carries its risks; the 30-day mortality rate after total hip arthroplasty is approximately 0.35%, and the 90-day postoperative mortality rate is about 1%[3]. In the revised comprehensive review and meta-analysis, regional anesthesia (RA) was not associated with a reduction in 30-day postoperative mortality for

patients undergoing hip fracture surgery compared to general anesthesia (GA). The incidence of intraoperative hypotension was lower in patients who were administered RA as opposed to GA. Beyond intraoperative hypotension, the analysis indicated no significant disparities in other complications between the two anesthesia methods [4].

A 2019 study spanning 1999 to 2015 across various nations examined osteoporotic hip fracture patients, revealing an average annual mortality rate of 144.9 per 1,000 patients, with a 2% yearly increase. The study also highlighted a higher mortality rate in men compared to women [5].

Patients with cardiovascular diseases or hypothyroidism were more likely to receive neuraxial anesthesia, while those with a history of anemia were more inclined towards general anesthesia [6-9].

These findings underscore the complexity of choosing the optimal anesthesia technique for hip fracture surgeries and highlight the need for ongoing research to fully understand the implications of anesthesia choice on patient outcomes. Our study contributes to this body of evidence, aiming to optimize perioperative care and improve survival rates in this vulnerable population.

Methods

This retrospective cohort study was conducted at Rasool Akram Hospital, encompassing patients aged over 50 who underwent orthopedic surgery for hip fractures from April 2017 to April 2021. The study's objective was to compare the 30-day postoperative mortality rates between patients administered GA and neuraxial anesthesia (NA). Additionally, it assessed the impact of preoperative comorbidities such as diabetes, hypertension, tobacco and opium use, and cardiovascular and pulmonary diseases on the mortality rate, as well as the association between fracture type and mortality. Data collection began with identifying patients over 50 who had hip fracture surgery. Patient records provided information on demographics, comorbidities, and substance use history. Records lacking complete comorbidity data or patient information were excluded. For 30-day mortality analysis, patients were categorized based on hospitalization duration post-surgery. Those hospitalized for at least 30 days or readmitted within that period had their mortality recorded in the hospital system. Others, with shorter stays or no readmission, had their mortality status confirmed through follow-up calls. Non-respondents or those with incorrect contact details were excluded from the study.

The study examined a range of variables, including fracture type (hip, intertrochanteric, femoral neck), cardiac conditions, hypertension, diabetes, pulmonary diseases, smoking, opioid addiction, occupational hazards, cancer, seizures, Alzheimer's, cerebrovascular accidents, hypothyroidism, and anemia.

Patient data were categorized by preoperative comorbidities to explore the relationship with anesthesia type and to compare mortality rates between GA and NA. Mortality rates for NA were further analyzed across spinal, combined, and epidural anesthesia types.The study also investigated the relationship between fracture type and anesthesia choice, as well as the correlation between fracture type and mortality.

Ethical considerations were upheld with ethical approval (IR.IUMS.REC.1399.1429) and informed consent was obtained for research use of patient information, ensuring confidentiality and adherence to the Declaration of Helsinki principles.

Inclusion criteria were patients over 50 who underwent surgery for hip fractures between April 2016 and April 2014. Exclusion criteria included patients with incomplete records or unconfirmed 30-day postoperative mortality due to lack of follow-up or response. The sample size included all eligible patients over 50 who experienced hip fractures within the specified period and received GA or NA at Rasool Akram Hospital. Data were analyzed using SPSS V22 2019, with quantitative data expressed as mean and standard deviation, and qualitative data as frequency and percentage. The relationship between anesthesia type and comorbidity was analyzed using Fisher's exact test and Pearson's Chi-square test, considering a P value of ≤ 0.05 as statistically significant.

