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ORIGINAL ARTICLE

Anesthetic Techniques in Octogenarians and Older Undergoing Orthopedic Surgery for Hip Fracture

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ABSTRACT

Objectives: Hip fracture is common orthopedic problems for patients aged 80 years and older. Because of their decreased cardiopulmonary capacity, an optimal anesthetic technique should be chosen by anesthesiologists. The purpose of the present study is to analyze anesthetic techniques and related postoperative mortality in octogenarians and older who underwent hip fractures surgery.

Patients and Methods: We analyzed hip fracture surgeries and identified patients aged 80 years and older between January 2012 and December 2013. Patient age, gender, coexisting diseases, American Society of Anesthesiologists (ASA) Physical Status classification, anesthetic technique, hematocrit, hemoglobin, total lymphocyte count (TLC), the length of surgery, intraoperative blood transfusion requirements, postoperative discharge ward, the length of postoperative hospital stay, and postoperative status were recorded.

Results: We retrospectively identified 106 patients aged 80 years and older underwent hip fracture surgeries. Six (5.6%), 36 (34.0%), 2 (1.9%), 53 (50.0%), and 9 (8.5%) of procedures were performed under general anesthesia (GA), spinal anesthesia (SA), epidural anesthesia, combined spinal-epidural anesthesia (CSEA), and peripheral nerve block (PNB), respectively. The postoperative 7 and 30-day mortality were 6.6% and 10.4%, respectively. Age, gender, ASA, hematocrit, hemoglobin, TLC, discharge to the ward, the length of postoperative hospital stay, and the postoperative mortality rates were similar between the GA, SA, CSEA, and PNB. There was no relationship between postoperative mortality and anesthetic technique.

Conclusion: In octogenarians and older, the postoperative mortality is higher after hip fracture and is not associated with the anesthetic technique.

Key Words: Octogenarians, general anesthesia, central neuraxial block, peripheral nerve block, mortality

INTRODUCTION

Because of the development of medical therapies and improvement of living conditions all over the world, human life is prolonged and elderly population is increased day by day. The risk of encountering very elderly patients for anesthesiologists is increased.

Orthopedic surgical procedures, especially for hip fractures, were commonly encountered in patients aged 80 years and older [1-4]. Because of the decreased cardiopulmonary capacity and multiple coexisting diseases, octogenarians and older have increased the risk of perioperative morbidity and mortality for hip fracture surgery [5-7]. The postoperative mortality is increased in the first year, especially in the first month, after hip fracture surgery [8,9]. Because of this, anesthetic management required more careful approach in octogenarians. Anesthesiologists should chosen an optimal anesthetic technique.

The purpose of this present study was to analyze anesthetic techniques and to compare the length of postoperative hospital stay and postoperative mortality in patients aged 80 years and older who underwent hip fracture surgery.

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PATIENTS AND METHODS

Patient selection and data collection

We retrospectively analyzed orthopedic surgical procedures for hip fracture and identified patients aged 80 years and older between January 2012 and December 2013 at a single institution, after Local Ethics Committee approval had been obtained (17.07.2014-71522473-050.01.04-77).

Patient age, gender, coexisting diseases, American Society of Anesthesiologists (ASA) physical status classification, anesthetic technique, hematocrit, hemoglobin, total lymphocyte count (TLC), the length of surgery, intraoperative blood transfusion requirements, postoperative discharge unit (intensive care unit (ICU) or ward), the length of postoperative hospital stay, and postoperative status were recorded.

All values of patients were obtained from computers, had a hospital information management system, and anesthetic charts. Additionally, the postoperative 7 and 30-day status of these patients are obtained to call with the patients' parents by the telephone.

Statistical analysis

All analyses were performed using the Statistical Package for Social Sciences for Windows (SPSS 22.0; SPSS Inc./IBM; Chicago, IL, USA). Data were expressed as mean ± standard deviation (SD), percentage or n. Kolmogorov-Smirnov and Shapiro-Wilk tests were used for normality assumption of data. The Student's t test and Mann-Whitney U test were used for comparisons of numeric parameters. The categorical parameters were compared using Pearson's chi square test and Fisher's exact test. The association of postoperative mortality with patient-related or surgical variables were analyzed by Cox regression analysis. A p-value of less than 0.05 was accepted as statistically significant.

