

Delay in Anesthesia Assessment Time – A Cause of Postponement in Orthopedic Trauma Surgery

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Abstract

Background: Postponement of surgery increases the length of hospitalization and medical expenses, the mortality rate, and the prevalence of major medical complications. There is a limited study about the role of anesthesia assessment in developing these complications. Thus, the aim of the present study was to examine the anesthesia assessment time for traumatic patients aged over 50 years and also to investigate the role of anesthesia service in surgery postponement. **Materials and Methods:** This descriptive retrospective study was performed on 110 patients with traumatic injuries referred to Imam Khomeini Hospital Complex (Tehran, Iran) from March to September 2017. The information was extracted retrospectively from the hospital information system. The standard definitions in the International Classification of Diseases 10 code S00-T88 were used to identify traumatic injuries and fractures. **Results:** The results of the present study showed that the mean of anesthesia assessment time was significantly different in terms of the type of trauma, and femoral fractures had a higher anesthesia assessment time ($P = 0.009$). Furthermore, the anesthesia assessment time in patients who underwent echocardiography was significantly higher than those with no echocardiography ($P < 0.05$). The current study explored that the mean anesthesia assessment time was substantially higher in patients who underwent myocardial perfusion imaging (MPI) (7.1 vs. 1.84 days). Furthermore, the results revealed that there was no significant difference in anesthesia assessment time regarding gender of the patients (3 vs. 2.7 days). Finally, patients aged between 61 and 70 years had a higher anesthesia assessment time with a mean of 4.41 days ($P < 0.05$). **Conclusions:** The study concluded that the mean of anesthesia assessment time was significantly higher (3.6 days) in patients with a femoral fracture. Furthermore, this study has shown that diagnostic assessments, including echocardiography, MPI, and angiography, which were performed in some patients, did not change the surgery plan.

Keywords: Anesthesia assessment time, fracture, postponed surgery, trauma

INTRODUCTION

Postponement of surgery is an essential matter in traumatic patients; it can increase hip fracture complications.^[1] Postponing surgery can be caused by several factors, such as waiting for routine medical clearance and unavailability of the operating suite or surgeon in patients over 50 years.^[2]

Trauma is a significant cause of death in the world. In 1998, 5.8 million people died worldwide due to trauma.^[3,4] In trauma patients, surgery is usually postponed due to lack of time and space of the operating room.^[5] The incidence of trauma and its damage is one of the major problems of the elderly.^[6-8] Reducing fertility and mortality in the last century has led to

an increase in life expectancy in many societies and an increase in elderly peoples.^[8,9]

Schofield *et al.* showed that from 7913 patients scheduled for surgery from May 13 to November 15, 2002, 941 (9.11%)

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surgeries were canceled on the day of surgery. They showed that 60% of elective surgeries were canceled due to lack of adequate bed in the ward (15%), absence of the patient (9%), inadequate preoperative preparation (13%), nursing unavailability (11%), and causes of anesthesia (8%).^[10] Orosz *et al.* reveal that the main reasons for postponing surgery for >24 h in patients over 50 years old with hip fractures were waiting for routine medical clearance (52%) and unavailability of the operating suite or surgeon (29%).^[2] Rae *et al.*^[11] showed that a 30-day postoperative mortality rate in the acute hip fracture in patients over 50 years old who were operated within 2 days after fracture had the mortality rate of 5.8%. While patients who were operated >2 days after fracture had a mortality rate of 9.4%, which showed no significant difference. Still, the mortality rate was higher in a group with postponement in surgery.^[11] In another study, Siegmeth *et al.* showed that patients aged over 60 years with hip fractures who were operated with delayed surgery >48 h from injury significantly had higher hospital stay (32.5 vs. 21.6 days).^[5] The results of a study conducted by Lefaivre *et al.* in 2001 revealed that a postponed surgery in patients with hip fracture can increase fracture complications.^[1]