Results

Between April 2017 and April 2021, our retrospective cohort study at Rasool Akram Hospital included 469 individuals over 50 who underwent hip fracture surgery. From this group, 32 patients were excluded due to non-responsiveness to follow-up calls or incomplete medical records. Consequently, the study analyzed 437 patients, comprising 200 men (45.8%) and 237 women (54.2%). The average age of participants was 73.4 years with a standard deviation of 11.5 years. The prevalence of

comorbidities within the study group was as follows: Hypertension was present in 206 patients (47.1%), diabetes in 113 (25.9%), heart disease in 58 (13.3%), and lung diseases in 26 (5.2%). Additionally, lifestyle factors were considered, with 101 individuals (23.1%) identified as smokers, 15 (3.4%) as opium users, and 7 (1.6%) with a history of occupational exposure to ovens. Anesthesia methods were also recorded, with 177 patients (40.5%) receiving general anesthesia and 260 (59.5%) receiving neuraxial anesthesia. Within the neuraxial group, 164 patients (63.3%) had spinal anesthesia, 40 (15.4%) had epidural anesthesia, and 55 (21.2%) had combined spinal-epidural anesthesia. The study observed a 30-day postoperative mortality rate of 10.5%, equating to 46 patient deaths.

By dividing the patients into two age groups, those under 75 years old (71 people or 40.5%) and those over 75 years old (139 people or 53.5%), we found that patients over 75 years of age typically underwent neuraxial anesthesia, which was statistically significant (P-value = 0.004). Additionally, in this study, we observed that 44 patients (16.9%) with a history of heart disease underwent neuraxial anesthesia compared to 14 patients (7.9%) who received general anesthesia, and this difference was statistically significant (P-value = 0.006). Conversely, a significantly higher number of patients with a history of hypothyroidism were subjected to neuraxial anesthesia (18 patients or 6.9%) versus 4 patients (2.3%) (P = 0.043). Patients with a history of anemia in our study were more likely to undergo general anesthesia (6 patients or 3.4%) as opposed to 1 patient (0.4%) (P-value = 0.019). Furthermore, our study included 271 patients with intertrochanteric fractures, of whom 180 (69.2%) underwent neuraxial anesthesia and 91 (51.4%) underwent general anesthesia. The group with hip fractures consisted of 22 individuals; 9 patients (3.5%) received neuraxial anesthesia and 13 patients (7.3%) received general anesthesia. Among the 144 patients with femoral neck fractures who underwent surgery, 71 (27.3%) received neuraxial anesthesia and 73 (41.2%) received general anesthesia. Statistically, the fracture type is related to the choice of anesthesia (P = 0.001), as most patients with hip and femoral neck fractures tend to undergo general anesthesia. In contrast, most patients with intertrochanteric fractures tend to receive neuraxial anesthesia (Table 1).

In Table 2, we observed that among the sub-groups receiving neuraxial anesthesia, there were 164 patients with spinal anesthesia, 40 patients with epidural anesthesia, and 55 patients with combined anesthesia. Upon examining the characteristics of patients and the type of neuraxial anesthesia administered, we found a statistically significant correlation between gender and the choice of neuraxial anesthesia. The majority of the spinal anesthesia group consisted of women (104 patients or 63.4%), while men predominated in the epidural (35 patients or 62.5%) and combined anesthesia groups (32 patients or 58.2%) (P = 0.001).

Table 1: Comparison of the Characteristics of Patients in 2 Groups of Neuraxial Anesthesia and General Anesthesia [a]

Variables	Neuraxial Anesthesia (n = 260)	General Anesthesia (n = 177)	P-Value
Gender	117 (45)	83 (46.9)	0.697
Gender, (female)	143 (55)	94 (53.1)	0.697
Age (over 75)	139 (53.5)	71 (40.1)	0.004
HTN	128 (49.2)	78 (44.1)	0.289
DM	65 (25)	48 (27.1)	0.62
Smoker	63 (24.3)	38 (21)	0.488
Opium user	9 (3.5)	6 (3.4)	0.968
Working with oven	4 (1.5)	3 (1.7)	0.898
Pulmonary disease	18 (6.9)	8 (4.5)	0.297
Cardiac disease	44 (16.9)	14 (7.9)	0.006
Pelvic fracture	9 (3.5)	13 (7.3)	0.001
Femur neck fracture	71 (27.3)	73 (41.2)	0.001
hypothyroidism	18 (6.9)	4 (2.3)	0.043
History of CVA	21 (8.1)	9 (5.1)	0.225
Cancer	3 (1.2)	3 (1.7)	0.633
Anemia	1 (0.4)	6 (3.4)	0.019
Alzheimer	3 (1.2)	2 (1.1)	0.982

[a] Values are presented as No. (%).

