Definition of polytrauma: Discussion on the objective definition based on quantitative estimation of multiply injured patients during wartime

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A R T I C L E   I N F O

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A B S T R A C T

Aim: There is a clear lack of consensus on a validated definition of the term “polytrauma”. This study presents and classifies the extent of injuries during wartime in Croatia using the Revised Trauma Score and Injury Severity Score (TRISS) and compares the scores with a clinical estimation based on subjective assessments of polytraumatised and non-polytraumatised patients.

Methods: We analysed the data from 426 war victims who sustained multiple injuries and were managed at Osijek University Hospital from September 1st 1991 to December 31st 1991. The victims were divided into polytraumatised (n = 149) and multitraumatised (n = 277) patients according to the initial clinical estimation of the extent of injury. Patients classified as monophasic were excluded from this study. The assessment was based on the following definition of polytrauma: simultaneous injury of two or more body regions or anatomical systems with at least one injury being life-threatening. All data were scored retrospectively using TRISS methodology.

Results: Two patients classified as polytraumatised had an ISS of less than 16, and one patient classified as multitraumatised had an ISS of more than 16. The difference between the actual (29.5%) and expected (40.44%) postoperative mortality in the polytraumatised group was statistically significant (p = 0.0016), whereas in the multitraumatised group, the difference between the actual (3.2%) and expected (3.04%) postoperative mortality was not significant (p = 0.6103).

Conclusions: The data show that clinical and subjective assessment of polytraumatised patients can be useful in the management of such cases and can be tested retrospectively using TRISS methodology.

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Introduction

There is a clear lack of consensus on a validated definition of the term “polytrauma” [1–4]. A universally accepted definition would be of both scientific and clinical value [4], and would help to guide emergency department physicians and trauma surgeons in decisions about the most suitable management procedure for the patient. Descriptive definitions have certain merit [5–9]. The modern history of dealing with defining polytrauma goes back to the middle of the 20th century [10–13].

There are many papers in the literature about trying to reach a “new” definition for polytrauma, which shows the need for a new definition and that lessons from the past have not yet been learned [1–4,10,11].

According to the experiences of trauma surgeons in Croatia, there is a lack of standardisation in defining the multiply injured patient, polytraumatised patient, or major trauma patient. The situation is similar in other countries; for example, the mortality rate for multiply injured patients ranges from 9% to 48% in the older literature [6,12,14].

More reliable approaches have introduced scoring systems in traumatology. Modern scoring began in the 1970s [5,7]. The table from the Edwin Smith Papyrus (from 2800 BC) revealed that ancient Egyptians divided head injuries into three classes, with the therapeutic possibilities and prognosis defined for each class [15].

This study compares the extent of injury classified during wartime using the Revised Trauma Score and Injury Severity Score (TRISS) with a clinical estimate based on subjective assessments of polytraumatised and non-polytraumatised patients.

War injuries add more problems to the clinical assessment of injury management procedures. Most often they affect a younger population with more productive life years ahead of them and have
a greater likelihood of causing long-term disability than other major causes of disease.

The definition of polytrauma used by trauma surgeons in Osijek for the last 30 years was based on the definitions of De La Croix (1967) [10] and the Hannover trauma school [13,14]: simultaneous serious injuries to two or more anatomical regions (similar to the ISS regions), or organic systems (cerebrovascular, respiratory, vascular, digestive, urinary, locomotor), with at least one of the injuries being classified as life-threatening.

Multitrauma was defined as simultaneous injury to two or more anatomic regions/organic systems, but not life-threatening.

The problem of clinical estimation grows when dealing with war injuries. There are not many experiences in coding and evaluating war injuries. Some experienced authors do not consider the ISS to be exact when applied to multiply injured patients with penetrating injuries [16–18].

Patients and methods

A total of 4545 individuals who were injured during the intensive air and artillery attacks on the city of Osijek and its surroundings were admitted to Osijek University Hospital from May 2nd 1991 to November 1st 1992.

The period chosen for this study was from September 1st 1991 to December 31st 1991; this was four months of the heaviest combat for Osijek and its University Hospital in which 2,635 patients were managed at the Department of Surgery. During this period, a total of 149 injured patients admitted to the hospital were assessed as polytraumatised, and 485 were assessed as multitraumatised.

All patients who were classified as monotraumatised were excluded from this study, even though among them there were also heavily injured patients. All data were scored retrospectively using TRISS methodology (Abbreviated Injury Score [AIS]-Update 98). The patients with an ISS of 16 or more were considered to be polytraumatised. The score was compared with clinical estimation of polytrauma or multitrauma annotated on patients’ admission War recording sheets provided by the hospital crisis headquarters, where an estimation of the type of trauma was mandatory.

Polytrauma patients. The mean age of polytraumatised patients (n = 149) was 35 ± 12.7 years (range 15–81 years). The cause of injury in 121 (81%) patients was shell fragments of various explosive devices, in 25 (17%) it was bullets, and in 3 (2%) it was blunt injuries. Several of the injured patients sustained two, sometimes even three, “dominant injuries”. The leading surgeon in the team made a clinical assessment of the dominant injury.