Previous studies^[1,5,11-13] showed that postponing surgery can increase hospital stay days, mortality rate, treatment costs, and complications. However, few studies have been conducted about the role of anesthesiology service in delaying surgery and the occurrence of complications in populations over 50 years old who had traumatic fractures. The purpose of the anesthetic counseling is to educate the patient and reduce anxiety, history taking, and physical examination. Furthermore, its purpose is to determine paraclinics, request advice from other specialists to choose the appropriate anesthetic method, and treatments necessary to provide safe anesthesia, which ultimately reduces the complications of surgical procedures and costs.^[14]

Perhaps, the delay in preoperative anesthesia assessment can cause postponement in trauma surgery and subsequently, according to previous studies,^[1,5,11-13] increase the rate of complications. Therefore, the aim of the present study was to examine the anesthesia assessment time for traumatic patients aged over 50 years and also to investigate the role of anesthesia service in postponing surgery.

MATERIALS AND METHODS

This retrospective, descriptive, and cross-sectional study was conducted on 110 patients over 50 years old with traumatic

injuries referred to Imam Khomeini Hospital Complex (Tehran, Iran) from March 1, 2017, to September 30, 2017. All patients' information was extracted from hospital information system (HIS), and the standard definitions in the International Classification of Diseases 10 of the S00-T88 codes were used to identify traumatic injuries and fractures. The fractures were distributed, including 50 cases of femoral and trochanteric fractures, 24 cases of upper limb and foot fractures, and 36 cases of tibiofibular fractures.

The patients with comorbidities, including anemia, electrolyte imbalance, uncontrolled diabetes, untreated heart failure, pneumonia, gastrointestinal bleeding, bleeding diseases, and uncontrolled hypertension, were excluded from the study.

All data were analyzed by SPSS software version 24. (SPSS, Chicago, IL). Demographic information, types of fractures, and the time interval for assessment by anesthesia service in all groups of fractures were analyzed using the one-way analysis of variance. The K2 test analyzed the distribution of patients in groups of time intervals.

The Institutional Review Board of Tehran University of Medical Sciences reviewed and approved the study's protocol and declared that there were no ethical concerns and conflicts of interest in this study.

RESULTS

From a total of 110 patients included in the study, 84 were males (76%) and 26 females (26%). Retrospectively, the anesthesia assessment record of patients was checked in HIS.

As shown in Table 1, the patients were divided into three groups according to several factors, i.e., surgery complications, surgery timing, bleeding risk, and embolus risks. The first group included 50 patients with femur fractures (i.e., greater trochanter, lesser trochanter, femoral head, shaft, and distal femur). The second group included 24 patients with upper limb and foot fractures, and the third group consisted of 36 patients with tibiofibular fractures. As shown in Table 1, femoral fractures had the highest anesthesia assessment time, with a mean of 3.6 days ($P = 0.009$). Fifty patients in the first group were assessed by anesthesia service within 2 days from admission, and a lower rate of surgery within 2 days was reported in this group ($P = 0.009$).

Table 2 shows the frequency distribution for the patients who underwent echocardiography and those with no echocardiography and the mean of anesthesia assessment time

Table 1: Comparison of anesthesia assessment time based on types of the fractures

	<i>n</i>	≤2	3-5	6-10	11-15	Mean time (days)
Femur fractures (%)	50	25 (50)	10 (20)	10 (20)	5 (5)	3.6
Upper limb and foot fractures (%)	24	14 (58)	3 (12.5)	7 (30)	0	2.4
Tibiofibular fractures (%)	36	21 (57)	7 (20)	6 (18)	2 (5)	2.5
Total (%)	110	60 (54.5)	20 (18)	23 (21)	7 (6.5)	2.96
<i>P</i>				0.009		

Table 2: Comparison of anesthesia assessment time between groups based on the echocardiography examination

