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Evaluation of Patients Delivered To The Postoperative Intensive Care Unit

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ABSTRACT

In our study, the purpose was to investigate the preoperative evaluations and indications of hospitalization of patients projected to be followed-up in postoperative Intensive Care Unit (ICU).A total of 77 patients who were projected to need ICU in the postoperative period and referred to postoperative ICU peroperatively as a result of preoperative evaluations for one year, were included in the study. The age, gender, ASA, type of surgery (elective/emergency), anesthesia method, postoperative stay in postoperative Intensive Care Unit and results (discharge/exitus) of the patients were recorded.In preoperative evaluation, it was determined that a total of 12.5% of patients projected to be hospitalized in postoperative ICU were referred to postoperative services. It was determined that 89.6% of patients were ASA III-V, 24.7% had malignancy, and 49.4% were operated urgently. As the indication of hospitalization at ICU, follow-up with monitoring was detected at 57.1%, hemodynamic instability at 27.3%, respiratory failure at 11.7%, and peroperative complications at 3.9%. While 92.5% of our patients were discharged with cure, 4.5% were exitus, and 3% were referred to another center. It was determined that our patients with postoperative ICU indications were elderly, male, and ASA III and above. The need for postoperative monitoring and hemodynamic instability were observed to be the most common indications for hospitalization. It was revealed that our hospital needed intermediary intensive care for the effective use of ICU capacities and optimum postoperative patient care.

Key Words: Surgery, endication, intensive care, triage, prognosis

Introduction

Peroperative mortality and morbidity development under the follow-up of an experienced anesthetist is not very common (1). However, complications,which might develop in peroperative and postoperative period may be affected by many factors that are not related to anesthesia.More than 40% of the patients admitted to Intensive Care Units (ICU) were patients who underwent surgery (2,3). Complications might develop in the first 24 hours following surgery because of many causes related to anesthesia and surgery, and can cause major morbidity and mortality (4). Sometimes, postoperative early and unexpected intensive care can occur, and mortality may be high (5). For this reason, it is very important to predict the need for postoperative ICU in preoperative evaluation and refer the patient to ICU without delay. In our study, the purpose was to evaluate clinical data, treatment processes in ICU, and mortality rates of the patientswho were predicted to be referred to ICU in preoperative evaluations and those for whom we decided peroperatively to transfer to intensive care unit.

Materials and Methods

A total of 77 patients who were projected to need ICU in the postoperative period and referred to postoperative ICU peroperatively as a result of preoperative evaluations for one year, were included in the study. The consents of the patients or their relatives were obtained. The age, gender, ASA, type of surgery (elective/emergency), anesthesia method, postoperative stay in postoperative Intensive Care Unit, and results (discharge/referral/exitus) of the patients were recorded.

The expression of categorical data was made as number and percentage, and the Chi-Square Test was used in comparisons. The analysis was made with IBM SPSS Package Program, version 24.0 (IBM Corporation, Armonk, NY, USA). When Type 1 error

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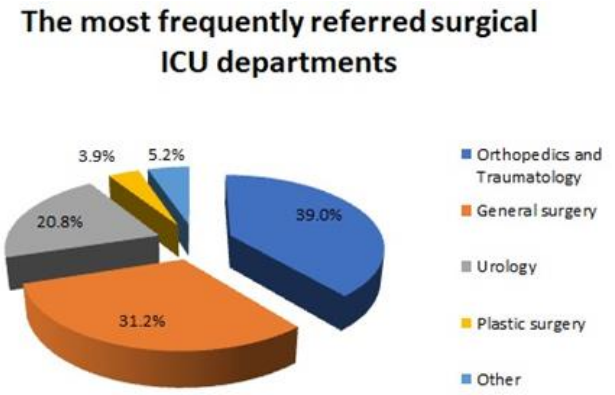

Fig. 1. Distribution of patients referred to Intensive Care Unit by surgical departments

level was below 5%, it was considered to be statistically significant.

Results

The median age of the patients who were referred to postoperative ICU was 72 (20-105). The most common hospitalization age wasfound to be between 65-79 with 47.7% in men, and 80 and older for women with 42.4%. ASA levels were similar in men and women with ASA 3 (70.5% and 81.8%, respectively). The rate of those admitted to intensive care with emergency indications was 51.5% in women, while it was 47.7% in men ($p>0.05$). When the durations of hospitalization in ICU was evaluated, similarly in men and women, the most common hospitalization time was 1 day (61.4% and 63.6%, respectively). When considered according to gender, no statistically significant differences were detected in terms of age, ASA, status, ICU hospitalization times and hospitalization results ($p>0.05$) (Table 1,2).