Table 2: Comparing the Characteristics of Patients with the Type of Neuraxial Anesthesia [a]

Variables	Spinal Anesthesia (n = 164)	Epidural Anesthesia (n = 40)	Combined Anesthesia (n = 55)	P-Value
Gender	60 (36.6)	25 (62.5)	32 (58.2)	0.001
Gender, (female)	104 (63.4)	15 (37.5)	23 (41.8)	0.001
Age over 75	96 (58.5)	24 (60)	27 (49.1)	0.427
HTN	87 (53)	18 (45)	23 (41.8)	0.294
DM	45 (27.4)	7 (17.5)	13 (23.6)	0.413
Smoker	36 (22.1)	10 (25)	17 (30.9)	0.41
Opium user	6 (3.7)	1 (2.5)	2 (3.6)	0.935
Working with Oven	4 (2.4)	0 (0)	0 (0)	0.308
Pulmonary disease	8 (4.9)	5 (12.5)	5 (9.1)	0.184
Cardiac disease	27 (16.5)	9 (22.5)	8 (14.5)	0.569
intertrochanteric fracture	117 (71.3)	26 (65)	36 (65.5)	0.456
Pelvic fracture	7 (4.3)	0 (0)	2 (3.6)	0.456
Femur neck fracture	40 (24.4)	14 (35)	17 (30.9)	0.456

[a] Values are presented as No. (%).

In the subsequent section, we studied and compared the mortality rates of patients in the groups receiving neuraxial anesthesia and general anesthesia. Our study revealed that patients who underwent surgery with neuraxial anesthesia reported a significantly higher mortality rate (Figure 1). Within the first 30 days after surgery, 10 patients (5.6%) who received general anesthesia passed away, whereas 36 patients (13.8%) who received neuraxial anesthesia died, indicating a significant difference between the two types of anesthesia (P-value = 0.006).

Furthermore, our investigations showed that, statistically, the mortality rate among smokers was higher with neuraxial anesthesia than with general anesthesia (P-value = 0.039), with 10 patients (15.9%) who were smokers and received neuraxial anesthesia dying, compared to only 1 patient (2.6%) who was a smoker and received general anesthesia. Additionally, this study found that the mortality rate for patients with intertrochanteric fractures was significantly higher when neuraxial anesthesia was used compared to general anesthesia (P-value = 0.02) (Table 3).

Upon examining the findings related to the types of neuraxial anesthesia (including spinal, epidural, and combined anesthesia), we determined that there was no statistical difference in mortality rates among the different types of neuraxial anesthesia (Table 4).

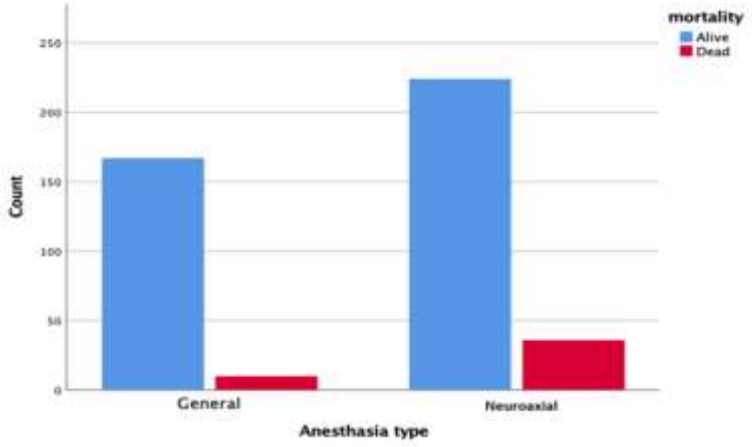

Figure 1: A bar chart representing mortality in 2 groups of general anesthesia and neuraxial anesthesia

