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Research Article

Does Anesthesia Type Affect Mortality Rates in Delayed Femoral Neck Fracture Surgery? A Retrospective Study

Seray Turkmen,[1] Mehmet Mutlu,[1] Bulent Karslioglu[2]

[1]Department of Anesthesia and Reanimation, University of Health Sciences, Prof. Cemil Tascioglu City Hospital, Istanbul, Turkey
[2]Department of Orthopedics and Traumatology, University of Health Sciences, Prof. Cemil Tascioglu City Hospital, Istanbul, Turkey

Abstract

Objectives: Traumatic femur fractures are a significant cause of mortality and morbidity in the elderly. Our study aims to investigate the effect of anesthesia type on mortality in delayed hip surgeries.

Methods: 366 patients aged 65-80 years who underwent partial hip replacement surgery within 48 hours-5 days after hospitalization due to hip fracture were included in this retrospective study. Demographic information, the time between hospitalization and surgery, ASA (American Society of Anesthesiology) grades, the reason for the delay to surgery, comorbidities, postoperative complications due to anesthesia, and mortality rates at 30 days were obtained from the medical records of the patients and analyzed.

Results: Significant statistical difference was not found between the two groups regarding postoperative complications (p=0.179). 30-day mortality rates rate was 3.5% in the spinal anesthesia group and 4.5% in the generalized anesthesia group. There was no difference between the two groups regarding 30-day mortality (p=0.672).

Conclusion: The type of anesthesia preferred in hip surgeries performed 48 hours-5 days after trauma does not affect 30-day mortality. Regardless of the type of anesthesia applied, patients die depending on their accompanying comorbidities.

Keywords: Anesthesia, elderly, generalized, hip fracture, mortality, spinal

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Traumatic femur fractures are a significant cause of mortality and morbidity in the elderly. Age-related fractures are also increasing due to the gradual increase in the elderly population to prolong their life span. Fragility fractures in elderly patients are considered a worldwide epidemic because they cause high socioeconomic costs to the health care systems of countries.[1] The average length of hospital stay is up to 21.6 days even in developed countries, and above all, the 30-day mortality rate of 6.7% reveals the importance of hip fractures in the elderly.[2]

Many studies have been conducted to reduce mortality and morbidity rates in elderly hip fractures. The most emphasized among these studies is the effect of early surgery on mortality and morbidity. British Orthopaedic Association Standards for Trauma and Orthopaedics(BOAST) recommend surgery to be performed on all hip fracture patients within 36 hours of admission,[3] and the American Academy of Orthopedic Surgeons (AAOS) recommends within 48 hours of access.[4] A cut-off of 48h after hospital admission can be determined according to AAOS guidelines to define surgical delay. It has been reported that early hip surgery reduces the risk of chest infections, thromboembolism, pressure sores, and urinary tract infections by reducing the time that the patient will spend inactive in bed, thus reducing

Address for correspondence: Seray Turkmen, MD. Anestezi ve Reanimasyon Anabilim Dali, Saglik Bilimleri Universitesi, Prof. Cemil Tascioglu Sehir Hastanesi, Istanbul, Turkey
Phone: +90 505 844 57 08 **E-mail:** drserayturkmen@yahoo.com.tr

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mortality and morbidity rates.[5] It is not true that all the literature claims the usefulness of early surgery. There are also publications claiming that early hip surgery does not affect the mortality and morbidity rates of elderly patients.[6]

General systemic conditions of patients, accompanying injuries or diseases, and blood loss due to surgery are also parameters that affect mortality rates.[7] As in minimally invasive surgical applications and implant designs, developments in anesthesia applications over the years aim to reduce mortality rates by shortening long surgical times.

Our study aims to investigate the effect of anesthesia type on mortality in delayed hip surgeries. We hypothesized that the type of anesthesia in delayed hip surgeries affects mortality independently of other factors. To the best of our knowledge, there is no other study in the current literature describing the relationship between delayed hip surgery and anesthesia type.

