

A City Hospital Experience: Is Preoperative Internal Medicine Evaluation Important?

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ABSTRACT

Objective: We aimed to determine the effects of preoperative evaluation, demographic data including the presence of chronic diseases, surgery indication, obesity frequency, and laboratory data on survival, admission to intensive care unit (ICU), and mortality rate of patients requiring internal examination scheduled for elective, noncardiac surgery.

Methods: A total of 1230 patients, for whom an elective, noncardiac surgery was planned between June 1, 2020, and October 1, 2020, in our hospital, were prospectively evaluated and their follow-up assessment was conducted at 6 months. Preoperative American Society of Anesthesiologists scores, demographic information, indication for surgery and surgical method, chronic diseases, height, weight, waist circumference, body mass index (BMI), requirement for postoperative intensive care, and laboratory results were recorded.

Results: A total of 1230 patients were included in this study. The mean age was 60.2±12.7 years, and 51.0% (n=624) of the patients were men. Preoperative ASA scores were 16.3% (n=200), 49% (n=603), 32.9% (n=405), and 1.8% (n=22) for ASA-1, ASA-2, ASA-3, and ASA-4, respectively. Patients who would be operated on for malignancy constituted 22.4% (n=276). Ophthalmic surgeries were the most evaluated patient group (n=438) and hypertension (HT), diabetes mellitus (DM), and coronary artery disease (CAD) are the most common diseases. The hospitalization rate in the ICU was 5.7% (n=70) and the mortality rate was 1.5% (n=18). The highest rate of mortality among this group was seen in patients with malignancy diagnosis (18.5%), admission to ICU (10.9%), and BMI value <18.5 kg/m² and ≥40 kg/m².

Conclusion: The three most common diseases during internal medicine preoperative evaluation were HT, DM, and CAD. Patients with malignancy and very high or very low BMI were found to be significantly related to more requirements for ICU and mortality in the postoperative period. We think that close monitoring of these patient groups in the perioperative and postoperative periods is important for survival.

INTRODUCTION

The evaluation of patients' medical history and physical examination are the cornerstones of risk assessment before elective surgery. Stabilizing the medical condition before the surgery is important for perioperative management and postoperative survival. The aim of preoperative management is to evaluate risky patients for surgical operation and to apply necessary precautions, rather than choosing them for elective surgery. A preoperative outpatient medical evaluation can decrease the length of hospital stay and minimize postponed or canceled surgeries. [1] The patient's underlying diseases must be well evaluated and understood, for the planned operation to be effective. The consultation should consist of evaluation and treatment recommendations, including necessary prophylactic treatment for minimizing the perioperative risk. The

presence of hypertension (HT), diabetes mellitus (DM), coronary artery disease (CAD), and renal failure should be evaluated in addition to the surgical disease, and the control should be provided during the pre- and postoperative periods. The American Society of Anesthesiologists scoring system (ASA) is a risk classification based on the presence and severity of additional diseases and is used for determining the perioperative risk.[2]

In the preoperative evaluation, the perspective, opinions, and suggestions of the internal medicine physician are especially valuable in terms of postoperative survival. In this study, we aimed to raise awareness to control the additional diseases of our patients and manage complications.

MATERIALS AND METHODS

Patients were eligible for participation in the study if

they were referred by a surgeon for internal medicine evaluation before scheduled elective surgery. A total of consecutive 1345 patients, who applied to the internal medicine outpatient clinic between June 01, 2020, and October 01, 2020, and elective surgery were approved, were prospectively evaluated. Demographic information, preoperative ASA scores, chronic diseases, laboratory results, the requirement for intensive care, and mortality were recorded. A medical consult was defined as a note in the chart from an internist, other than the admitting history and physical, dated within 30 days of scheduled surgery. The patients were evaluated in terms of HT, DM, thyroid functions, obesity, and CAD. The medical histories of the patients, such as the drugs, diagnoses, and chronic diseases, were checked through databases called "e-Nabiz," belonging to the Ministry of Health. Laboratory and radiological examinations of the patients were evaluated at the time of admission. New laboratory and radiological tests were requested for the patients deemed necessary. The drug doses of the patients were adjusted, and they were recalled for reevaluation. A note was written to the surgeon over the system for the patients who were ready for the operation after the interventions. The points that surgeons and anesthesiologists should be attended to before, during, and after surgery were specified.

