Orijinal Araştırma / Original Investigation
Aegean J Med Sci 2019;3:108-111

Factors Affecting Prolonged Stay in Postoperative Period in General Surgery Intensive Care Unit

Genel Cerrahi Yoğun Bakımda Postoperatif Dönemde Uzamış Yatış Süresine Etki Eden Faktörler

Mehmet Üstün[1], Gizem Kılınç[1], Avni Can Karaca[2], Halit Batuhan Demir[3], Nimet Şenoğlu[4], Cengiz Aydın[1]

1. General Surgery Department, University of Health Sciences, Tepecik Training and Research Hospital, Izmir/Turkey
2. General Surgery Department, Izmir University of Economics, Faculty of Medicine, Izmir/Turkey
3. General Surgery Department, Ege University, Faculty of Medicine, Izmir/Turkey
4. Anesthesiology and Reanimation Department, University of Health Sciences, Tepecik Training and Research Hospital, Izmir/Turkey

ÖZET

AMAÇ: Yoğun bakımda uzamış yatış süresi, yüksek mortalite riski ile ilişkilidir. Bunu öngörmek, mortaliteyi azaltmak amacıyla önemlidir. İkinci basamak genel cerrahi yoğun bakımda uzamış yatış süresine etki eden faktörleri saptamayı amaçladık

GEREÇ VE YÖNTEM: Ocak 2014- Ekim 2017 tarihleri arasında, genel cerrahi prosedür sonrası postoperatif dönemde genel cerrahi yoğun bakım takibine alınan hastalardan uzamış yatış süresine sahip 68 hasta ve bu hastalar ile benzer özellikte randomize olarak seçilmiş aynı sayıdaki hastalar iki grup şeklinde karşılaştırmalı olarak incelendi.

BULGULAR: Uzamış yatış süresi olan hastaların medyan yaşı 69.00 (22.50) iken kontrol grubundaki hastaların medyan yaşı 59.00 (14.75) dur (p<0.001). Uzamış yatış süresi grubundaki hastalardan 59 tanesine abdominal acil cerrahi prosedür, 9 tanesine abdominal elektif cerrahi prosedür, uygulandı. Kontrol grubundaki hastalardan abdominal acil prosedür uygulanan hasta sayısı 23, abdominal elektif prosedür uygulanan hasta sayısı 45 idi (p=0.001). Uzamış yatış süresi grubundaki hastalardan 48'inde mortalite gelişirken, diğer gruptaki hastalardan 7'sinde mortalite gelişmiştir (p<0.001). Yapılan multivariate analizleri sonucunda; uzamış yatış grubunda acil abdominal cerrahi prosedür uygulaması (p<0.001) (Odds ratio:12.983), yaş (p=0.006) (Odds ratio:0.96), mortalite oranı (p<0.001) (Odds ratio:20.91) istatistiksel olarak anlamlı yüksek bulunmuştur.

SONUÇ: Acil abdominal cerrahi prosedür uygulaması, yaş ve yüksek mortalite oranı, uzamış yatış süresi ile ilişkilendirilmiştir.

Anahtar Kelimeler: uzamış yatış, yoğun bakım, genel cerrahi

ABSTRACT

OBJECTIVE: Prolonged stay in intensive care unit is associated with a high risk of mortality. Predictability of it is important to reduce mortality. This study aimed to determine the factors affecting prolonged stay in secondary general surgery intensive care unit (ICU).

MATERIALS AND METHODS: Between January 2014 and October 2017; 68 patients with prolonged stay undergoing general surgery ICU follow-up in the postoperative period after the general surgical procedure and the same number of randomly selected patients with similar characteristics were compared in two groups.

RESULTS: The median age of the patients with prolonged stay was 69.00 (22.50) and the median age of the patients in the control group was 59.00 (14.75) (p<0.001). In prolonged stay group, 59 patients underwent abdominal emergency surgery, and 9 patients underwent abdominal elective surgery. The number of patients undergoing the abdominal emergency procedures in the control group was 23, and the number of patients undergoing the abdominal elective procedure was 45 (p=0.001). Forty eight of the patients in the prolonged stay group had mortality, 7 of the patients in the control group had mortality (p<0.001). As a result of multivariate analysis; in the prolonged stay group, emergency abdominal surgical procedure rate (p<0.001) (Odds ratio:12.983), age (p=0.006) (Odds ratio:0.96) and mortality rate (p<0.001) (Odds ratio:20.91) was found to be statistically significant..

