



Profile, outcome and predictors of mortality of abdomino-pelvic trauma patients in a tertiary intensive care unit in Saudi Arabia



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ABSTRACT

Introduction: The Kingdom of Saudi Arabia (KSA) is one of countries with the world's highest number of deaths per 100,000 populations from road traffic accidents (RTAs). Numerous trauma victims sustain abdomino-pelvic injuries, which are associated with considerable morbidity and mortality. The purpose of this study was to describe profile, outcomes and predictors of mortality of patients with abdomino-pelvic trauma admitted to the intensive care unit (ICU) in a tertiary care trauma centre in Riyadh, KSA.

Methods: This was a retrospective analysis of prospectively collected ICU database. All consecutive patients older than 14 years with abdomino-pelvic trauma from March 1999 to June 2013 were included. The followings were extracted: demographics, injury severity, mechanism and type of injury, associated injuries, use of vasopressors and mechanical ventilation, and worst laboratory results in the first 24 h. The primary outcome was hospital mortality. We compared profile and outcomes between survivors and non-survivors and reported predictors of mortality.

Results: Of the 11,374 trauma patients who were admitted to the hospital during the study period, 2120 (18.6%) patients had abdomino-pelvic injuries, out of which 702 (33.1%) patients were admitted to the ICU. The mean age was 30.7 (SD 14.4) years and the majority was male (89.5%). RTA was the most common cause of abdomino-pelvic trauma (70.4%). Pelvis (46.2%), liver (25.8%), and spleen (23.1%) were the most frequently injured organs; and chest (55.6%), head (41.9%), and lower extremities (27.5%) were the most commonly associated injuries. Mechanical ventilation was required in 89.6% with a mean duration of 9.1 (SD 9.2) days and emergency surgery was performed in 45.0% of the patients with prolonged ICU and hospital length of stay (10.8 [SD 10.8], 56.9 [SD 96.7] days; respectively). Of the 702 patients with abdomino-pelvic trauma, 115 (16.4%) patients did not survive. Associated head trauma and retroperitoneal haematoma, higher level of lactic acid on admission and ISS, and advanced age were potential risk factors for hospital mortality.

Conclusions: Abdomino-pelvic injuries are common in trauma patients, affecting mainly young male victims, and are associated with significant morbidity and mortality, and resource utilisation.

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Introduction

In the United States, trauma is the fifth leading cause of death regardless of age, and the first leading cause of death in persons between the ages of 1 and 44 years, with a peak incidence of 14–30 years [1–3]. Globally, 6–10% of all deaths are caused by traumatic injuries [4]. In 2011, The World Health Organization (WHO) has reported that nearly 1.3 million people die and up to 50 million more are injured each year as the result of trauma secondary to road traffic accidents (RTAs) [5]. Consequently to the socio-economic, technological and industrial development, deaths from injury are expected to increase overtime [6].

In Saudi Arabia, an average of 20 Saudi Arabian residents dies every day due to traumatic injury after RTAs, which are the primary cause of death in males aged 16–36 years [7,8]. The WHO found Saudi Arabia is among countries with the world's highest number of deaths from road accidents with an average rate of deaths of 24.8 per 100,000 populations [9]. Moreover, in young adult males, trauma is the leading cause of disabilities, and about 75.0% of handicapped inhabitants have been injured in RTAs [10]. Hence, trauma is a major medical, socioeconomic and serious public health problem in Saudi Arabia; causing major loss in life in young productive group of people, and in economy as the cost of treatment encompass the acute phase to support handicapped survivors of RTAs for several years [11].

RTAs are associated with the greatest risk of abdomino-pelvic injuries [12]. In consequence many trauma victims sustain abdomino-pelvic injuries. Abdomino-pelvic injuries are associated with considerable morbidity and mortality in both blunt and penetrating trauma [13]. Approximately, 10.0% of deaths in trauma are due to abdominal injuries. However, abdominal trauma is one of the most common causes of preventable, trauma-related deaths [14]. Most deaths resulting from preventable abdominal trauma are due to unrecognised intraabdominal injury [12].

There are no studies published in the literature on abdomino-pelvic injuries in the Middle East or in Saudi Arabia. The purpose of this study is to describe the profile, outcomes and the predictors of mortality of patients with abdomino-pelvic trauma admitted to the intensive care unit (ICU) in a tertiary care trauma centre in Riyadh, Saudi Arabia.

