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Factors Affecting Length of Hospital Stay After Laparoscopic Adrenalectomy

Laparoskopik Adrenalektomi Sonrası Hastanede Kalış Süresine Etkili Faktörler

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Abstract

Objective: The aim of this study is to evaluate the factors affecting the length of hospital stay after surgery in patients who underwent laparoscopic adrenalectomy.

Methods: Patients who underwent laparoscopic adrenalectomy between 2012 and 2022 were retrospectively analyzed. The 75th percentile of the study population was set as the limit for the length of stay. Staying longer than this time was defined as prolonged hospital stay. Factors affecting prolonged hospital stay were analyzed with univariate and multiple logistic regression analyses. Variables with a p-value of <0.10 in univariate logistic regression analysis were included in the multiple regression model.

Results: A total of 86 patients were included in the study. Seventy-one (83%) of the patients were women. The median age was 54 (interquartile range, 45-61) years. The median hospital stay was 2 (interquartile range, 2-2) days. According to the 75th percentile of the population, the duration of stay longer than 2 days was determined as prolonged hospital stay. Prolonged hospital stay was detected in 14 (16%) patients. As a result of multiple regression analysis, operation time (odds ratio: 1.03; p-value: 0.017), conversion to open surgery (odds ratio: 4.79; p-value: 0.045), and male gender (odds ratio: 5.61; p-value: 0.022), was associated with prolonged hospital stay.

Conclusion: Laparoscopic adrenalectomy is a safe technique in the treatment of various adrenal pathologies. Operation time and conversion to open surgery were associated with prolonged hospital stay; however, studies with a high level of evidence are needed.

Keywords: Laparoscopic adrenalectomy, minimally invazive adrenalecomy, transabdominal approach, length of hospital stay

Öz

Amaç: Bu çalışmanın amacı laparoskopik adrenalektomi uygulanan hastalarda, ameliyat sonrasında hastanede kalış süresine etki eden faktörleri değerlendirmektir.

Yöntem: 2012-2022 yılları arası laparoskopik adrenalektomi uygulanan hastalar retrospektif olarak incelendi. Hastanede kalış süresi için çalışma popülasyonunun 75. yüzdelik dilimi sınır olarak belirlendi. Bu süreden daha uzun süre kalınması uzamış hastanede kalış olarak tanımlandı. Uzamış hastanede kalışa etkili faktörler tek değişkenli ve çoklu lojistik regresyon analizleriyle incelendi. Tek değişkenli lojistik regresyon analizinde p-değeri <0,10 olan değişkenler çoklu regresyon modeline dahil edildi.

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Öz

Bulgular: Çalışmaya toplam 86 hasta dahil edildi. Hastaların 71'i (%83) kadındı. Ortanca yaş 54 (çeyrekler arası aralık, 45-61) yıldı. Ortanca hastanede kalış süresi 2 (interkuartil aralık, 2-2) gündü. Popülasyonun 75. yüzdelik dilimine göre 2 günden uzun süren kalış süresi uzamış hastanede kalış olarak belirlendi. Buna göre 14 (%16) hastada uzamış hastanede kalış saptandı. Çoklu regresyon analizi sonucunda operasyon süresi (olasılık oranı: 1,03; p-değeri: 0,017), açık cerrahiye geçiş (odds oranı: 4,79; p-değeri: 0,045) ve erkek cinsiyet (olasılık oranı: 5,61; p-değeri: 0,022), uzamış hastanede kalış süresi ile ilişkili bulundu.

Sonuç: Laparoskopik adrenalektomi, bir çok adrenal patolojinin tedavisinde güvenilir bir yöntemdir. Operasyon süresi ve açık cerrahiye geçiş, uzamış hastanede kalış süresi ile ilişkili bulunmuştur; ancak kanıt düzeyi yüksek çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Laparoskopik adrenalektomi, minimal invaziv adrenalektomi, transabdominal yaklaşım, hastanede kalış süresi

Introduction

Laparoscopic adrenalectomy (LA) has been defined as a safe and feasible treatment method for adrenal diseases since its introduction in 1992[1-4]. Gagner et al.[5] described lateral decubitus position for LA in 1994. LA offers various advantages over conventional adrenalectomy, such as less postoperative pain, reduced risk of bleeding, shorter hospital stay, and lower morbidity[1,6-8].

While LA is now a standardized procedure, there are significant differences in short-term outcomes such as hospital stay and morbidity among centers[9].

The aim of this study is to evaluate the factors affecting the duration of hospital stay following LA.

