Perioperative assessment of the patients in intensive care unit

Avaliação perioperatória de pacientes em unidade de terapia intensiva

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A B S T R A C T

Objective: To evaluate the preoperative condition and the surgical procedure of surgical patients in a general intensive care unit of a university hospital, relating them to morbidity and mortality. **Methods**: We studied the medical records of patients undergoing medium and large surgical procedures, admitted to the general intensive care unit. We analyzed: demographic data, clinical records personal history and laboratory tests, both preoperatively and on admission to the intensive care unit, imaging, operative reports, anesthetic reports and antibiotic prophylaxis. After admission, the variables studied were: length of stay, type of nutritional support, use of thromboprophylaxis, mechanical ventilation, description of complications and mortality. **Results**: We analyzed 130 medical records. Mortality was 23.8% (31 patients), Apache II greater than 40 was observed in 57 patients undergoing major surgery (64%), ASA classification e" II was observed in 16 patients who died (51.6 %), the length of stay in the intensive care unit ranged from one to nine days and was observed in 70 patients undergoing major surgery (78.5%), the use of mechanical ventilation for up to five days was observed in 36 patients (27.7%), hypertension was observed in 47 patients (47.4%), the most frequent complication was sepsis. **Conclusion**: The correct stratification of surgical patient determines their early discharge and reduced exposure to random risk.

Key words: Morbidity. Mortality. Patients. Perioperative period. Intensive care unit.

INTRODUCTION

Despite all the scientific and technological developments, complications related to diseases and their treatments are still present and of great concern [1,2].

Perioperative assessment consists of a set of procedures performed before and after the operation, in order to aggregate the different areas of knowledge in a systematic way, to identify factors that may increase operative risk, devising strategies to avoid or reduce them, seeking the best operative course. It's is justified by the occurrence of postoperative complications ranging from 17 to 20% 1,2. Patients undergoing major surgical procedures are constantly admitted to the Intensive Care Units (ICU), which leads to higher hospital costs [3,4].

Several factors influence overall result in risk patients, such as hypothermia, changes in the cardiovascular and respiratory systems, basic-acid and electrolyte imbalances and blood volume loss, which may cause several changes in organic homeostasis due to surgical stress. In this aspect, the ICU has been encouraged to use evaluation mechanisms to stratify patients at real risk of death or morbidity. The determination of prognosis and treatment effectiveness for these patients have influence in preventing complications and maintaining recovery conditions [5].

Inside the hospital, risk assessment for some groups of patients can be used to guide the financial, personnel and hospital facilities. ICUs are responsible for approximately 20% of hospital costs, their management being a way to reduce them [6-8].

Risk assessment is performed through anamnesis, physical examination and laboratory tests based on clinical data from the patients. Studies describe that preoperative assessment positively influences the final surgical outcome [6,9]. The classification of the American Society of Anaesthesiologists (ASA) 2 is one of the methods used to assess these risks. This type of evaluation system is widely used to quantify surgical risks. Approximately 50% of surgical mortality can be classified as score IV or V, III is 33% and only 17% is I and II[10]. There may be significant variability in assessing perioperative ASA, collaborating in patient management. In the ICU, the APACHE II (Acute Physiology and Chronic Health Evaluation) is widely used, collaborating with the planning of the patient care [11-13].

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The initial diagnosis is essential for risk adjustment. Therefore, to establish common criteria and references for observation and comparison through the early recognition of complications, appropriate intervention and careful monitoring are the keys to avoid the negative surgical outcome. Hospital stay time can be seen as an indirect marker of adverse outcomes and increased resource use after surgery[12-16].

The aim of this study was to evaluate the preoperative conditions and the surgical procedure, relating them to the morbidity and mortality of surgical patients in a general intensive care unit of a university hospital.

METHODS

We retrospectively analyzed data from medical records of patients undergoing medium and major operations in the period from January to August 2009, admitted to the ICU of the University Hospital at Presidente Dutra County, Federal University of Maranhão (UFMA) . The population consisted of 146 medical records, of which 16 were excluded, leaving 130 records analyzed. All patients who had pre, peri or postoperative indication of ICU admission and were admitted immediately after the surgical procedure were included in the study. Exclusion criteria were patients undergoing cardiac procedures by having specific intensive care unit, undergoing the operation in other hospitals, postoperative of obstetric procedures and children, as well as incomplete charts.