Materials and methods

Setting

This study was conducted in a 1000-bed teaching hospital with a trauma centre in Riyadh, Saudi Arabia. The hospital carries The Joint Commission International Accreditation and is standardised as a level-1 trauma centre that receives an average of 1000 acute trauma cases per year. The trauma team is activated in the Emergency Department for severe trauma as per pre-defined criteria. In response, the trauma team, which is led by the in-house general/trauma surgeon, responds immediately and leads the process of acute care. The hospital leads a national programme for training in Advanced Trauma Life Support, which is mandatory for emergency physicians, and all surgeons who manage trauma cases. The ICU is a 21-bed, tertiary care medical-surgical and trauma ICU that admits more than 2500 patients per year, and is run as a closed unit 24 h a day, 7 days a week by in-house, full-time Critical Care Board – certified intensivists [15]. Eligibility for admission to the ICU is based on written admission and discharge criteria derived from the “Guidelines for ICU Admission, Discharge, and Triage” that were endorsed by the American College of Critical Care Medicine of the Society of Critical Care Medicine [16]. Patients with abdomino-pelvic injury are admitted to the ICU if they require

mechanical ventilation or vasopressors, or occasionally for close monitoring.

Study design

We carried out a retrospective analysis of prospectively collected, by a full-time data collector, ICU database that included data on all ICU patients. All consecutive patients older than 14 years with abdomino-pelvic trauma, from March 1999 to June 2013 were identified and included in this study. Abdomino-pelvic injury was defined as an injury of intra-abdominal organ(s), pelvic organ(s), or both intra-abdominal organ(s) and pelvic organ(s). The following data were extracted: patients' demographics including age, sex, and body mass index (BMI); injuries' severity including Injury Severity Score (ISS), Glasgow Coma Scale (GCS) score, and Acute Physiology and Chronic Health Evaluation (APACHE) II [17] score; mechanism of trauma including RTA, pedestrian, cycle, gunshot wound and other; type of abdomino-pelvic injury including abdominal viscous injury, liver, spleen, retroperitoneal haematoma, genitourinary, penetrating abdominal injury, ruptured diaphragm, pelvic fracture, and other; associated injuries including head, chest, orthopaedic/soft tissue, other head/neck, maxillofacial-head/neck, spinal, and vascular; emergency surgical interventions; use of vasopressors and mechanical ventilation; worst laboratory results in the first 24 h of admission including lactic acid, serum creatinine and bilirubin, platelet count, and international normalised ratio (INR), and PaO₂/FiO₂; ICU course including massive transfusion; and severe chronic illnesses [18]. The Research Committee at the King Abdullah International Medical Research Center (KAIMRC), Riyadh, Saudi Arabia, approved the study and since the study does not involve patient intervention or risk to subjects, approval from the Institutional Review Board was waived.

Outcome measures

The primary outcome was hospital mortality. Secondary outcomes were ICU mortality, duration of mechanical ventilation, need for tracheotomy, and ICU and hospital length of stay (LOS).

Statistical analyses

We described baseline characteristics, the profile, outcomes, and the predictors of mortality of abdomino-pelvic trauma victims. We compared the profile, outcomes, and the predictors of mortality between the group of patients who did not survive and the group of patients who survived an abdomino-pelvic trauma. Continuous variables were described as mean and standard deviation (SD) and compared using Student's *t*-test. Categorical variables were expressed as absolute and relative frequencies and compared using χ^2 test, or Fisher's exact test, as appropriate. We used stepwise multiple logistic regression models to assess the association of different exposures (listed below) with the categorical outcomes (hospital and ICU mortality and need for tracheotomy), and to identify potential risk factors. Odds ratio (OR) and 95% CI were calculated. *p*-Value less than 0.05 was considered to indicate statistical significance. The following exposures were entered in the model: age, BMI, APACHE II score, head trauma, GCS score, the presence or absence of associated injuries, retroperitoneal haematoma, lactic acid level on admission, ISS, operative status, and ICP monitoring. We calculated the predicted mortality by APACHE II, Mortality Probability Models (MPM) II at admission in the ICU (MPM II0) and at 24 h (MPM II24) [19,20]. The assumptions for using the multivariate logistic regression analyses were checked. We calculated the standardised mortality ratio (SMR) and 95% confidence interval (CI) by dividing the actual over

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