RESULTS

In the current study, we identified 106 patients aged 80 years and older who underwent hip fracture surgeries.

The demographic data of the patients were shown in Table 1.

Six (5.6%), 36 (34.0%), 2 (1.9%), 53 (50.0%), and 9 (8.5%) of procedures were performed under general anesthesia, spinal anesthesia, epidural anesthesia, combined spinal-epidural anesthesia (CSEA), and peripheral nerve block (PNB), respectively (Table 1).

The postoperative 7 and 30-day mortality were 6.6% and 10.4%, respectively (Table 1).

Whereas three patients had not any coexisting disease, 69 patients had one or two coexisting diseases and 34 patients had at least three coexisting diseases. Most of the patients had hypertension (61.3%). Cerebrovascular disease (38.7%) and diabetes mellitus (25.5%) were followed as coexisting diseases. The others were shown in Table 2.

Table 1. Demographic data

		Min-Max	Mean±SD
Age (year)		80 – 96	83.58±4.3
Length of stay (day)		1-55	4.65±5.8
		n	%
Gender	**Female**	76	71.7
	Male	30	28.3
ASA	**ASA I**	3	2.8
	ASA II	26	24.5
	ASA III	65	61.4
	ASA IV	12	11.3
Anesthetic Technique	**General**	6	5.6
	Spinal	36	34.0
	Epidural	2	1.9
	CSE	53	50.0
	PNB	9	8.5
Mortality	**7 day**	7	6.6
	30 day	11	10.4

SD: Standard Deviation, ASA: American Society of Anesthesiologists, CSE: Combined spinal-epidural, PNB: Peripheral nerve block, SD: standard deviation, n: number of patients, %: percentage, Min: minimum, Max: maximum

Table 2. Co-existing diseases

Co-existing Diseases	n (%)
Hypertension	65 (61.3)
Cerebrovascular Disease	41 (38.7)
Diabetes Mellitus	27 (25.5)
Alzheimer / Parkinson	20 (18.9)
Coronary Artery Disease / Congestive Heart Failure	19 (18.0)
Chronic Obstructive Pulmonary Disease	14 (13.2)
Psychiatric Disorder	8 (7.5)
Renal Failure	7 (6.6)
Hypo/Hyperthyroidism	6 (5.7)
Others	5 (4.7)

n: number of patients, %: percentage

The demographic and clinical data according to anesthetic technique were shown in Table 3. Age, gender, ASA, hematocrit, hemoglobin, TLC, discharge to the ward or ICU, and length of postoperative hospital stay were similar between the groups (p>0.05) (Table 3).

The length of surgery times were shorter in patients applied spinal anesthesia than in patients applied general anesthesia and CSEA (p=0.001 and p<0.001, respectively). Intraoperative blood

transfusion requirements were higher in patients applied PNB than in patients applied spinal anesthesia (p=0.026).

With regards to the postoperative mortality rate, all anesthetic techniques were similar at all times (p>0.05) (Table 3).

There was no relationship between the postoperative mortality and age, gender, ASA classification, discharge to ICU, blood transfusion requirement, and anesthetic technique at each time (p>0.05).

Table 3. Demographic and clinical data to anesthetic technique

	General anesthesia (n=6)	Spinal anesthesia (n=36)	CSEA (n=53)	Peripheral Nerve Block (n=9)	P
Age (year)	82.17±3.5	82.69±4.0	83.96±4.2	84.78±4.0	NS
Gender Male	3	12	13	2	
Female	3	24	40	7	NS
ASA I / II	0 / 2	2 / 8	1 / 13	0 / 1	
III / IV	3 / 1	21 / 5	36 / 3	5 / 3	NS
Hematocrit (%)	32.03±5.5	34.6±5.7	33.73±4.8	33.32±5.0	NS
Hemoglobin (g/dL)	10.90±1.7	11.52±1.8	11.16±1.5	10.90±1.7	NS
TLC (mm^3/dL)	1550±413	1380±567	1628±810	1355±691	NS
Length of surgery (min)	114±40 α	73±22	102±39 α	88±29	<0.05
Hospitalization day	11.7±21	3.8±3	4.5±3	4.2±2	NS
The need of intraoperative BT	1	9	23	6 α	<0.05
Discharge to ward	4	31	49	6	NS
Discharge to ICU	2	5	4	3	NS
7-day mortality	0	4	2	1	NS
30-day mortality	0	4	5	2	NS