It was found that 89.6% of the patients were ASA III-V, 24.7% had malignancy, and 49.4% were urgently taken into operation. It was found that 53.2% of the patients received neuraxial anesthesia, 44.2% general anesthesia, 2.6% peripheral nerve block as anesthesia method, and the mean operation time was 131.4 ± 77.8 minutes.

The most frequently referred surgical ICU departments was Orthopedics and Traumatology (39.0%), General surgery (31.2%), and Urology (20.8%), respectively (Figure 1).

The most common hospitalization indication was 57.1% infollow-up with monitoring, followed by hemodynamic instability (27.3%), respiratory failure (11.7%), and peroperative complications (Figure 2).

Inotropic support was givento 14.9% of patients who were in the ICU. A total of 70% of inotropic patients were aged 65 and over, and 60.0% were

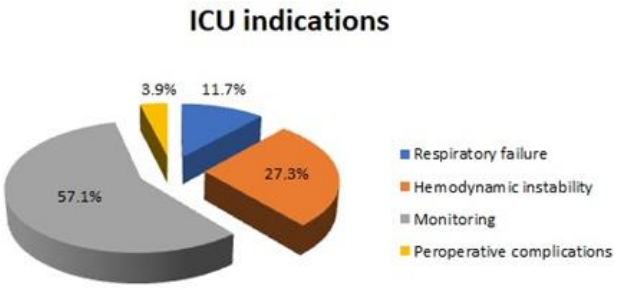

Fig. 2. Distribution of Intensive CareUnit indications

female. A statistically significant relation was detected between ICU indications and the need for inotrope($p<0.05$). It was found that 50% of inotropic patients were in intensive care because of hemodynamic instability, and 80% were requested for cardiology consultation (Table 3).

Intubation was applied to 5 patients (7.5%), while 8 (12%) patients needed noninvasive mechanical ventilation.

A total of 92.5% of our patients (n: 62) were discharged with cure, 4.5% (n:3) were exitus, and 3% (n:2) were referred to another center.

Discussion

As in the rest of the world, ICU bed capacities are limited in our country. While there are 2.8 intensive care beds per every 10,000 people in the USA and 1.15 in Europe, this ratio is 1.6 / 10,000 in Turkey (6). It is reported that 8-30% of hospital expenses belong to intensive care units. ICU bed capacities are limited in our country and all over the world. Treatment costs are high in intensive care units because of high number of personnel per patient and treatments like mechanical ventilation, dialysis, nutrition, antibiotic treatment (7). The limited capacity with high costs increases the importance of selectivity in patient admission to ICUs. For this reason, legal obligations and ethical problems caused by indication of intensive care hospitality must be made with care (8,9).

The ICU of our clinic is a third step general Intensive Care Unit, and has a capacity of 9 beds. Since there is no separate postoperative Intensive Care Unit in our hospital, the follow-up and treatment of our patients who are projected to need ICU after surgery is performed in the general Intensive Care Unit.

Anesthetists try to predict the need for postoperative ICU in preoperative examination when they decide the ASA classification of the patient with pre-evaluation according to the age, systemic disease, medication and size of the planned operation of the patient (10,11). This decision brings great responsibility on anesthesiologists because it is necessary to predict the need for ICU in time and

Table 1. Distribution of patients predicted for referral to postoperative intensive care by age and gender

	Male		Female		Total		p
Age	n	%	n	%	n	%	
20-50	6	13,6	3	9,1	9	11,7	0.082*
51-64	10	22,7	5	15,2	15	19,5	
65-79	21	47,7	11	33,3	32	41,6	
80 ≤	7	15,9	14	42,4	21	27,3	
ASA scoring							
ASA 1	1	2,3	0	0,0	1	1,3	0.338*
ASA 2	3	6,8	4	12,1	7	9,1	
ASA 3	31	70,5	27	81,8	58	75,3	
ASA 4	8	18,2	2	6,1	10	13,0	
ASA 5	1	2,3	0	0,0	1	1,3	
Emergency Status							
Emergent	21	47,7	17	51,5	38	49,4	0.742*
Elective	23	52,3	16	48,5	39	50,6	
Hospitalization time at ICU (Days)							
Not hospitalized at ICU	8	18,2	2	6,1	10	13,0	0.242*
1 day	27	61,4	21	63,6	48	62,3	
2 days	5	11,4	3	9,1	8	10,4	
3 days and over	4	9,1	7	21,2	11	14,3	

