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Effect of orthopedic surgery delay and counseling on postoperative complications and mortality rate in patients aged over 55 years in a teaching hospital

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Abstract:

AIM: The purpose of this study was to investigate the effects of delay in the operation and counseling on postoperative complications and mortality rates in elderly patients.

METHODOLOGY: The present study was a descriptive cross-sectional research. Population of this study was the entire elderly hospitalized patients who aged over 55 years for emergency orthopedic surgeries in a teaching hospital in Tehran. Surgery delays were then determined after examining the checklists, and the relationship between the variables and surgery delays, number of preoperative counseling, complications, and mortality rate was evaluated. Data were analyzed using the Mann–Whitney U-test and Pearson correlation coefficient in SPSS 18 at a 0.05 significance level.

RESULTS: Overall, 89.9% of the patients had counseling. The average hospitalization days were 5 days until surgery, and the standard deviation was 0.50. The mean counseling number was 5.5. The relationship between number of counseling and surgical delays was significant. Delay in surgery in this age group, mortality, and the chances of death have become 2.7 times more than who had not a surgical delay. No significant relationship was observed between surgery delay and the incidence of Deep Venous Thrombosis ($P = 0.102$), postoperative sepsis and Myocardial Infarction ($P = 0.337$), embolism ($P = 0.505$), and postoperative Cerebrovascular Accident ($P = 0.153$).

CONCLUSIONS: The delay in surgery in the elderly causes an increase in mortality. Considering the findings of this study and the importance of emergency orthopedic surgeries in the elderly, to reduce the surgical delays and the mortality rate in the elderly, the establishment of a surgical team for elderly patients in hospitals is recommended.

Keywords:

Complications, consultation, elderly, mortality, orthopedic surgery

Introduction

Advances in health sciences and medicine have increased life expectancy and consequently the elderly.[1] Reports suggest that the number of people over 60 years of age will increase to 1.2 billion in 2025 from 841 million in 2013, 70% of whom will live in developing countries. By 2050, 8 of 10 elderly people are expected to live in developing countries.[1-4] Falls in the elderly are among incidents that became more probable with age and are associated with numerous physical, psychological, and socioeconomic complications.[5] About 40%–60% of falls lead to injury, with fractures constituting about 10%–20% of

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the overall injuries, and hip fracture representing the most prevalent type of fracture. Half of the elderly sustaining this type of fracture cannot return to normal life, suffering from various degrees of disability. About 20% of them die within a period of 1 year.[6]

Population Aging has turned hip joint fractures into a growing medical problem and a matter of social concern for the elderly. The incidence of hip fracture is estimated to be 18% and 6% in women and men, respectively, with a 1-year mortality rate of almost 20%, leaving many survivals in need of long-term care.[7] The most prevalent types of hip fracture in the elderly are intertrochanteric and femoral neck fractures, which significantly affect health-care systems and societies. Hip fracture-induced mortality rate is relatively high in the elderly, reaching up to 37% within the 1st year following the incident. Several factors such as age, heart and lung diseases, malignancy, dementia, and malnutrition can increase mortality rates.[8] There is a widespread debate on the effect of surgery delay on the mortality rate of hip fracture patients. Despite limited evidence offered in numerous studies, there is a consensus that over 48-h delay is decisive for survival.[9] Moreover, this type of fracture is associated with increased mortality rate and major complications.[10] A maximum 48-h waiting time has been recently specified in the Health-Care Quality Indicator of the Organization for Economic Cooperation and Development (OECD) for surgical operation of hip fractures in elderly patients.[11] Drawing on doctors' instructions, other institutes such as Imperial College London recommend a 24-h waiting time following admission.[12] Novack showed a lower mortality rate for patients who underwent surgery within a shorter period of time from admission. In addition, hip fracture was associated with a significant increase in short-term and 1-year mortality.[13] In a meta-analysis and meta-regression review, it was demonstrated that a 48-h surgery delay in hip fracture patients can increase the 30-day and 1-year mortality rates up to 41% and 32%, respectively.[14] Verbeke demonstrated that an about 1-day surgical delay increased the risk of postoperative infection and was correlated with 1-year mortality and infectious complications in the American Society of Anesthesiologists (ASA) I and ASA II patients. Given the course of complications, they suggested that surgery should be performed much sooner on hip fracture patients capable of enduring operation to reduce the length of stay (LOS).[15] In the study by Rae *et al*. 2007, the 30-day mortality rate of patients undergoing surgery within and more than 2 days of the admission was 5.8% and 9.4%, respectively.[16] It is necessary to study the effect of time on hip fracture complications considering the round-the-clock admission of patients and the infeasibility of care provision and treatment at a time.[17] Given the absence of any previous study on orthopedic surgery delay in Iran, the present study aimed to examine the effect of orthopedic surgery delay and counseling numbers on mortality rate and complications in elderly patients in a teaching hospital.