Data are presented mean ± SD or n. α: p< 0.05 versus spinal. ASA: American Society of Anesthesiologists, BT: Blood transfusion, CSEA: Combined spinal-epidural anesthesia, ICU: Intensive care unit, n: number of patients, NS: not significant, p: significance value, SD: Standard deviation, TLC: Total lymphocyte count

DISCUSSION

With improving medical therapies and living conditions, the elderly population around the world is gradually increasing each year. Therefore, more and more elderly patients are encountered to receive surgical procedures. Anesthesiologists experience this aging population especially octogenarians and older. Because of the reduction of cardiopulmonary reserve and existing multiple comorbid diseases in octogenarians and older, surgical procedure could not be tolerable by these patients. In this situation, the optimum anesthetic technique is chosen to be very important. Because of this, we aimed to analyze the association between the anesthetic technique and mortality in octogenarians and older. The current study showed the postoperative mortality was not associated with the anesthetic technique such as general anesthesia, central neuraxial blocks or PNBs in octogenarians and older for hip fractures surgery.

The female gender was larger than the male gender among elderly patients in hip fracture surgeries [5-12]. With regards to the relationship between gender and mortality, they reported that the mortality rate is higher in males than females [2,7,9,13,14]. In the current study showed that female was more dominant gender as consistent with the literature; nevertheless, it did not find a correlation between mortality with gender.

The number of patients received regional anesthesia were larger than general anesthesia in elderly patients [6,10,11]. Consistent with the literature, the current study showed that regional anesthesia was more commonly choosing of anesthetic technique in octogenarians and older. In fact, a regional anesthetic technique is often applied as the first choice in such orthopedic procedures at our department. General anesthesia is performed in the following situations if regional anesthesia is contraindicated or not accepted by the patient.

With advancing age, the likelihood and the number of comorbid diseases are also increasing. Many of the studies showed the most common comorbidity was hypertension in elderly population, and diabetes mellitus and coronary artery disease were followed [2,10,11]. Contrary to Richmond et al. [8], who reported the patients aged 85 years and older have lower mortality risk than the patients aged between 65 and 84 years, many studies have found an association between high age and mortality [6,9,13-16].

Similarly Peled and colleagues' study [10], our study including octogenarians and older showed there was no relationship between mortality and age. Liu and Leung [17] reported that comorbid diseases such as coronary artery disease, congestive heart failure, and neurologic diseases are associated with the higher risk of postoperative mortality. Cardiac and pulmonary diseases are also associated with the high risk of mortality [6,13,15]. In this current study, cardiac and neurologic diseases were the more common coexisting diseases, but existing comorbid diseases are not increased mortality.

Intraoperative blood loss and transfusion requirement are commonly faced with in hip fractures surgery. Octogenarians have higher blood transfusion requirements than younger patients [18]. Intraoperative blood transfusion requirement is associated with morbidity and mortality [13]. Regional anesthesia has been associated with reduced blood loss in patients underwent hip fractures surgery [1]. But, the studies compared with general anesthesia and regional anesthesia reported that intraoperative blood transfusion requirements were similar between the groups [11,12,19,20]. In addition, intraoperative estimated blood loss and transfusion requirement were similar in general anesthesia, spinal anesthesia or epidural anesthesia [21]. In the current study, intraoperative blood transfusion requirements were similar in octogenarians under general anesthesia, spinal anesthesia, and CSEA. However, intraoperative blood transfusion requirements were higher in patients applied PNB than only in patients applied spinal anesthesia. But, we thought this result was accidental.