CONCLUSION: The emergency abdominal surgical procedure, age and high mortality rate are associated with prolonged stay.

Keywords: prolonged stay, intensive care unit, general surgery

INTRODUCTION

Prolonged stay in intensive care units (ICU) is associated with high mortality risk and serious resource consumption (1,2). The mortality rate is higher than 40% in patients who have ICU stay longer than 14 days (3). The prolonged stay was defined as ≥ 10 days, ≥ 14 days, ≥ 21 days, ≥ 30 days in

Yazışma Adresi/Address for Correspondence: Mehmet Üstün, MD, Sağlık Bilimleri Üniversitesi Tepecik Eğitim ve Araştırma Hastanesi A. Blok 1.Kat 1.Cerrahi Kliniği Yenişehir, Konak, İzmir/Türkiye
E-Posta/E-Mail: dr.m.ustun@gmail.com ‖ Tel: +90 532 372 8517
Received/Geliş Tarihi: 11 Tem 2019 ‖ **Accepted/Kabul Tarihi:** 8 Eyl 2019

various studies (3-6). Patients in ICU who have length of stay more than 2 weeks; constitute 11% of all ICU patient population, 45.1% of all days of stay in ICU and 55.5% of the days of mechanical ventilation (7). There are several studies, studying the factors affecting prolonged stay in surgical (mixed) and medical ICU (5,7,8,9).

Intensive care structuring in the world; is in the form of internal and surgical intensive care units meanwhile in Turkey general (surgical+medical) ICU are at the forefront. A small number of centers have secondary general surgery ICU in which general surgery patients are followed and managed by a general surgeon. However, these ICU are usually designed for short-term patient follow-ups. Therefore; it is important to predict the prolonged stay to decrease the mortality.

Unlike these studies, this study aimed to evaluate patients who underwent only general surgical procedures and who were followed-up in a secondary general surgery ICU and to determine the factors affecting the prolonged stay.

MATERIALS & METHODS

The general surgery ICU is a unit of our tertiary center that is classified as secondary and it is managed by closed model and only general surgery patients are followed in this unit. Between January 2014 and October 2017; 68 patients with prolonged stay, undergoing general surgery ICU follow-up in the postoperative period after the general surgical procedure and the same number of randomly selected patients with similar characteristics in general surgery ICU were compared in two groups. Length of prolonged stay was accepted as 14 days and over. Patients who were followed-up for 14 days or more in the postoperative period were included in the study.

Demographic data, length of hospitalization, type of general surgery procedure, Acute Physiology and Chronic Health Evaluation (APACHE II) scores, co-morbidities, post-follow-up status were evaluated retrospectively.

General surgical procedures were classified into two groups as abdominal elective and abdominal emergency,

Ethics committee approval was obtained dated 10/01/2018 and numbered 11.

Statistical analysis:

The data were evaluated in IBM SPSS Statistics 25 statistical package program. Descriptive statistics were given as the number of units (n), percentage (%), mean ± standard deviation, median (IQR) values. Pearson's Chi-Square and Ficher exact tests were compared in the evaluation of categorical variables. The normal distribution of the numerical variables was evaluated with Shapiro Wilk, normality test and Q-Q graphics. In the comparison of the two groups, the variables with normal distribution were made by the Independent Sample T-test and the variables which did not fit the normal distribution by Mann-Whitney U analysis. A logistic regression model was established to evaluate risk factors for prolonged stay. In the univariate analysis, the variables $p < 0.2$ were included in the logistic regression model. The confirmation of the logistic regression model was examined by the Hosmer-Lemeshow test. $p < 0.05$ was considered statistically significant.

RESULTS

In both groups, 31 patients were male and 37 were female. The median age of the patients in prolonged stay group was 69.00 (22.50) and the median age of the patients in the control group was 59.00 (14.75). There is a statistically significant difference in age between both groups ($p<0.001$). The median value of the length of stay was 23.50 (14-182 days) in prolonged stay group and it was 1.00 (1-12 days) in the control group. In prolonged stay group, 59 patients underwent abdominal emergency surgery, and 9 patients underwent abdominal elective surgery. The number of patients undergoing abdominal emergency procedures in the control group was 23, and the number of patients undergoing abdominal elective procedure was 45. The difference between the surgical procedures performed in the two groups was statistically significant ($p=0.001$).

