

Critically Ill Surgical Patients Followed in a Medical Intensive Care Unit

Bir Dahili Yoğun Bakım Ünitesi'nde İzlenen Kritik Cerrahi Hastalar

Mine Durusu Tannöver¹, Bilgin Sait¹, Begüm Ergan Arsava², Kaya Yorgancı³, Arzu Topeli İskit¹

¹ Department of Internal Medicine, Medical Intensive Care Unit, Faculty of Medicine, Hacettepe University, Ankara, Turkey

² Department of Pulmonology, Faculty of Medicine, Hacettepe University, Ankara, Turkey

³ Department of General Surgery, Faculty of Medicine, Hacettepe University, Ankara, Turkey

Abstract

Aim: Postoperative patients, particularly the elderly, might have high hospital mortality rates. A multidisciplinary approach can decrease the mortality rate in this patient population and offer high quality intensive care. The aim of this study was to evaluate the general characteristics and outcome of surgical and trauma patients followed in a medical intensive care unit (MICU).

Material and Methods: Data of critically-ill surgical patients, who were operated on during the MICU stay or within 1 month before MICU admission, and of trauma patients admitted to the MICU in a tertiary care university hospital between 1 May 2006 and 1 May 2009, were retrospectively collected from a prospectively established database.

Results: Thirty nine of 794 admissions (5%) in the defined period were trauma or postoperative patients. Twenty six of them had at least one accompanying comorbidity. Among trauma patients, there was just one death. The predicted mortality of the postoperative patients was 33.1%, while the overall observed MICU mortality was 25.6%.

Conclusion: Trauma and high-risk postoperative patients can be followed in MICUs with good ICU care and surgical back-up and good cooperation between medical and surgical departments. (Yoğun Bakım Derg 2010; 3: 60-2)

Key words: Postoperative, medical, intensive care, trauma, mortality

Received: 04.06.2010

Accepted: 29.11.2010

Özet

Giriş: Özellikle yaşlı olan postoperatif hastalarda hastane mortalitesi yüksek olabilir. Multidisipliner bir yaklaşım bu hastaların hastane mortalitesini azaltabilir ve yüksek kaliteli bir yoğun bakım hizmeti sunabilir. Bu çalışmanın amacı, bir dahili yoğun bakım ünitesinde (DYBÜ) izlenen cerrahi ve travma hastalarının genel özellikleri ve hastane sonuçlarını incelemektir.

Gereç ve Yöntemler: 1 Mayıs 2006 ve 1 Mayıs 2009 tarihleri arasında üçüncü basamak bir üniversite hastanesinde yer alan DYBÜ'de yatarken veya yatıştan bir ay önce opere olmuş cerrahi kritik hastalar ve travma hastalarının verileri prospektif olarak oluşturulmuş bir veri tabanından retrospektif olarak kaydedildi.

Bulgular: Tanımlanan zaman aralığındaki 794 yatıştan 39'u (%5) travma ve postoperatif hastalardı. Bunlardan 26'sinin en az bir komorbid hastalığı mevcuttu. Travma hastalarından sadece bir ölümcül vaka vardı. Postoperatif hastaların DYBÜ'deki beklenen mortalitesi %33.1 iken gözlemlenen genel mortalitesi %25.6 idi.

Sonuç: İyi bir yoğun bakım hizmeti ve cerrahi destek ve de en önemlisi dahili ve cerrahi bölümler arasında yakın işbirliği ile travma hastaları ve postoperatif hastalar DYBÜ'nde de izlenebilir. (Yoğun Bakım Derg 2010; 3: 60-2)

Anahtar sözcükler: Postoperatif, dahili, yoğun bakım, travma, mortalite

Geliş Tarihi: 04.06.2010

Kabul Tarihi: 29.11.2010

Introduction

Postoperative patients, especially when elderly and with co-morbidities, may have high hospital mortality rates (1). These patients may require intensive care unit (ICU) admission during their follow-up. Additionally, patients in the medical intensive care unit (MICU) can develop surgical complications during their ICU stay. A multidisciplinary team that recognizes the complications promptly can help to decrease the mortality rate and offer high quality intensive care (2). It has been shown that ICU based medical emergency care after major surgery is associated with lower complications and mortality rates (3). Use of a rapid response system and a medical emergency team was shown to increase the 1500-day rates of survival from 65.8% to 71.6% (p=0.001). The ratio of death was 0.77 during the medical emergency team intervention period (3).