The length of hospital stay is associated with morbidity and mortality. The length of hospital stay was longer in patients with complications or underwent emergent surgeries [10,22]. It is well known that, the short length of postoperative hospital stay is one of the advantages of regional anesthesia [1,19]. But, it was similar for orthopedic surgical procedures in patients under general anesthesia or regional anesthesia [11,14,20,21]. In this current study, the length of postoperative hospital stay was higher in patients applied general anesthesia than in patients applied other anesthetic techniques, but this difference was not significant statistically.

The postoperative mortality is increased in the first year after hip fractures and the mortality is especially higher at first 1 months [8,9]. The rates of postoperative 7 and 30 day mortality were changed about 3.5% [21,23] and from 7.4% to 9.9% [3,11], respectively. In the current study, the postoperative rate of mortality was slightly higher than the literature.

With regards to the postoperative mortality and the association with anesthetic technique, the results of the different studies were controversied. The postoperative morbidity and mortality were lower in patients applied regional anesthesia than general anesthesia [4,6,10,24]. As contradictory to these studies, in a retrospective study analyzed femoral fracture in elderly geriatric patients aged about 80 years, there were no differences between the rates of postoperative 1, 3, 6, and 12-month mortality in general and regional anesthesia [11]. Additionally, there was no difference in 1 year mortality rate between general and spinal anesthesia in a large size prospective study [25]. Wood and White [12] reported that the rate of mortality was 5.7% in their study included 1131 patients with proximal femoral fracture. Additionally, they found the postoperative 30-day mortality rate and length of hospital stay were similar between general and spinal anesthesia. Besides, the rates of postoperative 7th and 30th-day mortality were similar between the three anesthetic techniques such as general anesthesia, spinal anesthesia, and epidural anesthesia in elderly patients with hip fracture [21]. In the current study, the rates of postoperative mortality were similar between each anesthetic technique such as general anesthesia, spinal anesthesia, CSEA, and PNB.

Consequently, the postoperative mortality was not associated with the anesthetic technique such as general anesthesia, central neuraxial blocks or peripheral nerve blocks in octogenarians and older for hip fractures surgery. Therefore, it is well known that the patients should be individualized and anesthetic technique should be chosen based on anesthesiologist's experiences and knowledges.

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REFERENCES

1. Parker MJ, Handoll HHG, Griffiths R. Anaesthesia for hip fracture surgery in adults. Cochrane Database of Syst Rev 2004;4:CD000521.
2. Chung JY, Chang WY, Lin TW, Lu JR, Yang MW, Lin CC, et al. An analysis of surgical outcomes in patients aged 80 years and older. Acta Anaesthesiol Taiwan 2014;52:153-8.
3. Zeltzer J, Mitchell RJ, Toson B, Harris IA, Ahmad L, Close J. Orthogeriatric services associated with lower 30-day mortality for older patients who undergo surgery for hip fracture. MJA 2014;201:409-11.
4. Beaupre LA, Jones CA, Saunders LD, Johnston DW, Buckingham J, Majumdar SR. Best practices for elderly hip fracture patients. A systematic overview of the evidence. J Gen Intern Med 2005;20:1019-25.
5. Nyholm AM, Gromov K, Palm H, Brix M, Kallemose T, Troelsen A. Time to surgery is associated with thirty-day and ninety-day mortality after proximal femoral fracture: a retrospective observational study on prospectively collected data from the Danish Fracture Database Collaborators. J Bone Joint Surg Am 2015;97:1333-9.
6. Karaman Ö, Özkazanlı G, Orak MM, Mutlu S, Mutlu H, Çalışkan G, et al. Factors affecting postoperative mortality in patients older than 65 years undergoing surgery for hip fracture. Ulus Travma Acil Cerrahi Derg 2015;21:44-50.
7. Haentjens P, Magaziner J, Colon-Emeric CS, Vanderschueren D, Millisen K, Velkeniers B, et al. Meta-analysis: excess mortality after hip fracture among older women and men. Ann Intern Med 2010;152:380-90.
8. Richmond J, Aharonoff GB, Zuckerman JD, Koval KJ. Mortality risk after hip fracture. J Orthop Trauma 2003;17(8 Suppl):S2-5.
9. Vestergaard P, Rejnmark L, Mosekilde L. Has mortality after a hip fracture increased? J Am Geriatr Soc 2007;55:1720-6.
10. Peled E, Barak M, Keren Y, Soudry M, Norman D. Predictors for adverse outcome in patients aged 80 years and older undergoing emergent hip fractures. Surgical Science 2011;2:463-7.

