



The evaluation of American Society of Anesthesiology Classification 3–4 and 5 Patients Admitted Intensive Care Unit in Post-Operative Period

Murat Tolga Avşar,¹ İbrahim Akkoç,² Mehmet Toptaş,² Zeynep Zehra Gümüş³

¹Department of Anesteziyoloji and Intensive Care Unit, Gebze Fatih State Hospital, Kocaeli, Turkey

²Department of Anesteziyoloji and Intensive Care Unit, Haseki Training and Research Hospital, İstanbul, Turkey

³Department of Internal Medicine, İzmir Katip Çelebi University Atatürk Training and Research Hospital, İzmir, Turkey

Abstract

Introduction: Post-operative complications contribute high mortality rates. Pre-operative evaluation is performed to determine the risk of complications and mortality. Hence, we aimed to evaluate American Society of Anesthesiology Classification 3, 4 and 5 patients and their post-operative prognosis.

Methods: The patients, admitted to intensive care unit (ICU) in a tertiary hospital in Turkey in a year, were evaluated retrospectively.

Results: Among 590 patients, the mean age was 62.7±17.5. Postoperatively, 94.4% of the patients were discharged. However, 5.6% of the patients died and all of them had an emergency surgery.

Discussion and Conclusion: Pre-operative evaluation supplies a valuable estimation of patient prognosis. We recommend that the patients, who will undergo an emergency surgery, should be carefully followed during both under anesthesia and in ICU.

Keywords: American Society of Anesthesiology Classification; intensive care unit; postoperative period.

The patients admitted to intensive care unit (ICU) in post-operative period have a high mortality ratio. In the literature, mortality rates varies between 14% and 41.1% depending on many reasons such as underlying diseases, age, duration of mechanic ventilation, and severity of disease^[1]. A good pre-operative evaluation and determining critically ill patients, helps estimating prognosis, defining patient management strategies and effective use of resources^[1].

The most frequent and severe post-operative complica-

tions are dysfunctions of respiratory and cardiovascular systems^[2]. Incidence of complications vary depending on type of surgery, location of the operation, and comorbidities. The presence of pre-operative respiratory system disease increases the susceptibility to postoperative respiratory system complications^[2]. Post-operative pulmonary complications (PPC) contribute high mortality and complication rates. Having knowledge about respiratory system diseases and related complications is extremely important in terms of preventing possible perioperative complica-

Correspondence (İletişim): Murat Tolga Avşar, M.D. Gebze Fatih Devlet Hastanesi, Kocaeli, Turkey

Phone (Telefon): +90 555 581 66 77 **E-mail (E-posta):** dr.tolgaavsar@gmail.com

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tions. Pre-operative evaluation is performed to determine the risk of complications and mortality in the patients who will undergo surgery^[2]. Hence, we aimed to examine the relationship between pre-operative evaluation and post-operative prognosis.

Materials and Methods

After the approve of local ethics committee, we retrospectively examined the patients, who admitted ICU of a tertiary hospital in Istanbul between January 1, 2014 and December 31, 2014. We collected the data above:

- Age
- Gender
- Type of anesthesia
- Type of operation (emergency/elective)
- Post-operative complications
- Surgery clinic
- Outcome (discharged or exitus)
- Reason for admission to ICU
- Comorbidities.

We included the patients who met criteria for American Society of Anesthesiology Classification (ASA) 3, 4, and 5. ASA six patients were not included.

In the medical records, one the reasons of admission to ICU was general condition disorder. In this study, "general condition disorder" term was described above as having at least 1 criterion.

The Criteria for General Condition Disorder

- Severe electrolyte imbalance
- Arterial blood gas analysis anomalies
- Malnutrition
- Hypoalbuminemia
- Dehydration
- Glasgow coma scale <12 in the elderly population (>65).

We excluded the patients with absent medical records and ASA 1, 2, and 6 patients.

Statistical Analysis

For the statistical analysis, we used SPSS 15.0 for Windows program. We used nouns and per cents for categorical variables and mean, standard deviation, median value, and minimum and maximum for numeric variables. The ratio between categorical variables was examined with Chi Square analysis. The statistically significant level was accepted as $p < 0.05$.