* Chi-Square Test
ASA: American Society of Anesthesiologists (ASA), ICU: Intensive Care Unit

Table 2. Results of ICU hospitalizations by gender

	Male		Female		Total		p
Discharge with cure	35	97,2	27	87,1	62	92,5	0.159*
Exitus	0	0,0	3	9,7	3	4,5	
Referral	1	2,8	1	3,2	2	3,0	
Total	44	100,0	33	100,0	77	100,0	

*Chi-Square Test

plan the referral of the patient in terms of preventing and treating postoperative complications,which might develop while preventing inappropriate hospitalizations (9).

Age is an important factor in predicting the ICU need. Our patients were between the ages of 20 and 105; however, the mean age was 69.3. When considered in terms of gender, male patients were most frequently seen between the ages of 65-79 (47.7%), and female patients were most frequently over 80 years of age (42.4%). In advanced ages, the prevalence of systemic diseases like DM, HT, KAH, and KBY; and therefore, ASA classification is increasing. In a study conducted with elderly patients, it was found that high ASA classification, operation in emergency conditions, and intraoperative tachycardia presence were the most important determinants of the postoperative period (12). Similarly, in our study, a total of 89.6% of our patients, who were admitted to the ICU, were ASA III-V patients. It was shown in previous studies that ASA scoring is an important ICU requirement marker, and was associated with intraoperative blood loss, need for postoperative mechanical ventilation, duration of stay in ICU, postoperative complications, and mortality (13-15). Malignancy was detected in 24.7% of patients referred to intensive care. We believe that presence of malignancy is effective in predicting postoperative ICU indications. Cancer patients may require surgery for complications due to cancer or other emergency reasons. In these patients, anesthesia management and postoperative care are especially required depending on the type of cancer and organ failure (16). Studies have shown that mortality is high in cancer patients (17). In a multicenter study, it was shown that postoperative surveillance of surgical patients with malignancies was better than other

Table 3. Distribution of patients by inotrope needsin the Intensive Care Unit

	Inotrope (-)		Inotrope (+)		Total		p
Age	n	%	n	%	n	%	
20-50	6	10,5	0	0,0	6	9,0	0.371*
51-64	8	14,0	3	30,0	11	16,4	
65-79	26	45,6	3	30,0	29	43,3	
80 ≤	17	29,8	4	40,0	21	31,3	
Gender							
Female	25	43,9	6	60,0	31	46,3	0.495*
Male	32	56,1	4	40,0	36	53,7	
ICU indication							
Respiratory insufficiency	7	12,3	1	10,0	8	11,9	0.019*
Hemodynamic instability	16	28,1	5	50,0	21	31,3	
Monitoring	33	57,9	2	20,0	35	52,2	
Peroperative complication	1	1,8	2	20,0	3	4,5	
Cardiology consultation							
Yes	41	71,9	8	80,0	49	73,1	0.595*
No	16	28,1	2	20,0	18	26,9	
Total	57	100,0	10	100,0	67	100,0	

*Chi-Square Test

comorbidities as a result of intensive care follow-up (18).

Consultations are requested in the preoperative evaluations to assess organ reserves of patients because of systemic diseases with increased prevalence with advanced age. In preoperative evaluations, it was observed that our patients had low cardiac and respiratory reserves, and 72.76% asked cardiology consultation, 62.3% chest diseases consultation, and 53.2% internal diseases consultation.

In the study of Bath et al., 38.7% of patients referred to ICU, were ASA III, and 41.2% were ASA IV (1). In their study, 95.6% of patients underwent general anesthesia and 74.5% underwent abdominal surgery. When the anesthesia method in our study was evaluated, 44.2% underwent general anesthesia and 53.2% neuroaxial anesthesia. When surgery type was evaluated, abdominal surgery was 74.5% in this study, compared to 31.2% in our study. We believe that the difference in the frequency of anesthesia methods between these studies was because of the variety of surgeries.