Methods

The single-center study was planned by retrospectively scanning the computer records of patients who underwent hemiarthroplasty surgery for femur fracture between January 1, 2016, and January 1, 2020. Patients aged 65-80 years who underwent partial hip replacement surgery within 48 hours-5 days after hospitalization due to hip fracture were included in the study. Demographic information, the time between hospitalization and surgery, ASA (American Society of Anesthesiology) grades, the reason for the delay to surgery, comorbidities, postoperative complications due to anesthesia, and mortality rates at 30 days were obtained from the medical records of the patients and analyzed. Patients younger than 65 and older than 80, overweight patients with a body mass index >35, patients with pathological fractures, and patients with pre-fracture mobilization problems, patients who underwent surgery earlier than 48 hours or later than five days were excluded from the study. Two hundred fifty-four patients who met these criteria and underwent hip surgery with spinal anesthesia and 112 patients who were administered general anesthesia for various reasons (patients with a history of bleeding diathesis and anticoagulant use, patients with maceration or infection in the lumbar region, patients who did not want spinal anesthesia, etc.) were included in the study. Our Institutional Review Board approved the study. All reported research involving "Human beings" was conducted in accordance with the principles set forth in the Helsinki Declaration 2008.

SPSS for Window Version 22.00 (SPSS Inc., Chicago, IL., USA) program was used to analyze the data obtained at the end of the study. The conformity of the measurement values obtained within the scope of the research to the normal distribution was examined with the Kolmogorov Smirnov test. In displaying descriptive statistics, mean±standard deviation was used for variables with normal distribution, median (minimum and maximum) for data that did not comply with normal distribution, number, and % values were used for displaying categorical variables. Chi-square test statistics were used to compare definite measures between groups. In comparing continuous measurements between groups, a t-test was used for independent groups if the assumptions were met, and the Mann-Whitney test was used if the assumptions were not met. Repeated measurements analysis compared the change over time of continuous measurements made on the same individuals at different times. The statistical significance level was taken as 0.05 in all tests.

Results

A total of 366 patients were included in the study. Spinal anesthesia was applied to 254 (69.4%) patients and general anesthesia to 112 (30.6%) patients. The mean age of the patients who underwent spinal anesthesia was 80.35, and the mean age of the patients who underwent general anesthesia was 76.71 years. There was no statistically significant difference between the ASA scores of both groups according to the independent samples t-test (p=0.190). When the postoperative complication rates are evaluated, postoperative complications are 5.9% in patients who underwent spinal anesthesia and 9.8% in those who underwent general anesthesia. Significant statistical difference was not found between the two groups regarding postoperative complications (p=0.179) (Table 1). 30-day mortality rates rate was 3.5% in the spinal anesthesia group and 4.5% in the generalized anesthesia group. There was no difference between the two groups regarding 30-day mortality (p=0.672) (Table 2).

Discussion

Hip fractures are an important health problem, especially for the elderly population and 86% of fractures occur after the age of 65. It is expected that this rate will increase towards older ages.[8] The treatment of hip fractures is related to orthopedics and a holistic problem needing help from other medical branches such as geriatrics and internal medicine. This pathological condition with high mortality and morbidity rates can only be managed with the support of all participants. However, despite all kinds of medical care and careful treatment, elderly hip fractures are critical in mortality and morbidity. The mean age of the patients who underwent spinal anesthesia was 80.35, and the mean age of the patients who underwent general anesthesia was 76.71 years in our study. This result shows that the age of

Table 1. Postop complication rates after both anesthesia techniques (Chi-Square Test)

	Postop complication		Total
	-	+	
Spinal			
Count	239	15	254
% within anesthesia type	94.1%	5.9%	100.0%
Generalized			
Count	101	11	112
% within anesthesia type	90.2%	9.8%	100.0%
Total	340	26	366
% within anesthesia type	92.9%	7.1%	100.0%
p	0.179		