Materials and Methods

Patients and Study Design

This is a retrospective cohort study. Patients who underwent laparoscopic transabdominal adrenalectomy between 2012 and 2022 were included in the study. Patients who underwent bilateral adrenalectomy were excluded from the study. All patients were evaluated by an endocrinologist for possible functional adenomas before the operation. The operations performed using lateral transabdominal approach. A drain was placed in all patients at the end of the operation.

Demographic data, past medical history, adrenal tumor size (mm) and side, histopathological result, performing surgeon (specialist/resident under specialist supervision), operation time (minutes), postoperative length of hospital stay (days), and the occurrence of conversion to open surgery were retrospectively evaluated.

The hospital stay duration was defined as the time between the operation day and discharge. Discharge criteria included stable vital signs, absence of peritoneal irritation signs, oral intake tolerance, and discontinuation of intravenous analgesia. The desired length of hospital stay was determined as the 75th percentile of the study population. Accordingly, patients were divided into two groups: Hospital stay of two days or less, and hospital stay of more than two days. Histopathological examination results were categorized into three main groups: Benign, malignant, and pheochromocytoma.

Ethical Approval

Approval for the study was obtained from University of Health Sciences Turkey, İzmir Tepecik Education and Research Hospital Ethics Committee (date: 03/05/2023, no: 2023/04-18). The study was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

The data were analyzed using the IBM SPSS Statistics software package, Version 25.0, released by IBM Corp. Descriptive statistics included frequency (percentage) for categorical variables and median (minimum-maximum) values for numerical variables. Between-group comparisons for categorical variables were performed using the chi-squared test or Fisher's Exact test, while numerical variables were compared using the Mann-Whitney U test. Logistic regression analysis was conducted to identify factors influencing prolonged hospital stay. Variables with a p-value <0.10 in univariate logistic regression analysis were included in the multiple regression model.

Results

A total of 86 patients were included in the study. Among them, 15 were male (17%), and 71 were female (83%). The median age of the patients was 54 years (range: 20-78). The length of hospital stay ranged from 2 to 5 days, with a median hospital stay of 2 days. In Group 1, comprising patients with a hospital stay of two days or less, there were 72 patients (84%), while in Group 2, with a hospital stay of more than two days, there

were 14 patients (16%). The baseline characteristics of the patients are presented in Table 1.

The median operation duration was 145 minutes (range: 90-210). In Group 1, the median operation duration was 140 minutes (range: 90-205), whereas in Group 2, it was 175 minutes (range: 115-210) (p=0.031). Among the patients, 35 underwent right adrenalectomy, while 51 underwent left adrenalectomy. Among those who underwent right adrenalectomy, hospital stay was prolonged in five patients (14%), and among those who underwent left adrenalectomy, hospital stay was prolonged in nine patients (18%). However, this difference was not statistically significant (p=0.678). Fourteen operations were performed by surgical residents under specialist supervision, and 72 operations were conducted by general surgery specialists. Prolonged hospital stay was not observed in operations performed by residents, whereas prolonged hospital stay was observed in 14 cases (19%) performed by specialists. However, the difference was not statistically significant (p=0.113). A total of 10 patients required conversion from laparoscopic surgery to open surgery. Among those converted to open surgery, hospital stay was prolonged in four cases (40%), while among cases completed laparoscopically, prolonged hospital stay was observed in 10 cases (13%) (p=0.053). Five patients had a history of previous abdominal surgery. Among patients with a history of previous abdominal surgery, two (40%) required conversion to open surgery, while among those without such a history, eight (10%) required conversion to open surgery. However, the difference was not statistically significant (p=0.101).

The median tumor diameter was 70 mm (range: 30-160). In Group 1, the median tumor diameter was 70 mm (range: 30-160), while in Group 2, it was 61 mm (range: 45-108) (p=0.247). There was no significant difference between the two groups in terms of histopathological results (p=0.573) (Table 2).

Complications were observed in seven patients. All complications were classified as Clavien-Dindo grade 1. Among patients with complications, length of hospital stay was prolonged in two cases (29%), while among those without complications, length of hospital stay was prolonged in 12 cases (15%). However, the difference was not statistically significant (p=0.319).

According to the results of the multiple regression analysis, male gender, operation duration, and conversion to open surgery were found to be associated with prolonged hospital stay (Table 3).