	<i>n</i>	≤2	3-5	6-10	11-15	Mean time (days)
Echo undid	51	38 (74%)	6 (12%)	4 (9%)	3 (6%)	1
Normal EF	30	18 (60%)	8 (28%)	2 (7%)	2 (5%)	2.6
Decreased EF	29	4 (13.5%)	6 (20.5%)	17 (58.5%)	2 (6.5%)	5.9
Total	110	60	20	23	7	2.96
<i>P</i>				<0.05		

EF : Ejection fraction

Table 3: Comparison of the anesthesia assessment time based on myocardial perfusion imaging examination

	<i>N</i>	≤2	3-5	6-10	11-15	Mean time (days)
MPI done	24	0	8	12	4	7.1
MPI undone	86	60	12	11	3	1.84
Total	110	60	20	23	7	2.96
<i>P</i>				<0.05		

MPI: Myocardial perfusion imaging

Table 4: Comparison of gender distribution based on anesthesia assessment time

Gender	<i>n</i>	≤2	3-5	6-10	11-15	Mean time (days)
Female (%)	26	13 (50)	8 (30)	4 (15)	1 (5)	2.7
Male (%)	84	48 (57)	14 (16)	19 (22)	6 (7)	3
Total (%)	110	60 (54)	20 (18)	23 (17)	7 (5)	2.96
<i>P</i>				>0.05		

for each group. The results of the present study demonstrated that the anesthesia assessment time was significantly higher in patients who underwent echocardiography, and the time increased dramatically in patients who had a decreased ejection fraction (EF) during the study with a mean time of 5.9 days ($P < 0.05$). Furthermore, the present study showed that the patients who underwent echocardiography significantly had higher anesthesia assessment time compared to those who did not perform echocardiography ($P < 0.05$).

Table 3 shows the results of the patients who had a decreased EF depending on undergoing or not undergoing myocardial perfusion imaging (MPI) examination. Of 29 patients who had a decreased EF, 24 patients underwent an MPI examination. The mean of anesthesia assessment time was significantly higher in patients who underwent MPI examination (7.1 vs. 1.84 days). None of the patients who underwent MPI could be assessed within the first 2 days by anesthesia service ($P < 0.05$).

Table 4 represents the gender distribution of the patients regarding the anesthesia assessment time. Eighty-four patients were male and 26 were female; 50% of each gender group were assessed by anesthesia service within the first 48 h. The mean time of anesthesia service assessment revealed no significant difference between males and females (3 vs. 2.7 days). Furthermore, the patients who needed MPI were excluded from comparison because of its effect on postponing surgery.

Moreover, there are no significant differences depending on male and female gender with a mean of 1.7 vs. 1.5 days, respectively ($P > 0.05$).

Table 5 shows that the patients were divided into four age groups with 10-year intervals. Patients aged between 61 and 70 years had a significantly higher anesthesia assessment time with a mean of 4.41 days ($P < 0.05$). We excluded patients who underwent MPI, and the mean of anesthesia assessment time was changed in each group, so that there were no significant differences between groups of age intervals ($P > 0.05$).

DISCUSSION

Surgery is usually postponed in trauma patients due to lack of time and space of the operating room,^[5] and the incidence of trauma and its damage is one of the major problems of the elderly.^[6-8] Trauma is a significant cause of death in the world. In 1998, 5.8 million people died worldwide due to trauma.^[3,4] Previous studies^[1,5,11-13] showed that postponing surgery can increase hospital stay days, mortality rate, treatment costs, and complications. However, there are few studies about the role of preoperative anesthetic assessment in postponing surgery and the occurrence of complications in population over 50 years old with traumatic fractures. Perhaps, the delay in preoperative anesthesia assessment can cause postponing trauma surgery and subsequently, according to previous studies,^[1,5,11-13] increase the rate of complications. Therefore, the aim of the present study was a retrospective evaluation of the time interval for preoperative assessment by anesthesia service in traumatic patients over 50 years old.