Results

A total of 590 patients were included the study. All of the patients had full medical records. The mean age of the patients was 62.7 ± 17.5 (minimum 1 year old, and maximum 101 year old). Among them, 56.6% of the patients were male and 43.4% were female. The average length of stay in ICU was 1.9 ± 2.8 days (maximum 29 days). Some demographic and clinical features of the patients are summarized in Table 1.

The reasons that caused to admission to ICU were various as shown in Table 2. The most frequently comorbidities belonged to cardiovascular system diseases: Heart failure, hypertension (HT), and ischemic heart disease. Asthma and chronic obstructive pulmonary disease (COPD) were the most frequently diseases in the respiratory system diseases. Some patients had more than one chronic disease, but we count these patients in each disease category.

In the study hospital, some features of the surgeries alone were enough to admission ICU. They were cranial mass surgery, cranial aneurism surgery, per-operative bleeding, and/or blood transfusion, the surgeries lasts more than 6 h, larynx malignancy surgery and scoliosis surgery.

Table 1. Demographic and clinic features of the patients

Age Mean \pm SD	62.7 \pm 17.5
Gender n (%)	
Male	334 (56.6)
Female	256 (43.4)
Length of stay Mean \pm SD	1.9 \pm 2.8
Clinics n (%)	
General surgery	220 (37.3)
Orthopedics	146 (24.7)
Neurochirurgia	107 (18.1)
Urology	61 (10.3)
ENT	45 (7.6)
Gynecology and obstetrics	8 (1.4)
Eye	2 (0.3)
Thoracic surgery	1 (0.2)
Emergency/Elective Surgery n (%)	
Emergency	85 (14.4)
Elective	505 (85.6)
Type of anesthesia n (%)	
General anesthesia	449 (76.1)
Spinal-epidural	137 (23.2)
Sedation	3 (0.5)
Infralavicular block	1 (0.2)
Outcome	
Exitus	33 (5.6)
Discharged	557 (94.4)

SD: Standart deviation.

Table 2. The indications caused to intensive care unit admission

Indications	Noun	
	Noun	%
General Condition Disorder	128	21.7
Heart Failure	117	19.8
Type and duration of surgery	109	18.5
Hypertension	101	17.1
Ischemic Heart Disease	75	12.7
COPD*	69	11.7
Diabetes Mellitus	66	11.2
Asthma	35	5.9
Renal Failure	27	4.6
Atrial Fibrillation	25	4.2
Other Cardiovascular Diseases	19	3.2
Cerebrovascular Disease	19	3.2
Other Respiratory System Diseases	13	2.2
Other neurologic diseases	12	2.0
Alzheimer's Disease	9	1.5
OSAS**	5	0.8
Postoperative Respiratory Failure	5	0.8
Myasthenia Graves	3	0.5
Thyroid diseases	3	0.5
Hematologic Diseases	2	0.3
Difficult Intubation	2	0.3
Other diseases	5	0.8

*COPD: Chronic obstructive respiratory disease; **OSAS: Obstructive sleep apnea syndrome.

Among clinics, there was statistically significant difference between the rates of emergency surgeries and elective surgeries ($p < 0.001$).

As seen below, in Table 3, emergency surgery rates were higher in general surgery, neurochirurgia and obstetrics and gynecology clinics. On the other hand, the highest elective surgery rates were found in ear nose throat, orthopedics, and urology clinics.

Table 3. The rates of type of surgery according to clinics

Clinics	Emergency		Elective	
	Noun	%	Noun	%
Neurochirurgia	26	24.3	81	75.7
General Surgery	51	23.2	169	76.8
Thoracic Surgery	1	100	0	0
Eye	0	0	2	100
Gynecology and Obstetrics	3	37.5	5	62.5
ENT*	1	2.2	44	97.8
Orthopedics	2	1.4	144	98.6
Urology	1	1.6	60	98.4

*ENT: Ear nose throat.

There was statistically significant difference between the chose of type of anesthesia ($p < 0.001$). Regional anesthesia (spinal or epidural) was mostly preferred by orthopedics and urology. The other type of anesthesia data is below (Table 4).

In emergency surgery group, general condition disorder was more common than elective surgery group ($p < 0.001$). Cardiovascular and respiratory system diseases were found more frequently in elective surgery group ($p < 0.001$). There was not any other statistically significant difference between groups in terms of other diseases (Table 5). Among the cardiovascular system diseases, the most common diseases were heart failure, HT, and ischemic heart diseases. Unregulated diabetes mellitus and hyper and hypothyroidism were came into prominence among endocrinological diseases.