For statistical analysis of the data, Statistical Package for the Social Sciences program (SPSS), version 24.0 was used. The data were presented as mean and standard deviation for continuous variables and percentage for discrete variables. The conformity of the data to the normal distribution was tested, and the independent group test was used for the data with normal distribution. The Mann-Whitney U test was used for data without normal distribution. The Chi-squared test was used to clarify the association between discrete data and other variables. For statistical significance, a p-value below 0.05 with a confidence interval (CI) of 95% was considered significant. Ethics committee approval was obtained from the Kartal Dr. Lütfi Kırdar City Hospital.

RESULTS

A total of 115 approved patients were not operated on due to the decision of the surgery departments. Among 1230 patients, 50.7% were male (n=624), and the mean age was 60.2±12.96 years. Demographic characteristics, ASA scores, underlying diseases, and type of anesthesia are shown in Table 1. Mortality has developed in 18 patients (1.5%) during the follow-up at the intensive care unit (ICU) including 22.8% of 35 male patients and 28.5% of 35 female patients. The mortality rate was higher in female patients. While the mean age was 68.58±9.95 years in surviving cases, it was 59.9±12.67 years in deceased patients. The difference between the mean ages was statistically significant (p<0.001). In the classification made with the ASA scoring system, the rate of admission to the postoperative ICU was highest in ASA-4 patients with a rate of 45.5% and lowest in ASA-I patients with a rate of 1%.

When chronic diseases were evaluated, the rate of HT, DM, CAD, hypothyroidism, hyperthyroidism, and neurological disease was 55.8% (n=686), 40.9% (n=503), 23.7% (n=292), 13.1% (n=161), 2% (n=24), and 3.6% (n=44), respectively. The main methods of anesthesia were general anesthesia, local anesthesia, and epidural anesthesia, with the rate of 61.4% (n=756), 36.1% (n=445), and 2.3% (n=29), respectively. Preoperative ASA scores were 16.3% (n=200), 49% (n=603), 32.9% (n=405), and 1.8% (n=22) for ASA-1, ASA-2, ASA-3, and ASA-4, respectively (Table 1). Among these patients, gynecology, general surgery, orthopedics and traumatology, ear-nose-throat, urology, plastic and reconstructive surgery, and neurosurgery operations were planned with a rate of 1.7% (n=21), 6.5% (n=80), 0.8% (n=10), 2% (n=24), 5.8% (n=71), 2.6% (n=32), and 0.9% (n=11), respectively. While malignant operations were mostly planned in general surgery and least neurosurgery, benign operations were planned mostly in ophthalmology and least in cardiovascular surgery (Table 2).

Body mass index (BMI) was calculated with the formula BMI=body weight/height² (kg/m²), and waist circumference was accepted as high when ≥94 cm in men and ≥80 cm in women.^[5] The average BMI value was 26.4±3.12 kg/m², and waist circumference was 86.0±9.9 cm. While the rate of hospitalization in the ICU was 5.7% (n=70), the mortality rate was 1.5% (n=18). The highest rate of mortality among this group was seen in patients with malignancy diagnosis (18.5%), admission to ICU (10.9%), and BMI value <18.5 kg/m² and ≥40 kg/m² (Table 3). When the appropriate level of hemoglobin for surgery was evaluated as ≥12 mg/dL in women and ≥13 mg/dL in men, the mean hemoglobin value was found to be 13.1 mg/dL in all groups.

Table 1. Clinical and demographic characteristics of patients

	n	%	Mean±SD
Age (years)			60.2±12.7
Male	624	50.7	
ASA 1	200	16.3	
ASA 2	603	49	
ASA 3	405	32.9	
ASA 4	22	1.8	
General anesthesia	827	61.4	
Local anesthesia	486	36.1	
Epidural anesthesia	32	2.3	
Hypertension	686	55.8	
Diabetes mellitus	503	40.9	
Hyperlipidemia	264	21.5	
Hypothyroidism	161	13.1	
Hyperthyroidism	24	2	
Coronary artery disease	292	23.7	
Neurological disease	44	3.6	
Malignancy	276	22.4	

ASA: American Society of Anesthesiologists score; SD: Standard deviation.