Ozer et al. (13) conducted a study and found that the planning of the surgery in emergency conditions was an important factor in predicting the need for ICU. In another study that examinedthe patients in postoperative Intensive Care Units, it was reported that the need for intensive care and mortality increased in patients over the age of 60, ASA classification III-IV, in abdominal surgery, in emergency surgeries, and in inotropic support conditions (19). In a study that examined high-risk surgical patients in the UK, emergency and elective mortality rates of the patients who were admitted directly to the ICU after surgery were 10.1% and 28.6%, respectively. Because of lack of time to solve existing problems in emergency cases, it is considered that the need for postoperative ICU and mortality was high (20). Similarly, in our study, it was found that 49.4% of our patients, who were operated in emergency conditions, were in need of ICU.

In preoperative evaluations, the surgeon plans the proper anesthesia method to protect the hemodynamics of the patientwith necessary surgical procedures. When there are additional systemic diseases, general condition of the patient is evaluated together with the physician from the relevant department. Necessary examinations and treatments are planned before the surgery. Possible complications and postoperative ICU hospitalization indication are also evaluated. Although it is sometimes not predicted in preoperative evaluations, due to complications that develop during intraoperative period and due to hemodynamic instability, the ICU decision can be made during surgery. In our study, it was observed that the need for follow-up and treatment in ICU was decided during the operation because of development of peroperative complications in 3.9% of patients.

Inotropic support therapy was administered to 14.9% of patients who were admitted to the ICU.

A total of 80% of these patients were asked for cardiology consultation in preoperative assessments, and 50% were referred to intensive care with hemodynamic instability.

Early diagnosis and intervention are the most important factors toavoid unwanted results. For this reason, after major surgery, all patients, and the elderly patients with systemic disease should be followed-up in postoperative period in terms of possible complications. Although intensive care waspredicted in preoperative evaluations, 13% (n: 10) of the patients were transferred to wards without taken to ICU. Regional anesthesia was administered to seven of these patients. With the application of regional anesthesia, respiratory and hemodynamic complications are avoided,which are common with general anesthesia;therefore, we believe that the patient was not referred to intensive care. It was observed in Er et al.'s study that more blood transfusions were applied in the group under general anesthesia and the risk of admission to intensive care increased as blood transfusion increased. In addition, 75% of the cases taken to the intensive care unit have been found to have at least one additional disease. Along with the surgical size, the presence of additional disease and the anesthesia method applied are also important in determining the need for intensive care (21).

In addition to general health status of patients and the conditions brought by surgery, clinicians can take a protective approach and decide forICU because of lack of technical equipment in the services or especially when there are no adequate medical personnel during the off-hours. Although hemodynamic instability is not the most common incidence, the need for follow-up was determined by hemodynamic monitoring. A total of 62.3% of the patients in Intensive Care Unit were monitored for 1 day, and were then transferred to wards. In the literature, our rate was found to be higherwhen compared to low-risk follow-uprates reported as 20-40%, which led us to suggest that a protective approach was taken due to the lack of intermediate intensive care and postoperative intensive care unit with the inadequacies in wards in our clinic.

Because of the limitations of Intensive Care Units in our hospital, there might occur difficulties in the triage of the patients in 3rd Step Intensive Care Unit.Because of the limited capacity, sometimes the surgeries of patients are delayed. In our study, 68.8% of the patients who were predicted for ICU requirements in preoperative evaluations did not require postponement on the date of the surgery, while 15.6% had to be postponed for 1 day.

In the articles of Rhodes and Cecconi (4), they discussed improving the surgical outcomes with postoperative intensive care follow-up of patients. They reported that complications were predicted to develop 75% frequently in postoperative period, and the results couldbe improved with the follow-up of these patients in intensive care;however, they also argued that this was not sustainable and financially affordable. However, Köse et al. found that postoperative hospitalizations constitute a small proportion of patients hospitalized in intensive care units, and mortality and cost are lower (22). Furthermore, Swann et al. examined postoperative early-period intensive care referrals of 34 patients, and found that 16 (47%) patients were predictable in terms of ICU referral, and 7 patients were preventable (20%). The lack of any such review was one of the limitations of our study. Also, comparative analysis of patients referred to ICUin postoperative period as a result of preoperative evaluations could not be carried out because of the low number of patients who were monitored in postoperative ICU but were transferred to postoperative wards. We revealed the need in our hospital for intermediate intensive care and postoperative Intensive Care Unit, and planning was made on this issue to improve the quality of healthcare in our hospital and to use Intensive Care Units more effectively.