The MICU of our hospital is a nine bed general intensive care unit where high-risk surgical and trauma patients are also sometimes admitted, mostly due to lack of available beds in other ICUs. The aim of this study was to evaluate the general characteristics and outcome of surgical and trauma patients followed in the MICU.

Patients and Methods

Data of critically-ill surgical patients who were operated on during the MICU stay, or within 1 month before MICU admission and all trauma patients admitted to the MICU between 1 May 2006 and 1 May 2009, were retrospectively collected from a prospectively established database. Demographic characteristics, indication for surgery and the procedures applied, accompanying disorders, length of stay, disease severity scores and the outcomes were recorded. Descriptive statisti-

Table 1. Characteristics of the patients

Characteristic	Postoperative patients (n=30)	Trauma patients (n=9)
Age (median (IQR))	56 (36.8-72)	42 (34.5-62)
Sex (male/female)	12/18	7/2
Underlying/accompanying diseases ^a (n (%))		
Diabetes mellitus	7 (23.3)	1 (11.1)
Coronary artery disease	8 (26.7)	0
Malignancy	5 (16.7)	1 (11.1)
Hypertension	3 (10.0)	1 (11.1)
Autoimmune diseases	4 (13.3)	0
Asthma and chronic obstructive pulmonary disease	3 (10.0)	0
Neuropsychiatric diseases	3 (10.0)	0
Peripheral artery disease	2 (6.7)	0
Chronic renal disease	2 (6.7)	0
Cerebrovascular disease	2 (6.7)	0
Valvular heart disease	2 (6.7)	0
Congestive heart failure	1 (3.3)	0
APACHE II score (median, IQR)	22 (17.5-27.5)	14 (11-18)
Injury severity score ^b (median, IQR)		25 (16-36.5)
Emergency surgery (%)	50	30

^amore than one disease may be present in one patient, ^bfor trauma patients only

cal analyses were performed to define the predicted and observed mortality rates separately for trauma and postoperative patients. Results were expressed as frequency, and median with an interquartile range. Predicted ICU mortality was expressed as mean (SD).

Results

During the study period, 794 patients were hospitalized in the MICU for over 24 hours, and 39 of them (5% of admissions) were trauma or postoperative patients. Twenty six of them had at least one accompanying comorbidity. Characteristics of the patients are presented in Table 1.

Nine of the 39 patients (23.1%) were trauma patients and 5 of them were not operated on before or during their ICU stay. Among the other 34 patients who underwent surgery, 7 of them were operated on during their stay in the MICU. Of those who were admitted to the MICU post-operatively, 11 were admitted immediately after surgery. The median postoperative period before MICU admission was one day. The surgical procedures carried out in the postoperative patient group are listed in Table 2. Four of the trauma patients were operated on and the procedures performed were femur internal fixation, open clavicular reduction & fixation, distal humerus internal fixation & olecranonisation and lung resection.

The major indications for admission to the MICU were sepsis for the postoperative patients and respiratory insufficiency for the trauma patients (Table 3). Eight of the trauma patients had thoracic trauma, among which five had flail chest. One trauma patient had head trauma and intracranial hemorrhage.

There was only one death among trauma patients, who had vertical decelerations trauma in a suicide attempt. That patient had multiple

Table 2. Surgical procedures performed in the postoperative patient population with regard to classification of the organ systems^a