Table 3: Comparison of Mortality of Patients in Neuraxial Anesthesia and General Anesthesia Groups

Variables	Neuraxial Anesthesia (n = 260)	General Anesthesia (n = 177)	P-Value
Mortality	36 (13.8)	10 (5.6)	0.006
HTN	15 (11.7)	8 (10.3)	0.74
DM	11 (16.9)	6 (12.5)	0.516
Smoker	10 (15.9)	1 (2.6)	0.039
Opium user	2 (22)	0	0.215
Working with Oven	1 (25)	1 (33)	0.809
Pulmonary disease	6 (33.3)	1 (12.5)	0.262
Cardiac disease	12 (27.3)	2 (14.3)	0.323
Pelvic Fracture	0 (0)	1 (11.1)	0.409
Intertrochanteric Fracture	26 (14.4)	5 (5.5)	0.020
Femur neck Fracture	10 (12.2)	2 (3.2)	0.054
Females under 75	6 (10)	4 (7.3)	0.625
Females over 75	14 (16.9)	2 (5)	0.67
Males under 75	6 (9.8)	1 (1.9)	0.82
Males over 75	10 (17.9)	3 (9.7)	0.305
[a] values are presented as No. (%).			

Table 4: Mortality Comparison of Patient Characteristics in 3 Subgroups of Neuraxial Anesthesia (Epidural, Spinal, and Combined) [a]

Variables	Spinal Anesthesia (n = 164)	Epidural Anesthesia (n = 40)	Combined Anesthesia (n = 55)	Sub Group P-Value
Mortality	25 (15.2)	7 (17.5)	4 (7.3)	0.252
HTN	12 (13.8)	2 (11.8)	1 (4.3)	0.62
DM	9 (20)	1 (14.3)	1 (7.7)	0.57
Smoker	8 (22.2)	2 (20)	0	0.11
Opium user	1 (16.7)	0	1 (50)	0.526
Working with Oven	1 (25)	0	0	0.809
Pulmonary disease	3 (37.5)	2 (40)	1 (20)	0.755
Cardiac disease	9 (33.3)	1 (11.1)	2 (25)	0.426
Intertrochanteric Fracture	18 (15.4)	4 (14.8)	4 (12.1)	0.815
Pelvic Fracture	1 (14.3)	0 (0)	0 (0)	0.778
Femur Neck Fracture	7 (14.2)	3 (23.1)	0	0.09
Females under 75	5 (11.6)	0	1 (10)	0.677
Females over 75	9 (14.8)	3 (33.3)	2 (15.4)	0.376
Males under 75	4 (13.3)	2 (20)	0	0.144
Males over 75	7 (23.3)	2 (13.3)	1 (9.1)	0.497
[a] values are presented as No. (%).				

Finally, we examined the relationship between the number of comorbidities and the mortality rate. Our findings indicate a significant correlation between the number of comorbidities in patients and their mortality rates (P = 0.003) (Table 5) (Figure 2).

Table 5: Mortality Comparison of Number of Comorbidities [a]

Morbidity mortality	Values				
	0	1	2	3	4
	N = 173 (39.6)	N = 152 (34.8)	N = 88 (20.1)	N = 21 (4.8)	N = 3 (0.7)
Alive	159 (34.4)	142 (32.5)	71 (16.2)	18 (4.1)	1 (0.2)
Dead	14 (8.1)	10 (2.3)	17 (3.9)	3 (0.7)	2 (0.5)
a Values are presented as No. (%).					