Table 1 is a review of urgent and delayed operations that were conducted. Primary operative procedures are also shown: the number of wound managements (437) indicates the multiplicity of wounding, an average of three wounds per patient. The number of secondary procedures was relatively smaller due to the evacuation of the injured (45% from this group) to other hospitals or rehabilitation centres after the primary surgical procedure.

All patients with open injuries were administered combined antibiotic therapy, and were heparinised postoperatively, 139 (of 149) patients underwent blood transfusion (mean 7.7 ± 5.8 units per patient).

Postoperative mortality was 29.5% (44 patients), 0–17 days after admittance (Table 2). The mean time of death after admittance was 39.5 ± 6.6 h. The mean transportation time from the site of injury to the hospital was 1.7 ± 1.7 h for the whole group, and 1.8 ± 5.2 h for the deceased (p < 0.05).

Mean ISS was 33.1 ± 16.0 (range 13–75) and the highest AIS was for abdominal injuries 2.56 ± 2.0, which influenced real mortality rate (p = 0.03). The mean probability of survival (Ps; by TRISS methodology) was 0.5956 (range 0.0–0.9957); therefore, the expected mortality was 40.44%.

Multitrauma patients. Data for 277 of 485 patients in the multitraumatised group were useful for this study; there was insufficient data for those treated as outpatients.

The mean age of the 277 analysed multitraumatised patients was 37 ± 14.4 years (range 13–90 years), the cause of injury in 225 (81.2%) patients was shell fragments, in 13 (4.7%) it was bullets, and in 39 (14.1%) it was sustained blunt injuries. Mean time of hospitalisation was 7.2 ± 11.8 days (range 0–90 days), and only 47 (17.4%) patients were evacuated to other hospitals. Postoperative mortality was 3.2% (9 patients), 0–16 days after admittance (Table 2). The follow-up after discharge was 0–40 months (mean 6.5 ± 20 months). The mean time of death after admittance was 77.3 ± 127.9 h. The mean transportation time to our hospital was 11 ± 14.4 for the whole group, and 1.5 ± 2.6 h for the deceased (p < 0.005).

Mean ISS was 8.0 ± 6.9 (range 1–75); the highest AIS was for extremity injuries (1.7 ± 1.0), which did not influence mortality rate. The mean Ps was 0.9696 ± 0.1167 (range 0–0.9993); therefore, the expected mortality was 3.04%.

The extent of injury in polytraumatised, multitraumatised, and all patients was shown according to ISS by grouping the score from 0 to 16, and 17 and higher, where ISS less than 17 applied to patients who were not heavily injured (Fig. 1).
The TRISS was used as the basis for quantifying the severity of injury. Descriptive statistics and nonparametric analysis were used for the analysis of data. The Kruskal–Wallis method was used for testing the influence of body region injury and probability of survival.

Results

Two patients classified as polytraumatised had an ISS of less than 16, and one patient classified as multitraumatised had an ISS of more than 16. The difference between real and expected postoperative survival in the polytrauma group was not significant (p = 0.96). The difference between the actual (29.5%) and expected (40.44%) postoperative mortality in the polytrauma group was significant (p = 0.0016).

In the multitrauma group, the difference between actual (3.2%) and expected (3.04%) postoperative mortality was not significant (p = 0.6103); the difference between actual and expected postoperative survival was also not significant (p = 0.6103). Furthermore, the correlations between the results compared between the two groups were not significant. Table 2 shows some characteristics of the polytrauma and multitrauma groups and indicates the difference in factors such as ISS and the number of patients who underwent multitrauma. These data might illustrate the severity of injuries in both groups.

Discussion

The results from this study show the comparability of wartime injuries with peacetime data from the recent literature using the TRISS method. There may be some limit on the comparability and there is some doubt of the validity of the TRISS method in classifying war injuries, as it may not be precise enough in the description of severity of injuries in patients with penetrating wounds [7,8,16,18].

Clinical assessment of polytrauma and multitrauma depending on only the knowledge and experience of the surgeon may provide exact data to estimate the extent of injury and threat to life. This study showed the precision of the initial surgeon triage and estimation and comparability with heavy multiple injury assessed using TRISS, and was a test of accuracy of clinical estimation of polytraumatised patients in Osijek University Hospital during war time [19–21].

The definition of polytrauma is possible on subjective assessments if trauma surgeons follow learned definitions in combination with their own experience, particularly if they are educated in hospitals with a long-term proficiency in trauma management [13,19,21].

The latest effort to define polytrauma showed that the reliable assessment of the polytraumatised patient may help clinicians to facilitate adequate distribution of in-hospital resources [4]. Testing the definition of polytrauma in polytraumatised patient using extensive empirical data showed the implication of parameters that are footing the old definition used by old time traumatologists [4,10–14].

Conflict of interest

I have no conflict of interest to declare.

References