Table 2. The 30-day mortality rates of both anesthesia techniques (Chi-Square Test)

	30-day mortality		Total
	0.00	1.00	
Spinal			
Count	245	9	254
% within anesthesia type	96.5%	3.5%	100.0%
Generalized			
Count	107	5	112
% within anesthesia type	95.5%	4.5%	100.0%
Total			
Count	352	14	366
% within anesthesia type	96.2%	3.8%	100.0%
p	0.672		

hip fracture is progressing towards older ages. In our study, patients who underwent general anesthesia were younger than those in the spinal anesthesia group. The fact that the patients who underwent general anesthesia were statistically younger may have emerged because of the preoperative interviews with the patients, depending on the patient's wishes.

Surgeries cannot always be performed in the acute period (within the first 48 hours) due to additional morbidity in elderly patients who require hip surgery. The most common reason in a retrospective study investigating the causes of surgical delay was that patients were not medically fit (20.7%) due to cardiovascular or pulmonary problems.[9] We check the patient's systemic condition using a general hematology test, chest radiography, electrocardiography, and echocardiography on admission to our hospital. We try to perform hip surgeries within the first two days after entry, as our patients' medical conditions allow. All our patients, included in our study retrospectively, underwent surgery on an average of 48 hour-5 days after hospitalization due to consultations on chest diseases and cardiovascular system, depending on the anesthesiologist's recommendation. In our study, 25 patients were operated on on the third day, 43 patients on the fourth day, and 298 patients on the fifth day after admission to the hospital.

The 30-day mortality rate is used as a quality indicator of treatment and primary outcome measure after surgical treatment of hip fractures. The 30-day mortality rate after the hip fracture has been reported as 10% and the one-year mortality rate as 30%.[10] The 30-day mortality rate was 41%, and the 1-year mortality rate was 32% in patients who underwent hip surgery more than 48 hours after trauma.[11] According to AAOS guidelines, a cut-off of 48 hours after hospital admission can be determined to define surgical delay. AAOS guideline recommends hip surgery to be performed within 48 hours after the trauma[4] due to the information that early hip surgery reduces complication rates. Uzoigwe et al.[12] reported, according to the results of a retrospective study of 2056 patients, that traumatic hip fracture surgery performed within 36 hours decreased mortality and was associated with better patient survival than those achieved after 36 hours. They even reported that ultra-early surgical interventions (surgeries completed within 12 hours) reduced the risk of in-hospital death. Ryan et al.[13] reported higher mortality rates in hip surgeries performed more than 72 hours later trauma in a study about delayed hip surgeries. In a study conducted to investigate the prognostic factors for mortality after hip fractures, it was reported that patients' mortality and complication rates were reduced in surgeries within the first 48 hours. In this work, Rosso et al.[14] concluded as "The option of operating within day 3 is not a valid alternative. Despite all these studies, there are also opposing publications that argue postoperative mortality is not due to delayed surgeries but due to patient characteristics[15] and that delayed surgeries do not increase the postoperative complications of patients(such as the need for postoperative intensive care unit) as much as it is claimed.[16] A total of 9 patients in the SA group and five patients in the GA group died within 30 days after surgery. According to the 30-day mortality rates in the patients included in our study (p=0.672) (Table 2).

There are several anesthetic options for hip surgery, but spinal (SA) and general anesthesia (GA) are the two most preferred anesthetics methods.[17] The complication rates were 21% lower in patients who underwent spinal anesthesia compared to the general anesthesia group in retrospective analyzes of a total of 23,649 patients.[18] In this study, the patients' 30-day mortality rates did not differ statistically for both groups, while a higher discharge home rate was

observed in the SA group. In another study, a total of 1600 patients who were operated on for hip fractures were evaluated in terms of postoperative delirium, inability to walk independently at 60 days, and death within 60 days. There was no statistically significant difference between SA and GA groups in all three evaluation criteria.[19] Although there were 5.9% postoperative complications in the SA group and 9.8% in the GA group in our study, no significant difference was found in comparing the two groups (p=0.179). Respiratory failure and pulmonary embolism were the most important causes of 30-day mortality in the GA group.