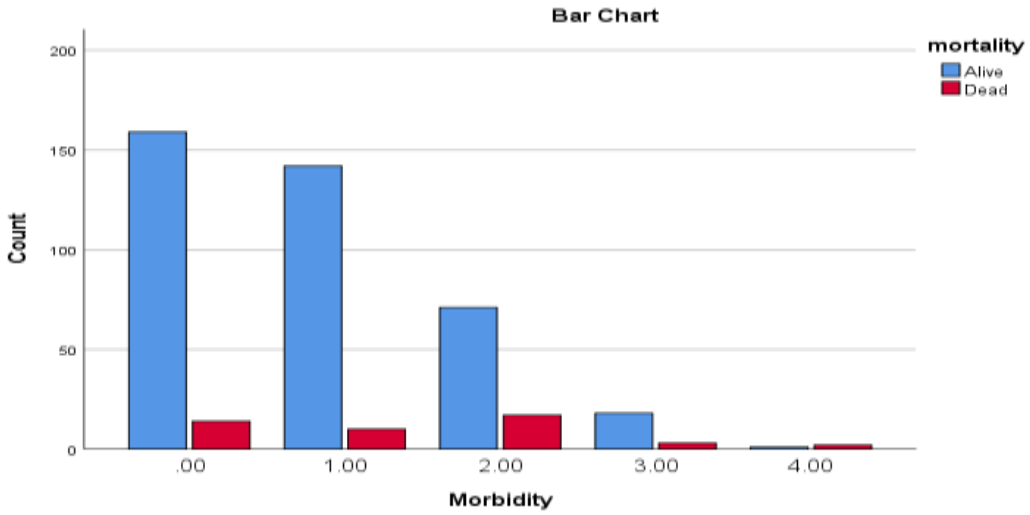

Figure 2: Bar chart showing the number of morbidity and mortality

Discussion

The research aimed to assess mortality rate disparities in individuals over 50 with chronic conditions post-hip fracture surgery, contrasting neuraxial with general anesthesia. The study found that those with heart issues, hypothyroidism, and seniors over 75 were more likely to choose neuraxial anesthesia. A distinct relationship was noted between fracture type and anesthesia preference, with general anesthesia favored for hip and femoral neck fractures and neuraxial anesthesia for intertrochanteric fractures. Data suggests a higher mortality rate linked to neuraxial anesthesia. Specifically, a heightened mortality rate was significant among patients with intertrochanteric and pelvic fractures receiving neuraxial anesthesia which may be due to more underlying diseases.

In 2018, Chen et al. conducted a meta-analysis on the postoperative outcomes of patients over 65 with hip fractures. Their study indicated that general anesthesia increased the probability of hospitalization, acute respiratory distress, and in-hospital mortality compared to neuraxial anesthesia. However, our study demonstrated that in patients over 50 undergoing hip fracture surgery, the overall mortality rate associated with neuraxial anesthesia was higher than with general anesthesia. The difference between these two studies is likely due to the different sample sizes. Our study included individuals with more severe conditions who were more likely to undergo neuraxial anesthesia. Additionally, the variation in comorbidities in our study may have been a significant factor in the higher mortality rate observed in the neuraxial group [10].

In the retrospective study conducted by Lin et al. on patients with hip fracture surgery between 2016 and 2018, it was shown that the one-year mortality rate between general anesthesia and spinal anesthesia was not statistically significant. However, our study found that the mortality rate associated with neuraxial anesthesia was higher than that with general anesthesia. This discrepancy could be due to the smaller number of

patients and the presence of more severe underlying conditions in the neuraxial anesthesia group in our study [11].

In the research performed by Zhang et al. on 2017 elderly patients with hip fracture surgery, it was shown that there was no statistically significant difference in the mortality rate between general anesthesia and neuraxial anesthesia and that the hospitalization rate and hospital costs were higher with general anesthesia. As previously mentioned, our study indicated that the mortality rate of patients with hip fractures who received neuraxial anesthesia was higher than that of those who received general anesthesia. This difference between the two studies could be due to the smaller population and the presence of patients with more severe underlying problems who received neuraxial anesthesia in our study [12].

In the retrospective analysis by Dr. Ahmad Mohammad Ismail and his team, covering the period from 2013 to 2017, it was determined that the one-year mortality rate among emergency hip fracture patients was not significantly impacted by the anesthesia method employed. The discrepancies between the outcomes of our study and theirs may stem from factors such as the advanced age of our patient cohort, the limited size of our study population, and the more pronounced severity of comorbid conditions within the group that received neuraxial anesthesia in our research [13].

