



Analysis of cancellations of surgery for benign prostatic hyperplasia after patients are taken to the operating room: A retrospective single-center study

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Abstract

Aim: This study aims to evaluate the reasons for canceling elective surgeries for benign prostatic hyperplasia (BPH) after patients are taken to the operating room.

Materials and Methods: Data from 1743 cases scheduled for elective surgery due to BPH that were taken to the operating room between December 2011 and June 2024 were retrospectively analyzed. The demographic data, American Society of Anesthesiologists (ASA) status, reasons for cancellation. The clinical course of the 89 patients (5.1%) whose surgeries were canceled in the operating room were evaluated.

Results: The mean age of the patients whose surgeries were canceled in the operating room was 69.2 ± 11.68 years. The most common reasons for surgical cancellations were cardiovascular system-related pathologies, such as uncontrolled hypertension (33.7%) and abnormal electrocardiographic changes (12.4%). Eighty-five (95.5%) patients had an ASA status of 3 or higher. The surgeries of 80 (89.9%) patients were successfully performed at a later date in our hospital. It was determined that 87.64% of the cancellations could have been avoidable.

Conclusion: Our study found that 5.1% of elective surgeries due to BPH were cancelled, and most were avoidable. We believe that rigorous and optimized preoperative patient assessment is crucial in preventing surgical cancellations, especially in procedures involving an elderly population, such as surgeries for BPH.



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Introduction

Benign prostatic hyperplasia (BPH) is the proliferative process of the stromal and epithelial components of the gland. Prostate enlargement and bladder outlet obstruction are the main clinical symptoms of BPH. The prevalence of BPH-related lower urinary tract symptoms continues to increase as the worldwide population ages [1,2]. BPH, which is one of the most common health problems among aging men, can be managed through several approaches, including watchful waiting, lifestyle modifications, pharmacological treatments, and surgical intervention [3,4]. If left untreated, BPH can lead to complications such as refractory urinary retention, obstructive uropathy, bladder stones, and recurrent urinary tract infections [5,6]. Large-scale studies report that the annual rate of surgery for BPH is around 7.5% [4]. Despite the development of new surgical techniques for BPH and developments in pre-

operative patient care, perioperative cancellations are an essential problem in current practice.

In many developed countries, surgical waiting times are considered a critical indicator of the quality of the health-care system. Particularly, the cancellation of operations once patients are inside the operating room leads to inefficient use of hospital resources, delays in surgical planning, and emotional distress for patients [7,8]. Therefore, developing effective strategies to minimize surgery cancellations is very important [9]. Recent clinical studies have focused on reducing cancellations by optimizing hospital capacity and minimizing the psychological impact of surgical stress on patients [7,9]. These studies highlight that a significant portion of cancellations of elective surgeries can be prevented through meticulous preoperative coordination [9].

However, there is limited literature on the specific factors leading to elective surgery cancellations after patients have been taken to the operating room. This study aims to analyze the causes of patient cancellations of surgeries for BPH. We aimed to analyze this critical health issue among

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the elderly population. While we have conducted a thorough search of the English literature, this study is, to the best of our understanding, the first to report on cancellations of BPH surgeries after patients have entered the operating room.

Materials and Methods

Data from 1743 patients who were scheduled for elective surgery due to BPH and admitted to the operating room at our institution between December 2011 and June 2024 were analyzed retrospectively. Elective surgeries for BPH included open prostatectomy, transurethral resection of the prostate, and transurethral incision of the prostate. All patients underwent routine preoperative evaluations at the anesthesia outpatient clinic at the time of their scheduled operation, which included laboratory blood tests, physical examination findings, electrocardiograms, and chest X-rays. In total, procedures of 89 patients (5.1%) were canceled after the patient entered the operating room. The demographic data, American Society of Anesthesiologists (ASA) status, reasons for cancellation, and clinical courses of whose surgeries were canceled in the operating room were analyzed.

Cancellations were categorized into two groups: patient-related reasons and hospital-related reasons. Additionally, the reasons for cancellation were classified as avoidable or unavoidable. The classification of arterial hypertension was made according to current guidelines. Patients with systolic blood pressure ≥ 180 mmHg or diastolic blood pressure ≥ 110 mmHg were considered to have stage 3 or more severe hypertension, and their surgeries were canceled as suggested by the guidelines [9]. Furthermore, the surgeries of patients with abnormal electrocardiograms detected during preoperative monitoring were canceled, and these patients were subsequently referred to the cardiology department. Similarly, patients with abnormal hormonal and biochemical results documented in the operating room were referred to the endocrinology department. On the other hand, patients with oral herpes, positive urine culture, and upper or lower respiratory tract infections detected preoperatively were referred to the infectious diseases department. We also analyzed the subsequent surgeries to determine whether the patients who received subsequent surgery at the same center.