The mortality rate of this study was 5.6% (33 patients). Some patients had more than one disease caused to mortality. We categorized these diseases and summarized in Table 6. The only diagnosis with statistically significant difference between the groups was general condition disorder. Furthermore, all of the dying patients had an emergency surgery.

Discussion

Cardiovascular and respiratory risk factors mostly determine the postoperative complications, morbidity, and mortality. Specifying the risk factors and evaluating the results provide managing surgery period and informing the patient^[3]. As compatible with the literature, we found that the most common indications of ICU admission were cardiovascular and respiratory system diseases. On the other hand, cardiovascular system diseases and general condition disorder were the most important reasons of mortality. Surgery interventions and the pathophysiological changes during anesthesia increases PPC. Obesity, elderly age, underlying pulmonary diseases, other comorbidities, duration of surgery, and type of surgical procedure affects the rate of respiratory system complications^[3]. In this study, type of surgery and respiratory system diseases were frequent reasons for admission to ICU, respectively, 20.8% and 22.4%.

Djokovic and Hedley-Whyte reported that the 30-day mortality of the patients older than 80-year-old, was 6.2% and elder age increases the mortality rate. Okboy et al.^[4] also demonstrated that age older than 80 heightens mortality rate^[5]. Daley et al. showed that serum albumin, ASA score, emergency surgery, age, and platelet count were related with high mortality^[6]. In this study, mortality rate was found 5.6%. Patients dying postoperatively were defined mostly with general condition disorder and this definition

Table 4. The chosen anesthesia types according to clinics

Clinics	General Anesthesia		Infraclavicular Block		Sedation		Spinal/Epidural	
	Noun	%	Noun	%	Noun	%	Noun	%
Neurochirurgia	106	99.1	0	0	1	0.9	0	0
General Surgery	200	90.9	0	0	1	0.5	19	8.6
Thoracic Surgery	1	100	0	0	0	0	0	0
Eye	2	100	0	0	0	0	0	0
Gynecology and Obstetrics	8	100	0	0	0	0	0	0
ENT*	44	97.8	0	0	1	2.2	0	0
Orthopedics	42	28.8	1	1	0	0	103	70.5
Urology	46	75.4	0	0	0	0	15	24.6

*ENT: Ear nose throat.

Table 5. Comparison of concomitant diseases according to groups

Disease	Emergency		Elective		p
	Noun	%	Noun	%	
Cardiovascular	21	24.7	250	49.5	<0.001
Respiratory	7	8.2	118	23.4	0.002
Endocrine	6	7.1	65	12.9	0.128
Neurologic	6	7.1	40	7.9	0.784
General Condition Disorder	45	52.9	70	13.9	<0.001
Type of surgery/Duration	19	22.4	102	20.2	0.649
Others	3	3.5	24	4.8	0.618

includes the risk factors mentioned above (elder age, hypoalbuminemia, dehydration, severe electrolyte imbalance, impaired renal functions, and malnutrition).

Smetana et al. previously adverted that the most frequent PPC were respiratory failure due to prolonged mechanic ventilation, atelectasis, bronchospasm and COPD^[7]. In this study, COPD was determined as the most important criterion to increase the risk index of general medical condition and age. While COPD increased PPC 2 fold, general medical condition changed the ASA score and became another risk factor for PPC. We also found that COPD was the most frequent respiratory system disease that caused to admission to ICU. The most frequent cardiovascular system disease was heart failure.

Arozullah et al. established that the risk factors for PPC are insulin treatment for diabetes mellitus, metastatic cancers, neuromuscular disease, central nervous system tumors, angina pectoris, myocardial infarction, functional dependency, and weight loss in 6 months before the surgery^[8]. In this study, among the dying patients postoperatively, 12.1% had endocrinological diseases, and 15.2% had neurologic diseases.

In the literature, emergency surgery was reported as a risk factor for PPC and mortality^[7,9]. As similar, in this study, all patients who died in postoperative period had an emergency surgery. All of the elective surgery patients were discharged without mortality.

Conclusion

Pre-operative evaluation supplies a valuable estimation of patient prognosis. To prevent the post-operative complications, anamnesis, physical examination, carefully analyzing laboratory results, and determining risk indexes are essential. We recommend that the patients, who will undergo an emergency surgery, should be carefully followed during both under anesthesia and in ICU.

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