Genitourinary (11)	Cesarean section (7)
	Tubo-ovarian abscess drainage
	Ovarian rupture, hematoma drainage
	Transabdominal hysterectomy and bilateral oophorectomy
	Transurethral resection
Gastrointestinal (10)	Small intestine perforation repair (2)
	Colonic perforation repair (2)
	Colon resection/colostomy (2)
	Laparoscopic cholecystectomy
	Jejunum&colonic segmental resection enterotomia & enterostomia
	Diagnostic laparoscopy
	Esophagus rupture repair
Orthopaedics (3)	Lower extremity amputation (2)
	Femur internal fixation
Thorax and cardiovascular (3)	Aorto-femoral bypass
	Ascending aorta grafting
	Mitral valve replacement
Neurosurgery (2)	Lumbar laminectomy
	Subdural hematoma drainage
Reconstructive (1)	Skin wound debridement

^aNumbers in brackets denote the number of patients (total of 30 patients who underwent surgery)

fractures, flail chest, acute respiratory distress syndrome and refractory septic shock with multi organ failure. The predicted mortality of the postoperative patients was 40.7% while the overall observed MICU mortality was 30% (Table 4). In-hospital mortality rates of the postoperative patients were 54% and 41%, respectively for those over 65 years of age and under 65 years of age. However, further statistical analyses did not yield any significant differences demonstrating any relation between higher age and mortality.

Discussion

Twenty percent of the high intensity ICUs are general ICUs in the United States (4). The general ICUs constitute two thirds of all ICUs in the States, with an increasing frequency in smaller hospitals. The MICU where the study was conducted serves as a general ICU of our tertiary care, teaching hospital. Overall, 5% of admissions to the MICU were postoperative or trauma patients.

Two-thirds of the patient population presented here had at least one comorbidity. A rather high proportion of them had accompanying diseases such as diabetes, coronary artery disease, malignancy, hypertension and autoimmune diseases. These patients have an increased risk of complications during the anesthesia and the surgical procedure as well as in the postoperative period. The adverse effects of surgery as a result of extra cardiac and pulmonary work with a further load of anesthesia have been demonstrated decades ago (5). The patients under high risk would benefit from care by a medical team in this regard. One fourth of the postoperative patients in this study had diabetes. Diabetic patients can develop a high incidence of adverse events after surgery, mostly due to the complications of diabetes and athero-

Table 3. The major indication for admission to the ICU (n (%))

	Postoperative patients (n=30)	Trauma patients (n=9)
Respiratory insufficiency	9 (30)	8 (88.9) ^a
Sepsis	13 (43.3)	
HELLP syndrome (with accompanying acute liver or renal failure)	3 (10.0)	
Major bleeding (with/without hypovolemic shock)	3 (10.0)	
Acute renal failure	2 (6.7)	
Intracranial hemorrhage		1 (11.1)
^a five of the patients had flail chest		

Table 4. The outcome data of the patients

	Postoperative patients (n=30)	Trauma patients (n=9)
Need for mechanical ventilation (%)	23 (76.7) ^a	5 (55.6)
Length of ICU stay, median (IQR)	7.3 (3.8-13.8)	15.6 (7.8-42.9)
Length of hospital stay, ^b median (IQR)	25.5 (11.3-52.8)	22 (8.5-48)
Predicted ICU mortality, ^c (SD)	40.7 (27.5)	18.9 (29.7)
Overall ICU mortality (%)	9 (30.0)	1 (11.1)
Overall hospital mortality (%)	14 (46.7)	1 (11.1)
^a 4 non-invasive mechanical ventilation, 1 both invasive and non-invasive, ^b excluding two patients who were still hospitalized during data analysis, ^c calculated according to APACHE II score, Predicted ICU mortality is expressed as mean (SD)		

sclerosis (6). The first 48 hours is critical with regard to the medical care of postoperative patients, since most of the deaths in this period are due to cardiovascular causes (cardiac failure, hypotension and hemorrhage) (7). A multidisciplinary approach in the preoperative assessment and postoperative care of these patients would decrease the complication rate as well as the length of the hospital stay (4).

The patients presented here had a wide range of surgical diagnoses and they had undergone different surgical procedures. Moreover, the trauma patients had multiple severe injuries. Follow-up of these patients in a team approach contributes significantly to the medical knowledge and practice of MICU staff. Moreover, it is well known that there is a trend where patients admitted to the ICUs are increasingly older and with more complex diseases (8, 9). Not only the medical care of surgical patients but also surgical care of medical patients can decrease ICU mortality. It has been shown that patients in the MICU who require abdominal surgery have higher mortality rates when the diagnosis is delayed (10). On the other hand, an article by Kim and colleagues published recently showed that daily rounds by a multidisciplinary team are associated with lower mortality among medical ICU patients (11). These data justify the reasons why a multidisciplinary team approach is required in the ICUs of the new era.