After approval of the Ethics Committee, data collection was carried out in the records through a specific form. The variables studied were age, gender, clinical records, preoperative laboratory tests preoperative and ICU admission tests (complete blood count, electrolytes and liver markers, arterial blood gases) and imaging (ultrasound, CT, MRI and radiography), surgical report, anesthetic report and antibiotic prophylaxis. During the hospitalization period we studied length of stay and type of nutrition adopted, use of anticoagulants, use of mechanical ventilation and discharge or death as the outcome. We used the preoperative ASA score described in the anesthesia record as an evaluator of the physical condition and the APACHE II as a severity indicator applied in the first 48 hours of ICU admission.

Surgical procedures were classified as medium (operations with up to two hours in length) and major (operations with more than two hours), each transaction being grouped by specialty, being discriminated abdominal, neurological, orthopedic, thoracic, urological and vascular surgeries. Each record was thoroughly read, matching name and registration number, and checking for exclusion criteria. For data to be collected correctly, the protocol was previously tested. There was participation from a collector, who was trained to properly collect data. Rereading all the medical records was performed for better interpretation of the observed data.

Factors associated with mortality and severe complications in the perioperative period were determined using multiple logistic regression models. Initially, each of the variables investigated was grouped according to similarities, concurrent medical problems, complexity of operation and data relating to the surgical procedure. Subsequently, we investigated the collinear variables in each group and between different groups of variables. We included in the final model only the ones that showed the strongest association with the event.

The database was structured to perform the descriptive analyzes. Data entry was performed monthly with parallel consistency analysis and correction of any errors. Statistical software was used for the construction and analysis of predictive models of mortality risk.

For comparison of data between the different groups we used the chi-square test, according to the sample size. The significance level for the null hypothesis was 5% ($p < 0,05$).

RESULTS

During the study period 146 records were analyzed, of which 16 (10.9%) were excluded, ten of these (6.8%) for being women undergoing cesarean section who developed complications after delivery, four (2.7%) with insufficient information for the study and two (1.4%) because they were children. The final sample consisted of 130 records that met the inclusion criteria.

Of the 130 records analyzed, survival was 76.1% (99 patients), with a predominance of males (59.5%) and the age of these patients was more than 40 years of age in 63 patients (63.6%). Eighty-nine patients (68.5%) underwent major surgery, abdominal operation being performed in 35 (35.5%). As for the evaluation of physical condition, 65 patients (65.5%) were classified as ASA II, 38 (38.3%) had a body mass index (BMI) less than 18.7%, and hypertension (HAS) was observed in 47 patients (47.4%), however this finding did not affect discharge (Table 1).

Regarding admission to ICU, 89 patients (68.5%) underwent operations classified as major. ASA risk II or greater was observed in 70 patients (53.8%)

The assessment of severity scores APACHE II considered 40% risk of mortality for most patients at ICU admission (81 patients - 62.3%), 57 (64.0%) undergoing operation classified as major. Those who died accounted for 38.3%, 12 patients in the group of medium procedures and 19 patients in the major (Table 2). The length of stay in the intensive care unit was up to nine days.

Ninety-four patients (72.3%) did not receive invasive ventilatory support. Thirty-six patients remained five days with mechanical ventilation. There was no significant difference in relation to the complexity of the surgical procedure (Table 2).

Subcutaneous thromboprofilaxis was performed in all patients, including those who survived 99. Enoxaparin was the drug of choice. Nutritional support was used in 41 patients (31.5%) distributed in relation to the size of the operation: 25 (19.2%) received enteral nutritional support and 16 (12.3%), parenteral (Table 2).

The occurrence of complications was directly related with patient survival. Among patients who were discharged, 76 (76.7%) did not present any complication. Among patients who died, the presence of uncontrolled sepsis in 17 patients (54.8%) was the most frequent postoperative complication and showed a direct relationship with the patient's death. Bleeding was present in 11 patients (35.4%). Surgical site infection, observed in the two groups, was not related to the patient's death, although more frequent in those who died (nine patients - 29%) (Table 3).

The antibiotic as a prophylactic was used in 94 patients (72.3%). Cefazolin was the most often used antibiotic.

DISCUSSION

The surgical population has been growing gradually and with it, the greater the need to establish evaluation criteria to identify the severity of the proposed surgical procedure. Over 40% of intensive care beds are for postoperative patients, who depends on the physical condition and the type of operation, especially in the case of major ones[10].