When the co-morbidities of the patients in both groups were compared; rates of hypertension (HT), chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), cerebrovascular disease (CVD), pre-existing malignancy without association with current hospitalization indication were more frequent in prolonged stay group. The number of patients with diabetes mellitus (DM) and coronary artery disease (CAD) co-morbidity was higher in the control group. The number of patients with atrial fibrillation (AF) co-morbidity in prolonged stay group was 16, in the control group it was 4 ($p=0.004$). Two patients in the prolonged stay group and one in the control group had a diagnosis of chronic kidney failure (CKF) as comorbidity. Besides, in prolonged stay group; one patient had gout, 1

patient had mitral stenosis, 1 patient had mitral regurgitation and 1 patient had systemic lupus erythematosus. In the control group, 1 patient had hashimoto thyroiditis and 1 patient had ankylosing spondylitis. While 48 of the patients in the prolonged stay group had mortality, 7 of the patients in the control group had mortality (p<0.001). When the APACHE II scores of the patients in both groups were compared; the median APACHE II score was 12.50 (9.00) in prolonged stay group and 6.00 (5.00) in the control group (p=0.001).

Table 1. *Clinical and demographic profiles of the patients in the study.*

	Prolonged stay group (n=68)	Control group (n=68)	P value
Type of operation			
- Abdominal elective	9	45	=0.001
-Abdominal emergency	59	23	
Co-morbiditity			
-HT	38	31	=0.23
-COPD	13	7	=0.146
-DM	15	16	=0.838
-CHF	6	3	=0.301
-CVD	8	4	=0.227
-Pre-existing	8	4	=0.227
Malignancy	6	7	=0.771
-CAD	2	1	=0.559
- CKF	16	4	=0.004
- AF			
Mortality	48	7	<0.001
Age (Mean)	69(22,5)	59(14,75)	<0.001
APACHE II score (Mean)	12,5(9)	6,0(5,0)	=0.001

HT: Hypertension, COPD: Chronic Obstructive Pulmonary Disease, DM: Diabetes Mellitus, CHF: Congestive Heart Failure, CVD: Cerebrovascular Disease, CAD: Coronary Artery Disease, CKF: Chronic Kidney Failure, AF: Atrial Fibrillation, APACHE II score: Acute Physiology and Chronic Health Evaluation II score

As a result of multivariate analysis; in the prolonged stay group, emergency abdominal surgical procedure rate (p <0.001) (Odds ratio: 12,983), age (p=0.006) (Odds ratio: 0.96) and mortality rate (p <0.001) (Odds ratio: 20.91) was found to be statistically significant.

DISCUSSION

Prolonged stay in ICU is also important for general surgery ICU, like all medical and surgical ICU. To determine the factors leading to prolonged stay in a secondary general surgery ICU, will help to take the necessary preventions for these factors, to review the options of the surgical procedure more carefully, to decide the time of the patient's ward follow-up and to predict the need for tertiary ICU.

In this study, emergency abdominal surgical procedure, age and high mortality rate are associated with prolonged stay.

Some studies reported that age has been associated with prolonged stay (7,8); in some studies, the age was reported as a predictive factor for prolonged stay (10). In this study, age was found to be a factor affecting the prolonged stay as a result of multivariate analysis.

Type of admission to ICU is associated with prolonged stay. In the study by Arabi et al., the length of prolonged stay was considered as 14 days and it was determined that the admission of emergency surgical procedures was significantly associated with prolonged stay compared to elective surgical procedures (7). In a study aiming to develop a predictive model for predicting patients at risk of prolonged stay in ICU, emergency surgery was found to be significant for intensive care stay of 5 days or more (11). Similarly, in the study by Zampieri et al., admission from the emergency department was associated with prolonged stay in ICU (8). In this study, the emergency abdominal surgical procedures are associated with prolonged stay.

No co-morbidity was correlated with prolonged stay except COPD ambulatory oxygen therapy (8). In this study; no correlation was determined between co-morbidity and prolonged stay.