In contrast, acute renal failure was more prominent in the SA group in our study in patients who underwent late surgery. Both methods have their advantages and disadvantages. The most crucial benefit of GA application is to remove the patient from the very uncomfortable environment of the operating room based on consciousness. The benefits of spinal anesthesia include less intraoperative hypotension, avoidance of neurologically active drugs, and a possible reduction in early delirium.[17,20] Decisions made with the patient's participation under the leadership of the anesthetist should play a role in the determination of the anesthesia method. In a retrospective study of 8144 patients, Morgan et al. found no statistical difference between SA and GA groups in 30- and 90-day mortality rates. Morgan et al.[17] attributed the less blood loss in SA applied patients to the intraoperative blood pressure reduction of SA in these patients. The most striking result of this study is that they found an increased risk of postoperative chest infection and venous thromboembolism in patients who underwent SA. The authors attribute their results, which were out of the knowledge of the classical literature, to the fact that the patients who underwent spinal anesthesia were already in the risk group for venous thromboembolism. The point not addressed in the work of Morgan et al. is whether the surgeries were performed early or late. More extended inactivity in bed in late surgery will increase the risk of venous thromboembolism.

The most important limitation of our study is forming the patient groups. Patients with hip fractures are primarily elderly patients with additional comorbidities. We paid attention to the homogeneous distribution of comorbidities while forming the SA and GA groups retrospectively to prevent bias formation. Another limitation of our study is related to the definition of delayed surgery. According to the AAOS guidelines, we took the 48-hour cut-off value, which we used when making the delayed surgery decision. It should also be noted that there are publications evaluating hip surgery performed after 36 hours as delayed surgery. Another limitation is that body mass index measurements were not included in the study. Although body mass index values are not among the criteria for exclusion from the study in the literature, we did not include overweight patients with a body mass index >35 in our study. Thus, we prevented the fact that delayed hip surgery increased mortality in an overweight patient with hip fracture from affecting the results of our study.[21]

Conclusion

The type of anesthesia preferred in hip surgeries performed 48 hours after trauma does not affect 30-day mortality. 30-day mortality and surgery-related complications are seen in close proportions between SA and GA groups. Regardless of the type of anesthesia applied, patients die depending on their accompanying comorbidities. The most appropriate type of anesthesia should be selected, considering the medical conditions, accompanying comorbidities, and patients' wishes.

Disclosures

Ethics Committee Approval: The study was approved by The University of Health Sciences Prof. Cemil Tascioglu City Hospital Ethics Committee (Date: 02/04/2019, No: 1214).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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References

1. Chatziravdeli V, Vasiliadis AV, Vazakidis P, Tsatlidou M, Katsaras GN, Beletsiotis A. The financial burden of delayed hip fracture surgery: a single-center experience. Cureus 2021;13:e13952.
2. Royal College of Physicians. National hip fracture database annual report 2017. Available at: https://www.rcplondon.ac.uk/projects/outputs/national-hip-fracture-database-annual-report-2017. Accessed Mar 23, 2022.
3. National Clinical Guideline Centre (UK). The management of hip fracture in adults. London: Royal College of Physicians (UK); 2011.
4. Roberts KC, Brox WT. AAOS clinical practice guideline: management of hip fractures in the elderly. J Am Acad Orthop Surg 2015;23:138–40.
5. Orosz GM, Magaziner J, Hannan EL, Morrison RS, Koval K, Gilbert M, et al. Association of timing of surgery for hip fracture and patient outcomes. JAMA 2004;291:1738–43.
6. Grimes JP, Gregory PM, Noveck H, Butler MS, Carson JL. The effects of time-to-surgery on mortality and morbidity in patients following hip fracture. Am J Med 2002;112:702–9.
7. Perskin CR, Littlefield CP, Wang C, Umeh U, Egol KA. The efficacy and safety of tranexamic acid treatment in orthopaedic