Most patients admitted to the ICU have undergone major surgery. There was a higher percentage of male and the age was over 40 years old. These two variables were not influential in the prognosis of patients with regard to discharge or death. Satyawan *et al*. [14] indicated good long-term prognosis of patients over the age of 80 after undergoing a surgical procedure, without any influence of gender in the final evaluation. Nevertheless, it is known that morbidity occurs more frequently in those over age influencing mortality[15-17]. About 30% of the sample patients have developed some kind of complication and consequent mortality, but age and gender were not factors. Sepsis was related to mortality.

The infectious complication remains a frequent cause of surgical mortality[18,19]. The infection rate was high, compared to other studies[20], despite the sharp use of prophylactic antibiotics. This proves that the antibiotic must be associated with a set of measures to minimize the occurrence of infection. Cefazolin was used in our population, following the guidelines for the administration of this drug[19].

In general, patients are discharged from the ICU after 24 or 48 hours of admission. Some studies have reported that discharge at the appropriate time reduces the excessive and unnecessary use of resources of the ICU, based on following the criteria established by the evaluation team, reducing costs and especially promoting the well-being of patients[21,22].

In compliance with the assessment criteria, the majority of patients had preoperative ASA II and, when admitted to the ICU, they were punctuated with score set

Table 1 – Predominant features according to demographics, surgical complexity , type of operation, ASA, BMI and associated diseases in patients who evolved to discharge or death.

	GS (n = 99 –76.1%)	GNS (n = 31 –23.9%)	p
Surgical complexity			
Medium	29 (29.1)	12 (38.7)	
Major	70 (70.7)	19 (61.2)	< 0.05*
Types of operation			
Abdominal	35 (35.3)	16 (51.6)	NS
Neurological	24 (24.1)	4 (12.9)	NS
Thoracic	20 (20.2)	4 (12.9)	NS
Orthopedic	15 (15.1)	4 (12.9)	NS
Urology	4 (4.1)	3 (9.7)	NS
Vascular	1 (1.2)	-	NS
Gender			
Male	59 (59.5)	14 (45.1)	NS
Age			
(> 40 years)	63 (63.6)	25 (80.6)	NS
ASA > II	65 (65.6)	16 (51.6)	NS
BMI < 18.7	38 (38.3)	22 (70.7)	< 0.01*
Associated disease (arterial hypertension)	47 (47.4)	4 (12.9)	< 0.01*

GS – survivor group; GNS – non-survivor group; BMI – body mass index; ***NS*** *– Non-signficant; * Chi-square test*

Table 2 – Characteristics of the 130 patients of ICU according to admission, discharge, APACHE II, mechanical ventilation time, anticoagulant therapy, nutrition type and death.

	Surgical complexity		
	Medium (n/%)	Major (n/%)	p
Admission (pre-op)	41 (31.5)	89 (68.5)	< 0.05*
ASA > II (99)	29 (22.3)	70 (53.8)	NS
APACHE II (40% -81 patients)	24 (18.5)	57 (43.8)	NS
Length of stay (1-9 days)	29 (22.3)	70 (53.8)	NS
Mechanical ventilation			
Did not use	25 (19.2)	69 (53.1)	NS
Up to five days	7 (5.4)	29 (22.3)	NS
Thrombosis prophylaxis (enoxaparin)	29 (22.3)	70 (53.8)	< 0.05*
Nutrition			
Enteral (25 patients)	9 (6.9)	16 (12.3)	NS
Parenteral (16 patients)	4 (3.1)	12 (9.2)	NS
Death	12 (9.2)	19 (14.6)	NS

** Chi-square Test.* ***NS****-Not significant*

at 40% mortality by APACHE II [23]. The association between these data influenced the overall mortality. Castro Júnior *et al*. concluded that patients with an APACHE II score greater than eight and subjected to large operations may present a high rate of morbidity and mortality[12], resembling these data.

This aspect extends to the use of mechanical ventilation, where mortality was greater than 90%. The process of withdrawal of ventilatory assistance in the postoperative period is more difficult and takes up almost 40% of the total time of mechanical ventilation, in addition to increasing the risk of pneumonia, length of stay, hospital costs and mortality rate of around 20 to 70%[24]. Of the 39% of patients remaining in the ICU, 10% were due to longer lasting mechanical ventilation.

Nevertheless, the majority of the individuals did not receive mechanical ventilation. This resulted in a direct response of hospitalization time of patients and the prevalence of pneumonia was only 4% in those who were discharged. A study by Soares *et al.*[25] showed that the shorter ventilatory prosthesis time and ambulation contribute to the shorter ICU stay.