The study was approved by Tokat Gaziosmanpasa University Local Ethics Committee (24- KAEK-225).

Statistical analysis

We performed descriptive analysis in the present study. The continuous variables are expressed in mean and standard deviation. The categorical variables are expressed in number of affected individuals and the percentage of the study population. The normal distribution of the continuous variables were evaluated using Kolmogorov-Smirnov test. Any p value less than 0.05 were defined as statistical significance. All statistical analyses were performed on the Statistical software Package for Social Sciences version 22 (SPSSv22, IBM, USA)

Results

The data of 1743 patients admitted to the operating room for elective surgery due to BPH were retrospectively analyzed. In total, 179 open prostatectomies, 1468 transurethral resection of the prostate, and 96 transurethral incision of the prostate were planned. The surgeries of 89 patients (5.1%) were canceled in the operating room. Of these, 2 patients (2.3%) were scheduled for transurethral incision of the prostate, 26 (29.2%) for open prostatectomy, and 61 (68.5%) for transurethral resection of the prostate. The mean age of the patients whose surgeries were canceled was 69.2 ± 11.68 years. Four patients (4.5%) were classified as ASA 2, 63 (70.8%) as ASA 3, and 22 (24.7%) as ASA 4. No patient was classified as ASA 1. Surgery cancellations in 74 patients (83.1%) were due to patient-related factors. A total of 30 patients (33.7%) had their surgeries canceled due to uncontrolled hypertension. All these patients had a history of antihypertensive medication use, and only 4 (13.3%) were found to be noncompliant with their treatment. Intraoperative abnormal electrocardiographic changes led to the cancellation of surgeries in 11 patients (12.4%). Of these, 1 patient (9.1%) had a newly diagnosed bundle branch block, 3 patients (27.3%) atrial fibrillation, 4 (36.3%) had frequent ventricular extrasystoles, and 3 (27.3%) showed ST-segment changes. Infectious causes were responsible for the cancellation of surgeries in 20 patients (22.4%). Among these, 9 patients had upper respiratory tract infections, 4 had lower respiratory tract infections, 5 had oral herpetic infections, and 2 had urinary tract infections. One patient (1.1%) had blood glucose levels above 400 mg/dL, which led to the cancellation of the surgery. Additionally, 7 patients (7.9%) had their surgeries canceled due to smoking on the day of surgery, and 5 patients (5.6%) due to issues with adherence to anticoagulant therapy protocols (Table 1). Fifteen (16.9%) procedures were cancelled due to hospital-related reasons. In one patient (1.1%), surgery was canceled due to failure of surgical equipment during final preoperative testing. Surgeries of 7 patients (7.9%) were canceled due to over-booking, and the operating theatre time was exceeded. Surgical procedures for three patients (3.4%) were canceled intraoperatively due to the unavailability of intensive care unit beds. Similarly, four procedures (4.5%) were canceled due to inadequate blood preparation, attributed to coordination deficits with the blood bank. While 87.64% of the cancellations were considered avoidable, 80 patients (89.9%) were successfully rescheduled for surgery at our hospital.

Discussion

The incidence of BPH in individuals over 50 years of age is approximately 30% and the incidence increases with the age of the individuals. BPH frequently causes lower urinary tract symptoms [3]. It affects more than 70% of men over the age of 70. The socioeconomic burden of BPH is substantial, causing a burden of over 3 billion dollars annually on the healthcare system. As the life expectancy of the individuals is rising the incidence of BPH is increasing [10]. In our country by the year 2040, the total elderly population is estimated to increase from 8% today to 16.3%. This indicates that healthcare professionals will

Table 1. Reasons for cancellation of surgery.

| Variables | Reasons for Cancellation of surgery | Percentage of canceled cases |
|-------------------------|-------------------------------------|------------------------------|
| Patient-related causes | Stage 3 or 4 hypertension | 30 (33.7%) |
| | Electrocardiographic changes | 11 (12.4%) |
| | Upper respiratory tract infections | 9 (10.1%) |
| | Oral herpetic infections | 5 (5.6%) |
| | Lower respiratory tract infections | 4 (4.5%) |
| | Urinary tract infections | 2 (2.2%) |
| | Smoking | 7 (7.9%) |
| | On anticoagulant medications | 5 (5.6%) |
| Hospital-related causes | High blood sugar levels | 1 (1.1%) |
| | Over-booking | 7 (7.9%) |
| | Lack of blood | 4 (4.5%) |
| | Lack of intensive care unit beds | 3 (3.4%) |
| | Lack of equipment | 1 (1.1%) |

face BPH more frequently [4]. For this reason, preoperative anesthesia preparation and prevention of cancellation of the procedure in the operating room are of increasing importance in patients with BPH.