Elderly surgical patients with comorbidities constitute the highest risk population for surgery. General surgical procedures can have a mortality rate as high as 80% in this high risk population (1). The median APACHE II score of the postoperative patients in our ICU were similar when compared to the overall patient data in previous years (median APACHE II score 22 in 2008) and the MICU mortality was similar to the overall 2008 mortality rate (MICU mortality 27.9%). Injury severity score

over 18 is accepted to point out a high level injury in trauma patients and it may be a more accurate prognostic tool in trauma patients. Although the median APACHE II score of the trauma patients were lower, they had a high median injury severity score, which might be the reason for their higher mortality rate than predicted. However, while having a high median severity score, trauma patients had a much lower MICU mortality rate than the postoperative patients and the general MICU population.

Critically ill surgical patients, especially trauma patients, need immediate admission to ICUs. In Turkey, the number of ICU beds are not sufficient and they are usually fully occupied with chronic critically ill patients. Because intensive care medicine is a multidisciplinary specialty, in the world and especially in Europe, the European Board of Intensive Care Medicine is attempting to construct a combined intensive care training through access of several basic specialties such as internal medicine, general medicine and anesthesiology. In our University Hospital, as ICU physicians and nurses who work in the departments of internal medicine, general surgery, neurology, neurosurgery, anesthesiology and pediatrics, we have already started a program where we meet regularly for seminars and discuss our patients and ideas. So, we also advocate a multidisciplinary training program in intensive care medicine and a multidisciplinary organization in patient care.

In conclusion, this study showed that trauma and high-risk postoperative patients can also be followed in MICUs with good ICU care and surgical back-up and, most importantly, good cooperation between medical and surgical departments.

Conflict of Interest

No conflict of interest is declared by authors.

References

- Pearse RM, Harrison DA, James P, et al. Identification and characterisation of the high-risk surgical population in the United Kingdom. *Crit Care* 2006; 10: R81.
- Moreno R, Estrada H, De Jesus MB, et al. Surgical and trauma patients in a medical intensive care unit. *Acta Med Port* 1992; 5: 425-8.
- Jones D, Egi M, Bellomo R, et al. Effect of the medical emergency team on long-term mortality following major surgery. *Crit Care* 2007; 11: R12.
- Angus DC, Shorr AF, White A, et al; Committee on Manpower for Pulmonary and Critical Care Societies (COMPACCS). Critical care delivery in the United States: distribution of services and compliance with Leapfrog recommendations. *Crit Care Med* 2006; 34: 1016-24.
- Clowes GH Jr, del Guercio Lr. Circulatory response to trauma of surgical operations. *Metabolism* 1960; 9: 67-81.
- Hoogwerf BJ. Postoperative management of the diabetic patient. *Med Clin North Am* 2001; 85: 1213-28.
- Cavaliere F, Conti G, Costa R, et al. Intensive care after elective surgery: a survey on 30-day postoperative mortality and morbidity. *Minerva Anestesiol* 2008; 74: 459-68.
- Jakob SM, Rothen HU. Intensive care 1980-1995: change in patient characteristics, nursing workload and outcome. *Intensive Care Med* 1997; 23: 1165-70.
- Groeger JS, Guntupalli KK, Strosberg M, et al. Descriptive analysis of critical care units in the United States: patient characteristics and intensive care unit utilization. *Crit Care Med* 1993; 21: 279-91.
- Kollef MH, Allen BT. Determinants of outcome for patients in the medical intensive care unit requiring abdominal surgery: a prospective, single-center study. *Chest* 1994; 106: 1822-8.
- Kim MM, Barnato AE, Angus DC, et al. The effect of multidisciplinary care teams on intensive care unit mortality. *Arch Intern Med* 2010; 170: 369-76.