It was determined that the severity of the disease was associated with prolonged hospitalization in many studies. Some scoring systems are available for objective assessment of disease severity (Simplified Acute Physiology Score (SAPS II), APACHE II). In the study by Arabi et al. APACHE II and SAPS II scores were found to be mild but significantly high in prolonged stay group compared to the other group (7). The reason why the difference is significant but mild is explained as follows; the scores of patients in prolonged stay group were at a level that defines “moderate” disease severity but the patients who have high scores and high disease severity die early. In this study, disease severity was determined by APACHE II score and no significant difference was found between the two groups. This situation can be explained with the early death of high scored patients and few numbers of patients. All of the above-mentioned studies were performed in the tertiary

ICU where medical and surgical patients were followed together.

In a study in which surgical intensive care patients were studied and the length of prolonged stay was accepted to be more than 30 days; respiratory failure, mean SAPS II score on the 30th day, the number of cardiac pathologies were determined to be positive predictive factors of one year mortality in patients with prolonged stay (12).

In a study in which surgical intensive care patients were studied and the duration of prolonged stay was accepted as more than 14 days; platelet count reduction, need for life support applications (positive inotropic support, mechanical ventilator application, etc.), high Charlson co-morbidity index, renal replacement therapy application and organ dysfunction on day 14 (SOFA score) and admission from emergency department are predictive factors of hospital mortality in the patients with prolonged stay (9). Surgical ICU in these studies are ICU in which mixed surgical patients are followed.

The weakness of this study is the lack of study of factors affecting mortality rates after discharge and hospital mortality rates and the factors affecting mortality in patients with prolonged stay.

As conclusion, patients undergoing the emergency abdominal surgical procedure and older patients are candidates for prolonged stay in general surgery intensive care. The mortality rate is high in these patients. We believe that the predictability of this will help to reduce the mortality due to prolonged hospitalization.

Yazarlar arasında çıkar çatışması yoktur.

The author declares no conflict of interest.

Finansal Destek: yoktur / Funding : none

doi: https://doi.org/10.33713/egetbd.590564

REFERENCES

1. Combes A, Costa MA, Trouillet JL, Baudot J, Mokhtari M, Gibert C et al. Morbidity, mortality, and quality-of-life outcomes of patients requiring > or = 14 days of mechanical ventilation. Crit Care Med 2003; 31:1373-81.

2. Wong DT, Gomez M, McGuire GP, Kavanagh B. Utilization of intensive care unit days in a Canadian medical-surgical intensive care unit. Crit Care Med 1999; 27:1319-24.

3. Heyland DK, Konopad E, Noseworthy TW, Johnston R, Gafni A. Is it 'worthwhile' to continue treating patients with a prolonged stay (>14 days) in the ICU? An economic evaluation. Chest 1998; 114:192-8.

4. Weissman C: Analyzing the impact of long-term patients on ICU bed utilization. Intensive Care Med 2000; 26:1319-1325.

5. Martin CM, Hill AD, Burns K, Chen LM: Characteristics and outcomes for critically ill patients with prolonged intensive care unit stays. Crit Care Med. 2005; 33(9):1922-7

6. Trottier V, McKenney MG, Beninati M, Manning R, Schulman CI: Survival after prolonged length of stay in a trauma intensive care unit. J Trauma 2007; 62:147-150.

7. Arabi Y, Venkatesh S, Haddad S, Al Shimemeri A, Al Malik S. A prospective study of prolonged stay in the intensive care unit: predictors and impact on resource utilization. Int J Qual Health Care. 2002;14(5):403-10.

8. Zampieri FG, Ladeira JP, Park M, Haib D, Pastore CL, Santoro CM et al. Admission factors associated with prolonged (>14 days) intensive care unit stay. J Crit Care. 2014; 29(1):60-5

9. Chang CJ, Tam HP, Ko WJ, Tsai PR. Predicting hospital mortality in adult patients with prolonged stay (>14 days) in surgical intensive care unit. Minerva Anestesiol. 2013; 79(8):843-52. Epub 2013 May 23.

10. Higgins TL, McGee WT, Steingrub JS, et al. Early indicators of prolonged intensive care unit stay: impact of illness severity, physician staffing, and pre-intensive care unit length of stay. Crit Care Med 2003; 31:45–51.

11. Kramer AA, Zimmerman JE. A predictive model for the early identification of patients at risk for a prolonged intensive care unit length of stay. BMC Med Inform Decis Mak. 2010; 13:10:27

12. Bickenbach J, Fries M, Rex S, Stitz C, Heussen N, Rossaint R et al. Outcome and mortality risk factors in long-term treated ICU patients: a retrospective analysis, Minerva Anestesiol 2011; 77:427-38.