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Management of polytraumatized patients with associated blunt chest trauma: a comparison of two European countries

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Blunt chest trauma;
Abbreviated injury scale;
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Summary

Background: Blunt chest trauma represents one of the most common injuries in polytrauma patients. Blunt chest injury complicating polytrauma is associated with significant prolongation of intensive care stay. Further, it has a great impact on the timing of fixation of skeletal injuries, possibly contributing to adverse outcome.The purpose of this study is to assess whether there are any differences in the management and outcome of polytrauma patients with blunt chest trauma between trauma units in two different countries. Detailed information about advantages and disadvantages of these two systems might allow optimising the management of blunt chest trauma.

Patients and methods: This investigation was performed using the polytrauma database of the German Trauma Society and the British Trauma Audit Research Network. After the definition of the inclusion abbreviated injury scale ($AIS_{chest} \geq 3$) and injury severity score ($ISS > 16$) and exclusion ($AIS_{head/neck} \geq 2$, referral from outside institutions) criteria, patients were recruited solely from these databases.

Results: 188 patients from the German database and 181 patients from the British database were enrolled in this study. Demographic data and injury pattern of the two patient populations did not significantly differ. The volume of initial red blood cell transfusion and length of the intensive care stay were significantly higher in Germany ($p < 0.05$). Mortality in the UK was 9% higher than in Germany ($p = 0.057$). Time to death in non-survivors was also significantly longer in Germany ($p < 0.05$).

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Conclusions: The reasons for the differences regarding survival times and survival rates seem to be multiple. German patients received more red blood cells, had a longer hospital stay in intensive care and a better survival rate. The use of kinetic therapy in Germany, not standard in the UK, may contribute to a more favourable outcome.

Introduction

Chest trauma ranks as the most important injury in polytrauma patients with a reported incidence of 45—65%. It is usually associated with blunt high-energy trauma and the reported mortality can be as high as 60%.[2] Overall, 20—25% of deaths in polytrauma patients are attributed to chest injury.[7,12]

The degree of chest trauma is usually assessed by the abbreviated injury scale (AIS). Irrespective of the severity of injury, blunt chest trauma plays an important role in the overall management of the multiply injured patient, from the scene of the accident to the surgical decision making process. Multiply injured patients with blunt chest trauma require significantly longer periods of mechanical ventilation and a significantly longer stay on intensive care unit compared with trauma patients without a thoracic injury.[2] Furthermore, chest injuries predispose to pneumonia, adult respiratory distress syndrome (ARDS) and multiple organ dysfunction syndrome (MODS).[22]

Management of chest injuries includes urgent thoracotomy for control of haemorrhage, cavity decompression by chest tube drainage; and mechanical ventilation in case of respiratory insufficiency. Factors which may contribute to favourable outcome include kinetic therapy, appropriate fluid management and avoidance of iatrogenic damage to the lung by unfavourable mechanical ventilation techniques.[22,24]

There has been little agreement over definitions of chest injury severity. This has led to conflicting results and created controversy in the management of polytrauma patients (early total care (ETC) versus damage control orthopaedics (DCO)).[18] One consequence of this lack of consensus is a broad diversity of practice between units and between European countries with otherwise similar levels of healthcare provision.

The purpose of this study was to assess whether there are differences in management and outcome of polytrauma patients with blunt chest trauma between trauma units in two different countries. Detailed information about advantages and disadvantages of these two systems might allow optimisation of blunt chest trauma management.

Patients and methods

Databases

All data were obtained from the polytrauma database at the Department of Trauma & Orthopedics at St. James's University Hospital, Leeds and the polytrauma database at the Department of Trauma Surgery at Hannover Medical School. The database of the former contributes to the Trauma Audit Research Network (TARN) ongoing study into the epidemiology of trauma in the United Kingdom, whereas the latter is part of the German Trauma Society, documenting polytrauma patients.

Both databases were developed in the early 1990s. Since that time, every polytrauma patient treated in one of the participating trauma centers has been documented prospectively in these databases.

Trauma Audit Research Network

The British database includes all patients that have been treated on an intensive care unit (ICU) or a high dependency unit (HDU) within the first 72 h after their injury. Besides the demographic data, clinical data including mechanism of injury, Glasgow coma scale (GCS), heart rate, blood pressure, ventilation rate, protective head gear and details of initial resuscitation (time, location and nature (fluid/blood)) and pre-hospital treatment are documented. The documentation of the hospital course includes details about any inter-hospital transfer and surgery (nature of procedure performed, seniority of the operating surgeon and assistant). Moreover, all injuries are documented, and they are classified according the abbreviated injury scale (AIS),[5] and the injury severity score (ISS) is calculated.[1] The duration of hospital stay, complications and mortality are recorded. During the ICU/HDU course, organ function scores, clinical and physiological data are documented daily.

Database of the German Trauma Society

The database of the German Trauma Society is divided into five parts. The first sheet documents patient status at the accident scene. Mechanism of injury, vital signs (heart rate, blood pressure, ventilation rate, GCS), mechanism of injury, and initial