However, several complicating factors cause longer ICU stay, including deep vein thrombosis[26]. Patients with multiple trauma or undergoing surgery of long duration are at increased risk of developing thromboembolism[26-28]. In the study, even though there had been no reported cases of thromboembolism, patients made use of enoxaparin and its use was mostly associated with the type of surgical procedure.

Low molecular weight heparin is indicated in operations potentially causing thrombosis. This indications, well defined in the literature, are dependent on the assessment of medical history and appropriate examinations[27].

Among the many issues to be addressed in relation to the surgical patient, nutritional assessment is fundamental and aims to estimate the risk of mortality and morbidity from malnutrition, identifying and individualizing their causes and consequences, indicating a more accurate

Table 3 - Distribution of patients according to the occurrence of complications in survivors and non-survivors. São Luis, 2010.

Complications	Survivors N=99 (n/%)	Não sobreviventes N=31 (n/%)	P
No complications	76 (76.7)	-	< 0.001*
Surgical site infection	6 (6.0)	9 (29.0)	< 0.05
Bleeding	7 (7.0)	11 (35.4)	< 0.05
Pneumonia	4 (4.0)	7 (22.5)	< 0.05
Sepsis	2 (2.0)	17 (54.8)	< 0.05
Other	4 (4.0)	6 (19.3)	

** Chi-square test*

and effective therapeutic nutrition[17]. As most patients were discharged without complications, nutritional support (enteral and parenteral) was little used and, moreover, in those who died, there was no significant correlation between the two diets, probably due to sample size.

Regarding associated diseases, hypertension was the most prevalent, and taking into account that this disease is often difficult to control, postoperative admission to the ICU is a security measure[19,28]. Even having had a significant number of hypertensive patients observed, hypertension was not associated with morbidity and only four such patients died.

Overall mortality rate was high when compared to others found in the literature[16,27,28].

The results of this study demonstrated that the indication of most patients to ICU admission was motivated by common characteristics, such as high surgical complexity, higher prevalence of hypertension, age, and ASA, those being significantly associated with mortality predicted by APACHE II. Infection was the most prevalent risk factor in the ICU, increasing the length of stay and mortality.

Although not covered in this study, there was no description or any conduct related to postoperative pain. There is thus need to include routines for managing pain in surgical patients in the ICU protocols. It is considered that despite the methodological limitations of the study, the fact that it was accomplished in just one ICU and has had a small sample, the results are consistent with most data from ICUs in the literature and show that the correct stratification of surgical patients determines their early discharge and reduced exposure to random risk.

R E S U M O

***Objetivo**: Avaliar as condições pré-operatórias e o procedimento cirúrgico relacionando-os à morbidade e mortalidade de pacientes cirúrgicos em uma unidade de terapia intensiva geral de um hospital universitário. **Métodos**: Foram estudados os prontuários de pacientes submetidos a procedimentos cirúrgicos de médio e grande porte, admitidos na unidade de terapia intensiva geral. Foram analisados: dados demográficos, quadro clínico, registros de antecedentes pessoais e exames laboratoriais pré-operatórios e de admissão na unidade de terapia intensiva, exames de imagem, relato operatório, boletim anestésico e antibioticoprofilaxia. Após a admissão, as variáveis estudadas foram: tempo de internação, tipo de suporte nutricional, utilização de tromboprofilaxia, necessidade de ventilação mecânica, descrição de complicações e mortalidade. **Resultados**: Foram analisados 130 prontuários. A mortalidade foi 23,8% (31 pacientes); Apache II maior do que 40 foi observado em 57 pacientes submetidos à operação de grande porte (64%); a classificação ASA e" II foi observada em 16 pacientes que morreram (51,6%); o tempo de permanência na unidade de terapia intensiva variou de um a nove dias e foi observado em 70 pacientes submetidos à cirurgia de grande porte (78,5%); a utilização da ventilação mecânica por até cinco dias foi observada em 36 pacientes (27,7%); hipertensão arterial sistêmica foi observada em 47 pacientes (47,4%); a complicação mais frequente foi a sepse. **Conclusão**: a correta estratificação do paciente cirúrgico determina sua alta precoce e menor exposição a riscos aleatórios*

***Descritores:** Morbidade. Mortalidade. Pacientes. Período perioperatório. Unidades de terapia intensiva.*

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