Methodology

This was a descriptive cross-sectional research which lacked sampling. A census survey was conducted on all orthopedic surgery records of over 55-year-old patients visiting the emergency department of the specified hospital in 2016. After making necessary arrangements and obtaining permission to conduct the research, relevant data to all the patients aged over 55 years hospitalized in Shariati Hospital, Tehran University of Medical Sciences, in 2016 to undergo emergency orthopaedic surgery were collected from daily operative reports and medical records. Necessary information was then extracted from records based on a checklist developed by the research team. The validity of this checklist was confirmed by the expert group. It should be noted that patients who lacked the determined criteria were excluded from the study. Surgery delays were then determined after examining the checklists, and the relationship between the variables and surgery delays, number of preoperative counseling, complications, and mortality rate was evaluated. Moreover, the most prevalent complications were identified based on orthopedist opinions. The variables examined in this study included surgery delay (over 24 h), counseling numbers, underlying diseases, postoperative complications, and mortality rate. Table 1 displays all research variables. Data were analyzed using the Mann–Whitney U-test and Pearson correlation coefficient in SPSS version 18.0. Software (Chicago: SPSS Inc.) at a 0.05 significance level.

Results

Overall, 180 medical records were examined. All patients were in the age range of 55–95 years, with a mean age of 73.5 years and a standard deviation (SD) of 8.95 years. In terms of gender, 44.6% and 55.4% of patients experiencing surgery delay were male and female, respectively. There was no significant relationship between gender and surgery delay (P =0.721). The median surgery delay was 7 days. In addition, 51.4% of patients experienced a minimum and maximum surgery delay of 3 and 34 days, respectively; 50% of delays were 3–7 days and the other 50% were between 7 and 34 days. Intertrochanteric fractures (16.9%) and femoral neck fractures (11.3%) represented the majority of patients experiencing surgery delay. Diabetic foot patients (9.2%) were the majority of nonemergency patients experiencing surgery delay.

Table 1: Research variables

Postoperative Variables	Preoperative Variables
Counselling	Surgery Delay
Surgical Site Infection (SSI)	Underlying Disease
Deep Vein Thrombosis (DVT)	Diabetes
Sepsis	Hypertension
Myocardial Infarction (MI)	Chronic Heart Disease
Embolism	Parkinson's Disease
Cerebrovascular Accident (CVA)	Dementia
Urinary Tract Infection (UTI)	Renal Failure
Gastrointestinal Bleeding	Thyroid Disorders
Surgical Site Hemorrhage	Smoking
Cancelled Operation	Drug Abuse
	Atrial Fibrillation (AF)

According to the results, surgery was canceled for 14.8% of patients. No significant relationship existed between readmission and surgery delay ($P = 0.356$). The median counseling number was 4, with a minimum and maximum of 1 and 25, respectively. The mean counseling number was 5.5. Overall, 89.9% of patients received counseling. There was a significant relationship between counseling and surgery delay. Fifty-three percent of patients who received counseling also experienced surgery delay, so that the higher were the counseling numbers, the longer was the admission to surgery interval. The correlation coefficient between the number of counseling and the admission to surgery interval was significant ($P < 0.001$, $r = 0.326$).

There was no significant relationship between underlying diseases and surgery delay ($P = 0.566$). In addition, 66.7% and 51.1% of patients with and without underlying diseases had surgery delay. There was no significant relationship between diabetes and surgery delay ($P = 0.311$) in that 55.1% of diabetic patients and 45.3% of nondiabetic patients experienced surgery delay. As depicted in Figure 1, the counseling numbers were greater within the first 5 days of admission and decreased with increasing LOSs.

The study of the relationship between hypertension and surgery delay revealed that 48.2% of hypertensive and 53.5% of normotensive patients experienced surgery delay, which was statistically insignificant ($P = 0.789$). In addition, 64% and 48.3% of patients with and without a history of chronic heart disease experienced surgery delay, which was statistically insignificant ($P = 0.306$).

Regarding the relationship between renal failure and surgery delay, it was revealed that 52.9% of patients with renal failure experienced surgery delay, which was statistically insignificant ($P = 0.157$). Moreover, 50.7% of patients with thyroid disease experienced surgery delay, which was statistically insignificant ($P = 0.401$).