Leibold et al.'s 2022 meta-analysis on hip fracture surgery patients indicated that both in-hospital and 3-month mortality rates were notably lower for those who underwent neuraxial anesthesia as opposed to general anesthesia. In contrast, our research found that the 30-day mortality rate was elevated in patients who had neuraxial anesthesia compared to those with general anesthesia. The variance in findings between the two studies may be attributed to different factors such as the shorter mortality assessment period, the advanced age profile of our subjects, the smaller scale of our study group, and the heightened severity of pre-existing health conditions among those in the neuraxial anesthesia cohort within our study [14].

In the retrospective cohort study by Nishi et al., which examined hip fracture patients, no significant disparity was found in the 30- and 90-day mortality rates when comparing general anesthesia to neuraxial anesthesia. The research included elderly patients who had hip surgery from 2012 to 2016. However, our study revealed that the mortality rate for patients who underwent neuraxial anesthesia was greater than for those who received general anesthesia. This discrepancy may be attributed to the more critical conditions of patients in the neuraxial group and the smaller sample size in our research [15].

The research by N. N. Saied and associates in 2016 aimed to evaluate the 30-day postoperative mortality rates for patients under general and neuraxial anesthesia. They scrutinized a large cohort of 328,540 patients, with 264,421 undergoing general anesthesia and 64,119 receiving neuraxial anesthesia. Their findings indicated no significant mortality rate difference between the two anesthesia modalities. The contrasting results between their study and ours may be ascribed to the broader patient base and the more diverse array of surgical procedures encompassed in their analysis [16].

Dr. White and the research team's 2012 study, which utilized the National Hip Fracture Database, aimed to discern the mortality differences at 5 and 30 days post-surgery between patients receiving general anesthesia and those given spinal anesthesia for hip fractures. The study encompassed a large sample of 65,535 individuals and concluded that there was no significant variance in mortality rates between the two anesthesia types. In contrast, our study observed a higher mortality rate within the neuraxial anesthesia group, which may be attributable to our study's focus on patients over the age of 50 [17].

The systematic review by Dr. Julia Van Waesberghe and her team in 2010 evaluated the differences between general and spinal anesthesia concerning 30-day mortality, hospital stay length, and in-hospital mortality. The review included adults over 18 and utilized data from PubMed and Embase spanning from 2010 to 2016. Their findings showed no significant difference in 30-day mortality between the two anesthesia types. However, they noted shorter hospital stays and lower in-hospital mortality with spinal anesthesia. In contrast, our study found a higher 30-day mortality rate among patients who underwent neuraxial anesthesia, potentially due to the advanced age and varied comorbidities of our patient group [18].

The retrospective cohort study by Timothy Brox and his team, conducted in January 2016 on hip fracture patients, involved a review of 7,585 individuals. Of

these, 4,257 received general anesthesia, 3,059 had neuraxial anesthesia, and 269 were given mixed anesthesia. Their mortality rates were tracked at intervals of 30 days, 90 days, and one year. Contrasting with these findings, our research indicated a notably higher mortality rate for patients who had neuraxial anesthesia compared to those who had general anesthesia. The study by Brox et al. found that neuraxial anesthesia was associated with a lower mortality rate than general anesthesia, with no marked mortality difference between general and mixed anesthesia. The discrepancies between the two studies' outcomes may be attributed to the smaller patient sample and the more complex health issues present in the neuraxial group in our study. Additionally, our findings regarding the mortality rates between spinal and combined anesthesia align with those reported by Brox et al., showing no significant statistical difference [19].

The article from the Anesthesiology Department of Taichung Hospital, China, published in March 2010, investigated mortality and morbidity differences in anesthesia methods among patients aged 80-90 undergoing hip fracture surgery. Out of 335 patients studied, the findings indicated no significant mortality difference between general and spinal anesthesia. However, morbidity was higher with general anesthesia, which also seemed to increase post-operative mortality risk in patients over 80. In contrast, our study observed a higher mortality rate among patients who underwent neuraxial anesthesia compared to those who had general anesthesia, potentially due to more severe underlying health conditions in the neuraxial anesthesia group [20].