Table 2. Surgical distribution of patients

	n	%
Malign operations		
Neurosurgery	11	0.9
Ear–nose–throat	24	2
Orthopedics	10	0.8
Plastic and reconstructive	32	2.6
Urology	71	5.8
Gynecology malign	21	1.7
General surgery malignancy	80	6.5
Benign operations		
Neurosurgery	42	3.4
Plastic and reconstructive	25	2
Urology	67	5.4
Cardiovascular surgery	5	0.4
Ear–nose–throat benign	42	3.4
Gynecology	93	7.6
Ophthalmic surgery	438	35.6
General surgery	201	16.3
Diabetic foot surgery	21	1.7
Orthopedics	47	3.8

Table 3. Mortality rates of BMI and chronic diseases

	n	%	p
BMI (kg/m²)			
<18.5	1	33.3	<0.001
18.5–24.9	20	8.7	NS
25–29.9	19	3.5	NS
30.0–39.9	2	9.6	NS
≥40	1	40	<0.001
Chronic diseases			
Hypertension	36	5.8	0.179
Diabetes mellitus	44	6.4	0.219
Hyperlipidemia	19	7.2	0.233
Hypothyroidism	8	5	0.671
Hyperthyroidism	1	4.2	0.745
Coronary artery dis-ease	20	6.8	0.328
Neurological disease	1	2.3	0.319
Malignancy	51	18.5	<0.001

BMI: Body Mass Index; NS: Not significant. P<0.01.

DISCUSSION

In our study, it was determined that internal medicine consultation was mostly performed for HT with a rate of 55.8% (n=686). As HT is the most common disease, cases can be determined by preoperative consultations, and complications such as mortality and ICU admission in the postoperative period can be predicted. The evaluation was needed for regulating DM with a rate of 40.9% (n=503), and preoperative recommendations are least commonly needed for hypothyroidism with a rate of 2% (n=24).

In the preoperative evaluation, ophthalmology was the branch that asked for preoperative advice at most 35.6% (n=438). Additionally, it was observed that the operations performed due to malignancy were most frequently performed by general surgery 6.5% (n=80).

In a study for the preoperative management of HT, high diastolic pressure (≥90 mmHg) has been shown to be associated with increased postoperative mortality and diastolic HT is a more powerful cardiovascular risk factor than systolic HT up to the age of 50. However, systolic blood pressure is a more powerful risk factor above this threshold.^[3] A patient with HT can be managed safely during the surgery period by continuing the treatment with appropriate drugs in the pre- and postoperative periods and by careful monitoring.^[4] In our study, 55.8% of our patients were diagnosed with HT in addition to their current disease, and their follow-up was provided with our pre- and postoperative treatment recommendations. While 6.4% of our patients diagnosed with HT required postoperative ICU follow-up, mortality has developed in 4.1% of them. European guidelines suggest that surgery can be postponed for further evaluation in patients with HT when blood pressure readings are consistently above 180 mmHg systolic or 110 mmHg diastolic.^[5] Our study excluded patients with a postponed surgical decision or further evaluation because of nonregulated HT, and all our study patients were regulated with current treatment modalities.

In the preoperative evaluation of patients with DM, hyperglycemia should not be a reason for the cancellation of the surgical procedure, and preoperative blood sugar regulation and safe anesthesia should be provided. The cancellation of surgical procedure should not be considered in hyperglycemic patients with Type I DM unless diabetic coma is present, and blood sugar regulation should be maintained with insulin.^[6] Insulin dose adjustment according to the level of glucose and strict blood glucose monitoring are essential in the perioperative period. Major surgical procedures and poor-controlled diabetes require hourly blood glucose measurement. HbA1c > 8% indicates poor metabolic control with a worse-than-expected surgical outcome. The therapeutic regimen may affect the management of anesthesia in patients with DM, and therefore pharmacological regimen and management principles such as details of treatment, drug type, and dose should be determined.^[7]

While the rate of diabetic patients was 40.9%, the rate of those who had planned to have an operation due to diabetic foot was 1.7% in our study. In their follow-up, the rate of admission to the postoperative ICU was 6.8% and mortality was 4.6% in patients with diabetes. The cases followed in the ICU constituted a very heterogeneous group, and some prognostic factors specific to the primary disease were present in addition to general factors that affect the mortality.^[8] Targeting HbA1c value <6.5% while managing preoperative glucose will decrease postoperative surgical complications such as wound infections

and exudates. Additionally, the optimization of nutritional status and psychological well-being should be ensured. High HbA1c is related to the higher perioperative level of glucose and is an independent risk factor for increased mortality in patients with preoperative hyperglycemia undergoing noncardiac, nonvascular surgical procedures, and elective surgical procedures should be delayed if HbA1c is ≥ 9 .^[6] The average value of HbA1c was 6.4% in our study and our patients did not experience any major complications after surgery due to our recommendations.