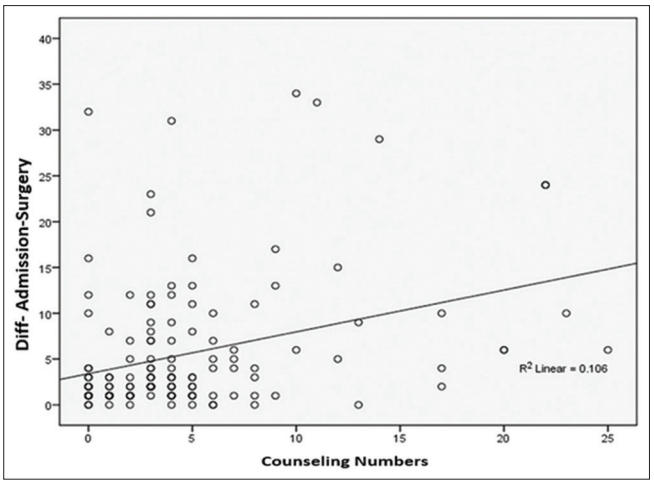

Figure 1: Admission and orthopedic surgery counseling times in patients over 55 years of age

The study of the relationship between smoking and surgery delay demonstrated that 73.1% of smoking patients experienced surgery delay, which was significant ($P = 0.121$). There was no significant relationship between drug abuse and surgery delay ($P = 0.189$). Figure 2 depicts the reasons and the time of orthopedic surgery delay in patients over 55 years of age.

The study of the relationship between preoperative variables and counseling numbers pointed to a significant relationship between diabetes and the latter ($P = 0.003$). A significant relation was also observed between chronic heart diseases and the counseling numbers ($P = 0.014$). No significant relationship was seen between hypertension and the counseling numbers. Patients with preoperative Atrial Fibrillation received a greater number of counseling, demonstrating a significant relationship between the two ($P = 0.035$).

The counseling number was shown to be an independent predictor for surgery delay and had a significant relationship with all risk factors ($P = 0.002$), meaning that the probability of surgery delay increased 1.2 times per each increase in the number of preoperative counseling. Smoking increased surgery delay, independently, but did not have a significant relationship with counseling. Smoking increased the probability of surgery delay by 3.5 times (multivariate regression analysis). The study of the incidence of postoperative complications and the relationship between surgery delay and mortality rate revealed that 4.1% of patients with surgery delay had surgical site infection (SSI), which was statistically insignificant ($P = 0.555$).

The number of counseling sessions was shown to be an independent predictor for surgery delay and had a significant relationship with all risk factors ($P = 0.002$),

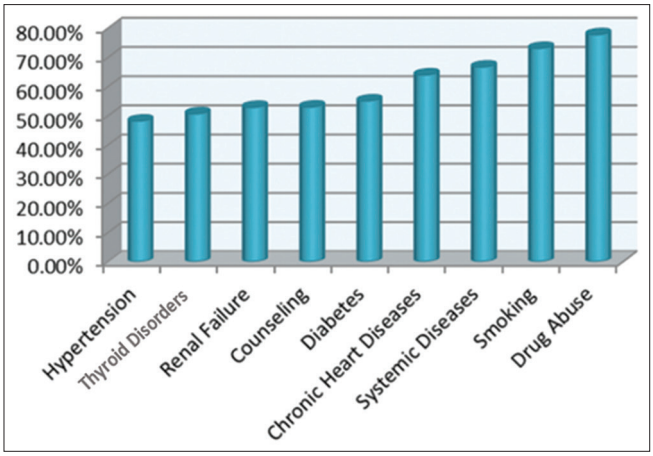

Figure 2: Delay time and reasons in orthopedic surgeries in patients over 55 years of age

meaning that the probability of surgery delay increased 1.2 times per each increase in the number of preoperative counseling. Smoking increased surgery delay, independently, but did not have a significant relationship with counseling (P = 0.328). Smoking increased the probability of surgery delay by 3.5 times (multivariate regression analysis). The study of the incidence of postoperative complications and the relationship between surgery delay and mortality rate revealed that 4.1% of patients with surgery delay had SSI, which was statistically insignificant. In addition, 1.4% of patients with surgery delay suffered from postoperative deep venous thrombosis (DVT). No significant relationship was observed between surgery delay and the incidence of DVT (P = 0.102). In addition, 1.4% of patients experiencing surgery delay suffered from postoperative sepsis and myocardial infarction (MI), which was not statistically significant (P = 0.337); 2.7% of patients suffered from postoperative embolism, which was not statistically significant (P = 0.505); 12.3% of patients with surgery delay suffered from postoperative cerebrovascular accident (CVA), which was not statistically significant (P = 0.153). None of the patients with surgery delay experienced gastrointestinal bleeding.

There was no significant relationship between such variables as SSI, gastrointestinal bleeding, surgical site hemorrhage, and underlying diseases with mortality. The study of patient mortality rate during two time periods, i.e. before 6 months and 6–12 months, revealed that the overall mortality rate was 11.3 7.7% of which was related to the first 6 months and 3.5% to the second. The mean age of deceased individuals was 73.4 years, with SD of 11 years, and the mean age of survivors was 73.5 years, with SD of 8.7 years (P = 0.966), which was statistically insignificant. No significant relationship was observed between post discharge and intra hospital mortality rate (P = 0.622). The results of the relationship between mortality and gender revealed that the mortality rate of male and female patients was 11.1% and 11.4%, respectively, which did not point to a significant relationship (P = 0.958).