The present study has shown that the mean of anesthesia assessment time had significant differences depending on the type of fracture. Furthermore, the highest anesthesia assessment time was for patients with femoral fractures. Upper limb, foot, and tibiofibular fractures had been in the next rank and had lower anesthesia assessment time. Perhaps, the differences were due to more assessments and consultant in femur fractures. Echocardiography was performed on about 76% of patients with femur fracture. However, 50% of patients with other fractures underwent echocardiography. It seems that echocardiography in femoral fractures could postpone the surgery and anesthesia assessment. Based on the present study, echocardiography can increase anesthesia assessment time with a mean of 1 day ($P < 0.05$), as seen in Table 2.

This study revealed that the distribution by the age of the frequency of patients without cases who performed MPI in

Table 5: Comparison of age 10-year intervals based on anesthesia assessment time

Age (years)	Mean age (years)	N	≤2	3-5	6-10	11-15	Mean time (days)	
							Without MPI	total
50-60 (%)	53.8	46	30 (65)	7 (15)	7 (15)	2 (4%)	1.21	2.38
61-70 (%)	64	33	10 (30)	8 (24)	11 (33)	4 (13%)	1.88	4.41
71-80 (%)	76	19	10 (57)	4 (19)	3 (15)	2 (9%)	1.75	2.29
81-90 (%)	87	12	10 (83)	1 (8)	1 (8)	0	1.8	2.25
Total (%)		110	60 (54)	20 (19)	23 (21)	7 (6)	1.66	2.96
<i>P</i>						<0.05		

MPI: Myocardial perfusion imaging

ages between 50 and 60 years could be assessed by anesthesia service with less time with a mean of 1.2 days. These results are in line with the results of a prospective study conducted on 1768 old Italian patients, which showed the association of age and type of surgery with postponed surgery for >2 days.^[15] The findings of a study conducted by Ventura *et al.* evinced that factors such as age, patient admission day, and medications (e.g., warfarin) had effects on postponement of surgery.^[16]

The findings of the present study reveal that there is no significant association between gender types and surgery postponing time. The mean of anesthesia assessment time in male and female patients was 2.7 versus 3 days ($P > 0.05$). This result is not consistent with the results of other similar studies, which showed that surgery postponing time was significantly higher in male patients.^[17,18] However, most of the previous studies had results similar to the current study's results regarding an association between gender type and surgery postponing time.^[5,16,19,20]

The present study explores that performing echocardiography can significantly increase anesthesia assessment time ($P < 0.05$) with a mean of 1 day. On the other hand, doing echocardiography for the patients with femur fracture was 25% more than other patients. It could be the main factor in increasing anesthesia assessment time in femur fracture patients. Furthermore, 29 of 59 patients who had undergone echocardiography had decreased cardiac output (EF); from 29 patients who had reduced EF, 24 patients underwent MPI. The findings of this study show that MPI can significantly increase the anesthesia assessment time with a mean of 5.5 days ($P < 0.05$). Despite the important results obtained from cardiologic assessments, it should be noted that just one patient underwent cardiac treatment before trauma surgery. Therefore, it seems that echocardiography and MPI could not change the surgical plan and postpone the operation and increase the mortality rate and costs.

To the best of our knowledge, the present study was the first study that investigated anesthesia assessment time in orthopedic trauma patients aged >50 years; this study is also the first in Iran conducted on the exploration of the association between the type of orthopedic fractures and anesthesia assessment time.

CONCLUSIONS

The present study discovers that the mean of anesthesia assessment time is significantly different depending on the type of trauma, so that the patients with hip fracture with a mean of 3.6 days significantly had the highest anesthesia assessment time. Furthermore, this study has shown that diagnostic assessments, including echocardiography, and MPI, which were performed in some patients, did not change the surgery plan except for one patient who underwent cardiosurgery. Still, it may change the anesthesia plans, which have not been considered in the present study. Therefore, these diagnostic assessments should be considered in terms of efficacy because postponing surgery can be caused by anesthesia assessment time and can lead to increased costs and complications. It is also advised that studies with more cases be done for a closer look at this issue.

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Conflicts of interest

There are no conflicts of interest.

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