

Research Article

Prognostic value of initial admission levels of biomarkers and hematological markers for outcome of adult trauma patients admitted to the ICU in Minia University Hospital

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Abstract

Introduction: Trauma is the most common cause of death in all over the world. The most frequent mechanisms include motor vehicle collisions and pedestrian injuries. Aim of the work: The aim of this study is to evaluate the effect of biological and hematological makers in prognosis of outcome of adult trauma patient admitted to ICU in Minia University Hospital. Patients and Methods: After obtaining an approval from our hospital – El-Minia university hospital – ethics committee and obtaining written consent from the patient or responsible relative, in a period of six months, adult trauma patients will be approached and enrolled in the study. Results: The rate of adult trauma admissions was 42.34% of the total ICU admissions which was 307 cases; there were 106(81.53%) males and 24 (18.46 %) females with a male to female ratio of 4.41:1. Conclusion: We concluded that trauma constitutes a significant cause of admissions into the general ICU and a very high incidence of morbidities and mortality including increased hospital course complication.

Introduction

Trauma is the most common cause of death in all over the world. The most frequent mechanisms include motor vehicle collisions and pedestrian injuries. The evaluation of traumatic injury in the patients can be challenging because of differences in patient's physiology and anatomy. Anatomically the increased pliability of patient's musculo-skeletal system and closer proximity of internal organs can result in internal injuries with minimal external signs of injury, Physiologically patient displays a much greater capacity for hemodynamic compensation, rendering hemodynamic parameters and fluid responsiveness less predictive of injury severity ⁽¹⁾.

Immediate recognition of occult shock due to hemorrhage in patients with trauma can help improving patient outcomes. Traditionally advanced trauma life support has taught that the "golden hour" is a period in which patients with traumatic injury have a better chance of survival if treated within the first hour of their injuries.

Although recent research has challenged this mantra, this concept is still widely accepted, Several other recent studies have questioned the

usefulness of vital signs in helping the physician determine the presence of shock, Current research has focused on the use of biomarkers to determine tissue hypo perfusion and the need for intervention to help improve outcomes, Although most of the literature has focused on the utility of biomarkers and metabolic indices such as anion gap (AG), serum lactate, and base excess (BE) in the intensive care setting, several studies suggest that the use of these biomarkers in the pre hospital environment and emergency department (ED) may improve survival and predict mortality These markers are products of different biochemical pathways and are measured in different ways ⁽²⁾

In patients with poly trauma and a low GCS hyperglycemia at an early stage after trauma may be a reliable marker of cerebral injury and patient prognosis, An elevated blood glucose level may suggest that a patient's prognosis is likely poor and the risk of dying is substantially high. ⁽³⁾

Aim of the work

The aim of this study is to evaluate the effect of biological and hematological makers in

prognosis of outcome of adult trauma patient admitted to ICU in Minia University Hospital

To evaluate the correlation of specific investigations to Intensive Care Unite scoring system mainly APACHE II score and to initiate local trauma predictive score.

Results

The rate of adult trauma admissions was 42.34% of the total ICU admissions which was 307 cases; there were 106 (81.53%) males and 24(18.46%) females with a male to female ratio of 4.41:1. The male to female ratio for the total

ICU admissions during the same period was 2.23:1, the age range was from 18 years to 65 years, average age is 42 years, ages more than 65 years and less than 18 years were excluded from the study.

The time of arrival of the patients to the ICU and having the first look from the ICU staff from the onset of the accident was variable and ranges from less than one hour to more than three hours with the majority of the patients taking 1 hour from the onset of the accident and trauma to be admitted, examined, evaluated and managed by the ICU physicians.

Table (1): Data are expressed as percentage

Time of arrival (hours)	Percentage
<1h	26%
1-3h	60%
>3h	14%

Discussion

Trauma can be defined as physical injury from mechanical energy, it is usually categorized as blunt or penetrating and it may be caused by road crashes, falls, blow sand assault (Scalea, 2002).

Care of the poly-trauma patient does not end in the operating room or resuscitation bay, it is said that “ the best place for a sick person is in the ICU” (Scalea et al., 2015), It is still debatable whether trauma patients do better in trauma ICUs compared to general ICUs. The study by Duane et al.,⁽⁴⁾ suggests that severely injured patients do better when managed in trauma ICUs. The study also stressed the importance of qualified, experienced personnel above location in the less severely injured patients.

Virtually all critically injured patients require some degree of immediate physiologic support on arrival to the ICU, This includes assurance of adequate respiratory and ventilator support as well as aggressive intervention to minimize secondary central nervous system (CNS) injury resolve critical acid–base and electrolyte disorders and restore normothermia⁽⁵⁾, Assessment of injury severity is important clinically to the correct triage of patients to a

trauma center, to selecting the adequate intensity of care and to prognosticating on short-/long-term patient outcome; it is also important to the comparison of trauma centers⁽⁶⁾.

Recommendations

We strongly recommend the establishment of local trauma management protocols that includes the pre hospital training and more efforts should be done to improve the trauma ICU programs.

We also recommend further studies to be done in the field of trauma trying to focus on the risk factors for occurrence of complications and the correlation between morbidity and mortality and these risk factors and the predictors of outcome.

We recommend the following studies to be done on a larger number of patients over a longer duration and in multiple trauma centers.

We also recommend the use of the acute physiology and chronic health evaluation (APACHE II) score and the injury severity score as predictors of occurrence of morbidity and mortality in adult trauma patients in the intensive care unit (ICU), we recommend the

further studies to use the laboratory score to evaluate the trauma patients.

References

1. A SI and Afessa B., Intensivist-to-bed ratio: association with outcomes in the medical ICU. *Chest* 2005; 128:567– 72.
2. Edouard, JF Benoist, C Cosson, O Mimos...- Intensive care..., 1998 Circulating cardiac troponin I in trauma patients without cardiac contusion.
3. Haddad SH and Arabi YM, Critical care management of severe traumatic brain injury in adults. *Scand J Trauma Resusc Emerg Med* 2012, 20:12.
4. Jousi M, Reitala J, Lund V, Katila A, Leppäniemi A. The role of pre-hospital blood gas analysis in trauma resuscitation. *World Journal of Emergency Surgery*. 2010 Dec; 5(1):10.
5. Scalea TM, Maltz S, Yelon J, et al., Resuscitation of multiple trauma and head injury: role of crystalloid fluids and inotropes. *Crit Care Med* 2005, 22:1610–1615.
6. Rossaint R, Bouillon B, Cerny V, Coats TJ, Duranteau J, Fernández-Mondéjar E, Filipescu D, Hunt BJ, Komadina R, Nardi G, Neugebauer EA. The European guideline on management of major bleeding and coagulopathy following trauma. *Critical care*. 2016 Dec; 20(1):100