Cancellation of elective procedures have a very negative impact on operating room efficiency and impose a significant economic burden on the healthcare system. Additionally, this situation decreases patient satisfaction and lowers staff morale [11]. Perroca et al. [12] stated that the average cost of surgery cancellations per patient was reported to be \$ 29.54 In another study, Dexter et al. [13] reported that each minute of delay in the operating room at Stanford University Medical Center cost the finance department approximately \$8.13. Moreover, surgery cancellations cause a backlog of patient appointments. Additionally, the psychological impact on both the patients and the surgical team is another negative aspect of cancellation of surgeries.

Leslie et al. [8] showed that in15,444 elective surgeries, reported that the urology department had the highest cancellation rate at 9.53% . In another study, Chiu et al. [14] evaluated the cancellations of elective surgeries and reported that the urology clinic ranked second among all surgeries with a cancellation rate of 13%. Argo et al showed that the urology department had a 14% cancellation rate, ranking in the top three [11]. Similarly, Özcan et al reported that urological surgery cancellations were the third most common among all surgery cancellations [9]. A multidisciplinary approach and preoperative evaluation have reduced elective surgery cancellations [9,12]. Previous studies have reported that approximately 60% of elective surgery cancellations are due to potentially avoidable factors [12]. In a clinical study analyzing surgery cancellations in an orthopedic clinic, it was observed a 42.9% reduction in cancellation rates following improvements in healthcare services [15]. Hori et al. [7] reported that the rate of surgery cancellations in the operating room was below 0.01%, that was attributed to patients undergoing medical examination and evaluation by an anesthesiologist the day before surgery. Surgery cancellations in the operating room are particularly critical due to the emotional stress it causes for patients and the unnecessary loss of

time and resources for the healthcare system [9].

Surgery cancellation causes vary depending on the demographic characteristics of the patient population and the surgical procedure [7,9]. In the pediatric age group, the most common cause is upper respiratory tract infections, while in the elderly population, metabolic and cardiac reasons are more prevalent [9,16]. Perroca et al. [12] more than half of the surgery cancellations were attributed to patient-related factors . Similarly, Chang et al. [16] reported that the most important cause of surgery cancellations was patient-related medical problems, accounting in 59% of the cases. In our study, %83.1 of cancellations were due to the medical conditions of the patients. Specifically, cardiac problems, which were associated with the advanced age of the patients scheduled for surgery, were frequent causes of cancellation. Similarly, Özcan et al. showed that more than half of the surgery cancellations were directly related to the cardiovascular system [9].

One common cause of surgery cancellations is insufficient operational capacity. Yoon et al. [17] evaluayed 2,494 patients and showed that more than 20% of the surgeries were canceled, with nearly one-third of the cancellations attributed to insufficient operational capacity. Similarly, in the study by Pollard et al. [18], the surgery cancellation rate was reported to be 13%, and nearly one-fifth of the cancellations were due to insufficient operating room hours . In our study, over-booking was observed in only 7 patients (7.9%), which we attribute to the fact that our university hospital has more spacious operating room conditions. In the study by Shah et al. [19], it was reported that 10.3% of surgery cancellations were due to surgeon unavailability. In the study by Lopez et al [20], it was documented that 5% of surgery cancellations were related to the surgical team . In our study, this rate was 1.1%. We believe that this is related to the fact that we work with a large urology team in a faculty hospital. In another study, 2.42% of surgery cancellations were attributed to the insufficiency of the intensive care unit [12]. In a similar study, Livingstone et al. [21] reported that 2.5% of surgery cancellations were due to bed shortages . In our study, surgery cancellations due to unexpected intensive care unit needs related to the patient’s clinical condition

occurred in only 3 patients (3.4%) on the operating table. Apart from that, there were no surgery cancellations due to bed shortages in the urology department.

Infectious pathologies are a significant cause of surgical cancellations. Studies report varying rates: 7% in a national study of adults [9], 12.8% due to upper respiratory tract infections (URTIs) [22], and 18% overall, primarily from respiratory infections [23]. In our study, 22.4% of cancellations were attributed to infections, with respiratory infections being the most common.

Limitations

The small patient volume and the retrospective nature of the analysis are the main limitations of our research. Our study needs to be developed prospectively involving higher patient numbers.

Conclusion

Intraoperative surgical cancellations significantly impact the healthcare system. The resulting emotional distress for patients, families, and surgical teams, coupled with prolonged surgical schedules and inefficient resource utilization, are critical consequences. In our study, 5.1% of elective benign prostatic hyperplasia (BPH) surgeries were canceled intraoperatively. Notably, a significant proportion of these cancellations were due to preventable causes.

Disclosures

Ethics Committee Approval: Ethical approval was obtained for this study from the Tokat Gaziosmanpaşa University Faculty of Medicine Clinical Research Ethics Committee (24-KAEK-225).

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Conflict of Interest: There are no potential conflicts of interest in this study.

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