11. Saricaoglu F, Akinci SB, Atay S, Caglar O, Aypar U. [The effects of anesthesia techniques on postoperative mortality in elderly geriatric patients operated for femoral fractures]. Turkish Journal of Geriatrics 2012;15(4):434-8.
12. Wood RJ, White SM. Anaesthesia for 1131 patients undergoing proximal femoral fracture repair: a retrospective, observational study of effects on blood pressure, fluid administration and perioperative anaemia. Anaesthesia 2011;66:1017-22.
13. Jamsen E, Puolakka T, Eskelinen A, Jantti P, Kalliovalkama J, Nieminen J, et al. Predictors of mortality following primary hip and knee replacement in the aged. A single-center analysis of 1,988 primary hip and knee replacement for primary osteoarthritis. Acta Orthop 2013;84:44-53.
14. Le-Wendling L, Bihorac A, Baslanti TO, Lucas S, Sadasivan K, Wendling A, et al. Regional anesthesia as compared to general anesthesia for surgery in geriatric patients with hip fracture: Does it decrease morbidity, mortality and healthcare costs? Results of a single-centered study. Pain Med 2012;13:948-56.
15. de Luise C, Brimacombe M, Pedersen L, Sorensen HT. Comorbidity and mortality following hip fracture: a population-based cohort study. Aging Clin Exp Res 2008; 20:412-8.
16. Kreder HJ, Berry GK, McMurtry IA, Halman SI. Arthroplasty in the octogenarian: quantifying the risks. J Arthroplasty 2005;20:289-293.
17. Liu LL, Leung JM. Predicting adverse postoperative outcomes in patients aged 80 years or older. J Am Geriatr Soc 2000; 48:405-12.
18. Kuo FC, Hsu CH, Chen WS, Wang JW. Total knee arthroplasty in carefully selected patients aged 80 years or older. J Orthop Surg Res 2014;9:61.
19. Macfarlane AJR, Prasad GA, Chan VWS, Brull R. Does regional anesthesia improve outcome after total knee arthroplasty? Clin Orthop Relat Res 2009;467:2379-402.
20. Karaman S, Karaman T, Dogru S, Sahin A, Arici S. [The effects of anesthesia techniques on morbidity-mortality in geriatric patients underwent orthopedic surgery]. J Contemp Med 2014;4:143-50.
21. Hekimoglu Sahin S, Heybeli N, Colak A, Arar C, Alan K, Copuroglu C, et al. Comparison of different anesthetic techniques on postoperative outcomes in elderly patients with hip fracture. Turkiye Klinikleri J Med Sci 2012;32:623-9.
22. Le Manach Y, Collins G, Bhandari M, Bessissow A, Boddaert J, Khiami F, et al. Outcomes after hip fracture surgery compared with elective total hip replacement. JAMA. 2015;314:1159-66.
23. Yli-Kyyny T, Sund R, Heinanen M, Venesmaa P, Kröger H. Cemented or uncemented hemiarthroplasty for the treatment of femoral neck fractures? A Finnish database study of 25,174 patients. Acta Orthop 2014**;** 85:49-53.
24. Rodgers A, Walker N, Schug S, McKee A, Kehlet H, vanZundert A. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results from overview of randomised trials. BMJ 2000; 321:1493-7.
25. Koval KJ, Aharonoff GB, Rosenberg AD, Schmigelski C, Bernstein RL, Zuckerman JD. Hip fracture in the elderly: the effect of anesthetic technique. Orthopedics 1999; 22:31-34.