Discussion

LA is considered the gold standard for the treatment of most adrenal tumors due to its low major complication rates

Table 1. Demographic data

Variable	Total	Group 1	Group 2	p-value
	n=86	n=72	n=14	
Age (years)	54 (20-78)	53 (20-78)	56 (37-69)	0.323
Sex				0.063*
Female	71 (83%)	62 (86%)	9 (64%)	
Male	15 (17%)	10 (14%)	5 (36%)	
Prior surgery				0.185*
No	81 (94%)	69 (96%)	12 (86%)	
Yes	5 (6%)	3 (4%)	2 (14%)	

*: Fisher's Exact test

Table 2. Histopathological results

Variable	Total	Group 1	Group 2	p-value
	n=86	n=72	n=14	
Histopathology				0.573
Benign	65 (100%)	54 (83%)	11 (17%)	
Malignant	4 (100%)	4 (100%)	0 (0%)	
Pheochromocytoma	17 (100%)	14 (82%)	3 (18%)	

Table 3. Factors affecting the length of hospital stay

Variable	Univariate analysis		Multiple analysis	
	OR	p-value	OR	p-value
Age	1.023	0.384		
Male gender	3.444	0.058	5.609	0.022
Prior surgery	3.833	0.164		
Operation time	1.022	0.029	1.030	0.017
Conversion to open surgery	4.400	0.042	4.786	0.045
Tumor size	0.983	0.306		
Right sided tumor	0.778	0.679		
Histopathology				
Benign (ref.)	1	-		
Malignant	0.000	0.999		
Pheochromocytoma	1.052	0.944		
Complication	2.233	0.368		

OR: Odds ratio

and safety. The length of hospital stay following a surgical procedure is influenced by patient-related factors and factors associated with the performed surgical procedure. It is generally accepted that length of hospital stay after minimally invasive interventions is shorter compared to conventional methods. Complications arising during or after surgical procedures are also well-known factors associated with prolonged hospital stay. The average postoperative hospital stay for LA has been reported as 2 to 8 days in the literature[10-17].

Various studies in the literature have investigated factors affecting postoperative hospital stay following adrenalectomy. In a series of 453 cases published by Pisarska et al.[16], the presence of postoperative complications, the need for drain usage, histopathological type, and the day of surgery (Thursday or Friday) were found to be associated with prolonged hospital stay. In this study, a correlation between histopathologically confirmed pheochromocytoma and prolonged hospital stay was reported. However, no relationship was found between the presence of complications and length of hospital stay. This could be attributed to the low complication rate and the fact that all complications were grade 1. Additionally, contrary to the literature, no significant relationship was found between histological subtypes and hospital stay. As routine drain usage was employed after LA in our clinic, the need for drainage could not be evaluated in our study.

In a large series published by Chen et al.[15], it was reported that tumor size is correlated with prolonged hospital stay. According to this study, adrenal masses with a size of 4 cm and above were associated with prolonged hospital stay. In another study by Rodríguez-Hermosa et al.[18] published in 2020, tumor size greater than 9 cm, the day of surgery (Thursday or Friday), and intraoperative blood loss were reported to be associated with prolonged hospital stay. However, in our study, no significant association was found between tumor size and prolonged hospital stay.

Study Limitations

Contrary to the results of the current study, Bergamini et al.[19] evaluated post-LA complications in a study where age, BMI, tumor diameter, and pheochromocytoma were indirectly associated with the rate of complications, and thus with the length of hospital stay. On the other hand, in the study of Aydin et al.[20], there was no observed disparity in the duration of hospital stay between the hormone-active and non-functional groups. However, upon conducting a subgroup analysis within the hormone-active group, a prolonged duration of hospitalization was noted specifically among patients diagnosed with Cushing's syndrome.

In our study, conversion to open surgery was associated with prolonged hospital stay. Consistent with this, Köstek et al.[21] reported similar results, as longer hospital stay in patients with conversion to open surgery.

Conclusion

LA is a safe surgical procedure in the treatment of various adrenal pathologies, with a low complication rate. According to this study, prolonged operation time, male gender, and conversion to open surgery were found to be associated with prolonged hospital stay. Since this study was limited because it was a single-center retrospective study, studies with a high level of evidence are needed.

Ethics

Ethics Committee Approval: Approval for the study was obtained from University of Health Sciences Turkey, İzmir Tepecik Education and Research Hospital Ethics Committee (date: 03/05/2023, no: 2023/04-18). The study was conducted in accordance with the Declaration of Helsinki.

Informed Consent: Informed consent was obtained.

Authorship Contributions

Surgical and Medical Practices: G.A., Concept: G.A., K.T., M.Ü., Design: G.A., K.T., Data Collection or Processing: G.A., S.V., Analysis or Interpretation: S.V., Literature Search: S.V., Writing: G.A., K.T., S.V., M.Ü.

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