Hypothyroidism can systemically produce changes in the normal physiology of each organ system and facilitate low metabolism in hemodynamics, heart, respiratory, and kidney functions. In terms of thyroid functions, 13.1% of our patients were diagnosed with hypothyroidism and 2% with hyperthyroidism, and all our patients were under treatment. The rate of mortality was 3.7% in patients with hypothyroidism diagnosis and 8.3% in patients with hyperthyroidism diagnosis. It is recommended to plan the elective surgical procedures for hypothyroid and hyperthyroid cases when thyroid functions reach normal limits. Additionally, it was recommended to plan the operation with the precautions and treatment to be taken to prevent/minimize postoperative complications when an emergency operation is required, and its postponement is inappropriate for the case.^[9]

Obesity can cause numerous medical conditions, including HT, dyslipidemia, DM, ischemic heart disease, stroke, osteoarthritis, obstructive sleep apnea, and some types of cancer. Anesthesiologists can optimize the probability of a good outcome by identifying and intervening factors that may increase the risk of perioperative complications.^[10] The evaluation of abdominal obesity in our patients showed that postoperative ICU follow-up is required in 4.8% of female patients with waist circumference ≥ 94 cm, and the mortality rate was 1.8% among these patients. However, postoperative ICU follow-up is required in 4.8% of female patients with waist circumference ≥ 80 cm, and the mortality rate was 2.8% among these patients.

A relationship is present between nutritional status and postoperative mortality–morbidity in major operations. Perioperative management of obesity and obese patients is important. In obese patients (BMI > 40 kg/m²), thromboembolic events that may develop, especially in the postoperative period, are effective on mortality and morbidity.^[11] According to our BMI results, the rate of admission to ICU and mortality are statistically significantly higher in patients with BMI < 18.5 and ≥ 40 ($p < 0.001$). In a study evaluating the effect of BMI values of patients who underwent colorectal surgery on surgical results, the risk of postoperative complications increased in underweight and morbid obese patients when compared with patients who had normal BMI.^[12] In another study, obesity was determined as an independent risk factor for perioperative morbidity, and morbid obesity was determined as a risk factor for mortality.^[13] Similar to our results, it was concluded in a study evaluating patients who underwent surgery for

gastrointestinal malignancy that overweight and obese patients were at risk of major postoperative complications compared with those with normal weight.^[14]

The rate of mortality (10.9%) and ICU admission (18.5%) were increased in our patients who were scheduled for surgery with the diagnosis of malignancy ($p < 0.001$). In another study, the rate of complications after major gastrointestinal surgery is high, similar to our study.^[15] Underlying comorbid conditions and diseases should be carefully defined to decrease preoperative risk because it is related to early postoperative mortality after gastrointestinal cancer resection in another study.^[16]

Preoperative anemia (hemoglobin < 13 g/dL in males, < 12 g/dL in nonpregnant females) is related to increased perioperative morbidity and mortality. A standardized approach is needed for blood transfusion risks and detection, assessment, and management of anemia.^[17] In our study, the mortality rate of female patients with anemia was 8.3% ($n = 14$) ($p < 0.001$), while the mortality rate of male patients was 8% ($n = 14$) ($p < 0.001$), which was statistically significant. In the group with normal hemoglobin values, the mortality rate was 1.1% ($n = 5$) in female patients and 2.2% ($n = 10$) in male patients. Anemia is related to survival. It can be used as an alert in identifying high-risk patients.^[18] Surgical patients with anemia are at higher risk of morbidity and mortality, and therefore detection and treatment of anemia before the surgery is particularly important. Higher in-hospital mortality, longer hospital stays, and more intensive care admission were observed in patients with moderate or severe preoperative anemia. In a recent meta-analysis, it was shown that patients with anemia were at risk of major adverse outcomes, including mortality, in 24 observational studies (949,445 patients) comparing outcomes after major surgery, including heart surgery, in patients with and without preoperative anemia.^[17,19]

It has been shown that quitting smoking 8 weeks before surgery reduces the risk of pulmonary complications, and quitting smoking 4 weeks before surgery significantly reduces complications.^[20] When we evaluated the ratio of smoking among our patients with mortality, the rate of mortality was 4.4%. In a study, pulmonary and cardiovascular complications and surgical site infections were found to be a mediator of smoking-related 6-month and 1-year mortality. Therefore, interventions for quitting smoking, preventing complications, and early treatment might help decrease postoperative mortality after elective surgery.^[21]

Limitations

The most important strength of our study is the prospective design and presence of no other studies in the field of internal medicine, including the same number of patients in our country. Besides, this study is completely reliable since all patient data were accessed from the hospital patient registry and national data system. One of our limitations is not reflecting the general population, and the presence of patients diagnosed with malignancy mostly consisted of

cases originating from general surgery and gastrointestinal system because of including patients originating only from Kartal province. Preoperative evaluations of orthopedics and traumatology cases were generally performed during their hospitalization in our hospital, and major cardiac surgery cases were not hospitalized. As smoking status may change with time, future status changes could not be reflected. There is a need for further studies with large sample groups.