trauma surgery. JBJS Rev 2021;9:e20.
8. Bhatti UF, Shah AA, Williams AM, Biesterveld BE, Okafor C, Ilahi ON, et al. Delay in hip fracture repair in the elderly: a missed opportunity towards achieving better outcomes. J Surg Res 2021;266:142–7.
9. Lieten S, Herrtwich A, Bravenboer B, Scheerlinck T, Van Laere S, Vanlauwe J. Analysis of the effects of a delay of surgery in patients with hip fractures: outcome and causes. Osteoporos Int 2021;32:2235–45.
10. Haugan K, Klaksvik J, Foss OA. 30-day mortality in patients after hip fracture surgery: A comparison of the Charlson Comorbidity Index score and ASA score used in two prediction models. Injury 2021;52:2379–83.
11. Shiga T, Wajima Z, Ohe Y. Is operative delay associated with increased mortality of hip fracture patients? Systematic review, meta-analysis, and meta-regression. Can J Anaesth 2008;55:146–54.
12. Uzoigwe CE, Burnand HG, Cheesman CL, Aghedo DO, Faizi M, Middleton RG. Early and ultra-early surgery in hip fracture patients improves survival. Injury 2013;44:726–9.
13. Ryan DJ, Yoshihara H, Yoneoka D, Egol KA, Zuckerman JD. Delay in hip fracture surgery: an analysis of patient-specific and hospital-specific risk factors. J Orthop Trauma 2015;29:343–8.
14. Rosso F, Dettoni F, Bonasia DE, Olivero F, Mattei L, Bruzzone M, et al. Prognostic factors for mortality after hip fracture: Operation within 48 hours is mandatory. Injury 2016;47:91–7.
15. Kristan A, Omahen S, Cimerman M. Causes for delay to surgery in hip fractures and how it impacts on mortality: A single level 1 trauma center experience. Acta Chir Orthop Traumatol Cech 2021;88:28–34.
16. Hasan O, Mazhar L, Rabbani U, Rabbani A, Mahmood F, Noordin S. Does early surgery prevent Postoperative ICU admission after surgery for the fracture of the hip. Nested case control study of 911 patients. Ann Med Surg 2021;61:35–40.
17. Morgan L, McKeever TM, Nightingale J, Deakin DE, Moppett IK. Spinal or general anaesthesia for surgical repair of hip fracture and subsequent risk of mortality and morbidity: a database analysis using propensity score-matching. Anaesthesia 2020;75:1173–9.
18. Rodkey DL, Pezzi A, Hymes R. Effects of spinal anesthesia in geriatric hip fracture: a propensity matched study. J Orthop Trauma. 2021 Sep 21. doi: 10.1097/BOT.0000000000002273. [Epub ahead of print].
19. Neuman MD, Feng R, Carson JL, Gaskins LJ, Dillane D, Sessler DI, et al; REGAIN Investigators. Spinal anesthesia or general anesthesia for hip surgery in older adults. N Engl J Med 2021;385:2025–35.
20. Bodenham AR, Howell SJ. General anaesthesia vs local anaesthesia: an ongoing story. Br J Anaesth 2009;103:785–9.
21. Ogawa T, Tachibana T, Yamamoto N, Udagawa K, Kobayashi H, Fushimi K, et al. Patient body mass index modifies the association between waiting time for hip fracture surgery and in-hospital mortality: A multicenter retrospective cohort study. J Orthop Sci. 2021 Aug 12. doi: 10.1016/j.jos.2021.07.015. [Epub ahead of print].