References

1. Bhat SA, Shinde VS, Chaudhari LS. Audit of IntensiveCareUnitadmissionsfromtheoperating room. IndianJ Anaesth 2006; 50: 193-200.
2. Rose K, Byrick RJ, CohenMM. Planned and unplanned postoperative admissions to critical care for mechanical ventilation. Can J Anesth 1996; 43: 333-340.
3. Swann D, Houstin O, Goldberg J. Audit of intensive care unit admissions from the operating room. Can J Anesth 1993; 40: 137-141.
4. Rhodes A, Cecconi M. Can surgical outcomes be prevented by postoperative admission to critical care?CritCare 2013; 17: 110.
5. Tın PP, Kulkarnı A, Lım KH. Unplanned post-operative intensive care unit admissions. Brunei Int Med J 2013; 9: 302-306.
6. Kılıç M, Yüzkat N, Soyalp C, Gülhaş N. Cost Analysis on Intensive Care Unit Costs Based on the Length of Stay. Turk J Anaesthesiol Reanim 2019; 47: 142-145.

7. Tan SS, Bakker J, Hoogendoorn ME,et all.Direct Cost Analysis of Intensive Care Unit Stay in Four European Countries: Applying a Standardized Costing Methodology. Value in Health 2012; 15: 81-86.
8. Sobol JB, Wunsch H. Triage of high-risk surgical patients for intensive care. Crit Care 2011; 15: 217.
9. Oerlemans AJ, vanSluisveld N, vanLeeuwen ES, Wollersheim H, Dekkers WJM, Zeggers M. Ethical problems in intensive care unit admission and discharge decisions: a qualitative study among physicians and nurses in the Netherlands. BMC Med Ethics 2015; 16: 9.
10. Task Force of the American Colllege of Critical Care Medcine. Guidelines for intensive care unit admission, discharge, andtriage. CritCareMed 1999; 27: 633-638.
11. Caldeira VM, Silva Júnior JM, Oliveira AM, et al. Criteria for patient admission to an intensive care unit and related mortality rates. Rev Assoc Med Bras (1992) 2010; 56: 528-534.
12. Satyawan AB, Shinde VS, Chaudhari LS. Audit of intensive care unit admissions from the operating room. Indian J Anaesth 2006; 50: 193-200.
13. Özer AB, Demirel İ, Erhan ÖL, Bayar MK, Düzgöl Ö. Postoperative appropriateness of assigning an intensive care bed preoperatively for high-risk patients: a retrospectivestudy. TurkJ Geriatr 2013; 16: 439-445.
14. Klein N, Weissman C. Evaluating intraoperative the therapeutic and diagnostic interventions. AnesthAnalg 2002; 95: 1373-1380.
15. Wolters U, Wolf T, Stützer H. ASA classification and perioperative variables as predictors of postoperative outcome. Br J Anaesth 1996; 77: 217-222.
16. Koutsoukou A. Admission of critically ill patients with cancer to the ICU: many uncertainties remain. ESMO Open 2016; 2: e000105.
17. Panay S, Ruiz C, Abarca M, Nervi B, Salazar I, Caro P, Muñiz S, Briones J, Bruhn A, Mondaca S. Mortality of Adult Patients With Cancer Admitted to an Intensive Care Unit in Chile: A Prospective Cohort Study J Glob Oncol 2018; 4: 1-9.
18. Puxty K, McLoone P, Quasim T, Sloan B, Kinsella J, Morrison DS. Characteristics and Outcomes of Surgical Patients With Solid Cancers Admitted to the Intensive Care Unit. JAMA Surg 2018; 153: 834-840.
19. S Manjula, D Lalita, R Shilpa.Analysis of anaesthetic ıntensive care unit admissions: The Anaesthesiologists' perspective. J AnaesthesiolClin Pharmacol 2007; 23: 283-289.
20. Pearse RM, Harrison DA, James P, et al.Identification and characterisation of the high-risk surgical population in the United Kingdom. CritCare 2006; 10: R81.
21. Er S, Çeğin M B, Gökyaş U, Güner S, Yüzkat N. Ortopedi Ve Travmatoloji Cerrahisinde Anestezi Yöntemlerinin Retrospektif Analizi. Anestezi Dergisi 2015; 23: 81-85.
22. Kose I, Zincircioglu Ç, Ozturk YK, Senoglu N, Erbay RK. Characteristics and Outcomes of Patients with Prolonged Stays in an Intensive Care Unit Eur J Gen Med 2016; 13: 127-133.