CONCLUSION

The perspective, opinions, and recommendations of the internal medicine physicians during preoperative evaluation are particularly valuable for postoperative survival. Patients with anemia, malignancy, and increased or decreased BMI during internal medicine evaluation constitute risky groups in terms of the need for intensive care and development of mortality. Pre- and postoperative close follow-up of these patients is important in terms of prognosis.

Ethics Committee Approval

This study approved by the Kartal Dr. Lütfi Kırdar City Hospital Clinical Research Ethics Committee (Date: 06.08.2020, Decision No: 2020/514/184/12).

Informed Consent

Prospective study.

Peer-review

Internally peer-reviewed.

Authorship Contributions

Concept: A.C.I., S.A.; Design: A.C.I., S.A., Ö.K.; Supervision: B.B., Ö.K.; Fundings: A.C.I., M.T.; Data: A.C.I., M.T., Ş.A.; Analysis: Ş.A., S.A., B.B., A.C.I.; Literature search: A.C.I., S.A., Ö.K.; Writing: A.C.I., M.T.; Critical revision: A.C.I., S.A., Ö.K., B.B.

Conflict of Interest

None declared.

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Bir Şehir Hastanesi Deneyimi: Ameliyat Öncesi İç Hastalıkları Değerlendirmesi Önemli midir?

Amaç: Çalışmamızda elektif, non-kardiyak cerrahi planlanan dahili görüş gerektiren hastaların ameliyat öncesi değerlendirilmesi ve demografik verileri, kronik hastalıkları, operasyon nedeni, obezite sıklığı, laboratuvar verileri ile sağkalım, yoğun bakım ünitesine giriş ve mortalite oranları üzerine etkisini belirlemeyi amaçladık.

Gereç ve Yöntem: Kartal Dr. Lütfi Kırdar Şehir Hastanesinde 01 Haziran–01 Ekim 2020 tarihleri aralığında elektif, kardiyak olmayan operasyon planlanan 1345 hasta ileriye yönelik olarak değerlendirilerek altı aylık takipleri yapıldı. Hastaların ameliyat öncesi American Society of Anesthesiologists skorları (ASA), demografik bilgileri, operasyon nedeni ve yöntemi, kronik hastalıkları, boy, kilo, bel çevresi, vücut kitle indeksi, ameliyat sonrası yoğun bakım gerekliliği ve incelemeleri kaydedildi.

Bulgular: Bu çalışmaya toplam 1230 hasta dahil edildi. Ortalama yaş 60.2 ± 12.7 olup, hastaların %50.7'si (n=624) erkekti. Ameliyat öncesi ASA skorları, ASA-1, ASA-2, ASA-3 ve ASA-4 sırasıyla %16.3 (n=200), %49 (n=603), %32.9 (n=405) ve %1.8 (n=22) idi. Malignite nedeniyle ameliyat edilecek hastaların oranı %22.4 (n=276) idi. Göz ameliyatları en çok değerlendirilen hasta grubuydu (n=438) ve hipertansiyon, diabetes mellitus, koroner arter hastalığı en sık görülen hastalıklardı. Yoğun bakımda yatış oranı %5.2 (n=70), ölüm oranı %1.3 (n=18) idi. Bu grup içinde en yüksek mortalite oranı malignite tanısı olan (%18.5), yoğun bakım ünitesine kabul edilen (%10.9) ve vücut kitle indeksi değeri $<18.5 \text{ kg/m}^2$ ve $\geq 40 \text{ kg/m}^2$ olan hastalarda görülmüştür.

Sonuç: Çalışmamızda ameliyat öncesi dahili değerlendirmede en sık rastlanan hastalıklar olarak sırasıyla hipertansiyon, diabetes mellitus ve koroner arter hastalığı ilk üç sırada saptanmıştır. Maligniteye sahip ve vücut kitle indeksi çok düşük veya çok yüksek olan hastalar ameliyat sonrası dönemde anlamlı olarak daha fazla yoğun bakım gereksinimi ve mortalite gelişimi ile ilişkili bulunmuştur. Bu hasta gruplarının perioperatif ve ameliyat sonrası dönemde çok daha yakın takip edilmesinin sağkalım açısından önemli olduğunu düşünmekteyiz.

Anahtar Sözcükler: Ameliyat öncesi dönem; diabetes mellitus; iç hastalıkları; vücut kitle indeksi.