In the retrospective study led by Dr. Mark Neuman and his team during 2007-2008, which focused on individuals who sustained hip fractures within that year, a total of 18,158 patients were evaluated. Their research found that those with intertrochanteric fractures who were treated with neuraxial anesthesia experienced fewer respiratory complications and had a reduced mortality rate compared to those who underwent general anesthesia. On the other hand, our study recorded a higher mortality rate among patients who received neuraxial anesthesia rather than general anesthesia. The discrepancies between the findings of these two studies could be attributed to the smaller patient sample size and the older age of patients with more complex underlying conditions in our study [21].

Dr. Irfan A. Khan and his research group's retrospective cohort study, which spanned from 2015 to 2016, involved an extensive review of 60,897 patients undergoing total hip surgery. Their findings indicated no notable mortality difference between patients who received general anesthesia and those who underwent neuraxial anesthesia. However, in our research, a higher mortality rate was observed among patients who had neuraxial anesthesia compared to those with general anesthesia. This divergence in results may be linked to the older patient demographic and the smaller sample size in our study, which could have influenced the outcomes [22].

The study by Eun Jin Ahn and team, which spanned six years, focused on a senior demographic presenting with hip fractures. Out of the 96,289 patients reviewed, a majority underwent neuraxial anesthesia. Their findings indicated a lower mortality rate for this group compared to those who had general anesthesia. In contrast, our research, which involved a smaller patient pool, reported a higher mortality rate for those who received neuraxial anesthesia. This variance could be due to the more critical health issues faced by patients in the neuraxial group in our study [23].

Dr. Linda Le-Wendling et al. retrospective cohort study from 2012, which examined patients treated for hip fractures between 2006 and 2008, concluded that the type of anesthesia—neuraxial or general—did not significantly affect patient mortality. This contrasts with our study's findings, where we observed a higher mortality rate in patients who received neuraxial anesthesia. This difference could be attributed to the more severe underlying health conditions present in the neuraxial group in our study [24].

Limitations

(1) The inability to follow up with patients after 30 days;
(2) The registry system contained incomplete information for some patients;

(3) Several patients passed away before surgery.

Conclusion

Overall, our study demonstrated that patients with heart disease, hypothyroidism, and those older than 75 years are more inclined to receive neuraxial anesthesia. Additionally, a significant correlation exists between the

type of fracture and the chosen anesthesia method. Most patients with hip and femoral neck fractures are administered general anesthesia, while those with intertrochanteric fractures predominantly receive neuraxial anesthesia. Our findings indicate that, generally, patients undergoing neuraxial anesthesia report a higher mortality rate from a statistical standpoint. Upon further analysis of fracture types, it was noted that patients with intertrochanteric and pelvic fractures experiencing neuraxial anesthesia reported a notably higher mortality rate in our study. Conversely, other research has indicated that neuraxial anesthesia is associated with a lower or equivalent mortality rate compared to general anesthesia in their respective study populations. These studies also suggested that neuraxial anesthesia could decrease the duration of hospital stays and the incidence of postoperative complications relative to general anesthesia.

No association was identified between the choice of neuraxial anesthesia and patient comorbidities, nor between the anesthesia type and patient mortality. For subsequent studies, it is advisable to encompass a more diverse patient population and ensure that participants are comparable in terms of the severity of their underlying health conditions. Moreover, it might prove advantageous to omit individuals with critical underlying health issues from the research sample.

Acknowledgments

None.

Conflict of Interest Disclosures

The authors declare no conflict of interest.

Declaration of Generative AI and AI-assisted technologies

The authors declare they have not used General AI and AI-assisted technologies.

Ethical Statement

This research was confirmed by the ethics committee of Iran University of Medical Sciences, Tehran, Iran, with the ethics code: IR.IUMS.REC.1399.1429.

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None.

Authors' Contributions

Pooya Derakhshan, Nasim Nikoubakht, and Golnaz Kazeranian participated in the study concept and design. Golnaz Kazeranian performed analysis and interpretation of data. Drafting of the manuscript was conducted by Pooya derakhshan ,Golnaz Kazeranian and Mahdi Mousavi. Pooya Derakhshan performed the revision of the manuscript for important intellectual content and statistical analysis.

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