The study of the interrelationship among postoperative variables revealed that 66.7% and 10.1% of patients with and without embolism died after surgery, respectively, showing a significant relationship (P = 0.034). In addition, 28.6% of patients who developed postoperative CVA died, showing a significant relationship (P = 0.054).

The study of the relationship between the mortality rate and a number of preoperative variables indicated that 16.1% and 8.1% of patients with and without a history of hypertension died, pointing to the higher mortality rate of the former group (almost twice as great) and a significant relationship between mortality and history of hypertension (P = 0.144).

Moreover, 25% and 10% of patients with and without a history of AF died, showing a significant relationship (P = 0.223), and 22.7% and 9.9% of patients with and without a history of chronic lung disease died, which was not statistically significant (P = 0.076). No significant relationship was observed between mortality rate and other variables such as history of chronic heart disease, chronic renal failure, thyroid disorders, smoking, and drug abuse.

The 1-year mortality rate of patients with and without surgery delay was 17.8% and 7.2%, respectively, which was not statistically significant (P = 0.111). In patients without delay, this figure was 5.8% and 2.9% during the 1st and 2nd months, respectively, which was not significant (P = 0.292). In patients with delay, this figure was 13.7% and 4.1% during the 1st and 2nd months, respectively. The probability of operating room death was 2.7 times greater in patients with surgery delay than those without delay.

The study of the relationship between mortality rate and counseling revealed that the intrahospital mortality rate of patients with and without counseling was 3.3% and 0%, respectively (P = 0.100). The 1-year mortality rate of patients with and without counseling was 14.8% and 5%, respectively (P = 0.475). The results indicated that surgery delay increased the probability of mortality by 2.2% even in the event of equal counseling numbers.

Discussion

A 48-h surgery delay time is considered for 95% of patients,[11] which is greatly different to the findings of this study, i.e. a mean LOS of 5 days until surgery. In situations where considerable surgery delay is encountered, the surgery should be canceled and rather

be included in the list of selective operations due to high workload. In this study, drug abuse was the major reason for the cancellation of operations from the list of selective orthopedic surgeries. This is inconsistent with the results of a cohort study in 2008 which attributed 5% of surgery delays to the absence of anesthesiologists, particularly over the weekends.[15] In this study, half of the patients experienced surgery delay and 89% of them received a mean of four counseling numbers. Therefore, counseling can be identified as a major cause of surgery delay, given the great number of counseling which is often provided with delay to the majority of patients.

It was demonstrated that the mortality rate of patients with surgery delay was higher than those without delay. The mortality rate was higher in the first 6 months following discharge. The mortality rate tripled for half of the patients experiencing a 2-day surgery delay, which is consistent with the result of a meta-analysis and meta-regression review that showed an increased mortality rate in elderly patients with hip fractures following an increase in surgery delay.[13] It is also consistent with the results of the study by Maggie who showed a greater probability of mortality in the hospital phase.[7]

Similarly, the results of the study by Hojat *et al*. pointed to a statistically significant difference between the two groups in terms of the presence of hematoma at the trauma site, postoperative blood transfusion, visiting other hospitals before the surgery, provision of invasive care techniques such as endotracheal tube suctioning, wound dressing at home, preoperative LOS, antibiotic prophylaxis dosage, postoperative antibiotics dosage, surgery duration, LOS, and number of daily wound dressings in hospital.[18] In the study by Siegmeth *et al*., patients experiencing delay in operative care for acute or hip fractures were exposed to relatively high levels of risk for DVT, and there was a direct relationship between the delay period and the incidence of DVT.[8] However, no significant relationship was observed in the present study between postoperative complications such as SSI, DVT, sepsis, MI, pulmonary embolism, gastrointestinal hemorrhage, and CVA in patients experiencing surgery delays. Patients with pulmonary embolism, hypertension, chronic lung disease, and AF had higher mortality rates.

Regarding the risk factors evaluated in this study, smoking and number of counseling were factors that increased surgery delay time.

Conclusion

Given the findings of this study, the vital nature of emergency orthopedic surgeries in the elderly, and the higher probability of mortality (2.2%) in the event of identical counseling numbers, it is recommended that expert teams comprising geriatricians, orthopedists, and anesthesiologists should be formed in hospitals with specific codes to facilitate the process of removing emergency patients from the waiting cycle and reduce surgery delay, mortality risk, and counseling time.

One of the limitations of this study was the no generalizability of its results due to investigation in a specific teaching hospital. Since participants were over 55 years of age, caution needs to be exercised in generalizing the results of the study to all the elderly.

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Conflicts of interest

There are no conflicts of interest. Departments of [2]Health Care Management.

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