

# Polytrauma in Elderly

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## ABSTRACT

*The aim of this study is to present certain particularities in treating polytraumatized patients age of 65 and above. All of the patients were treated in our hospital. 413 patients were included in this 4 year study (2006–2010). Injury severity score was 17 and above (ISS > 17). Patients aged above 65 were sub grouped. In this 4-year period, we treated 52 or 13% elderly patients. In this subgroup there were 30 (58%) males and 22 (42%) females, with mean age of 74 (max age 95 years old). Demographic factors, injury mechanisms, patients resuscitation protocols, imaging used, etc. were also included as variables. Mortality rate in elderly patients was 31%, while in patients below 65 years of age as 12%. Taking relevant data into consideration, a special emphasis was given to certain circumstances of intensive and surgical treatment of elderly patients. A large portion of polytraumatized patients are consisted of elderly. Patients aged 65 and above have higher mortality rate with lower ISS in the mortal group and falls are the most frequent mechanism of trauma. In this study, we tried to emphasize some clinical implications when treating those patients, as well as importance in continuous medical staff education in trauma principles to minimize mortality rates.*

**Key words:** aged, elderly, Injury Severity Score, multiple trauma, mortality, trauma

## Introduction

In the developed countries trauma is nowadays leading cause of death in the population group between 1–44 years of age and the fifth cause of death in the group older than 65 years of age<sup>1,3</sup>. Polytraumatized patients represent 3% of total number of traumatized with high mortality rate of 16–22%<sup>4</sup>.

Polytrauma in the elderly or geriatric polytrauma is defined as a polytrauma in patients of 65 years of age and over<sup>1,3</sup>. Today, people who are 65 years of age or older represent approximately 12% of the population in developed countries. It is expected that this ratio will rise to 21% in the year 2030<sup>2</sup>. With the improvement in living standards they are remaining active and independent and are experiencing injury at the same rate as the rest of the population<sup>5</sup>. According to this a concomitant increase in polytrauma in the geriatric sector is predicted<sup>6</sup>.

Compared to the younger population the treatment of geriatric trauma victims is associated with a higher mortality and morbidity<sup>7</sup>. Although the elderly are subject to the same mechanisms of injury as other age groups, geriatric patients are unique in their responses to injury. The physiologic, metabolic and biomechanical changes that

occur with aging can affect the ability to withstand major stress, can increase the incidence of complications and can decrease the chance for survival<sup>5</sup>. Age-related changes modify the responses to trauma and age is one of the most important determinants of mortality in trauma patients<sup>2,3</sup>.

Polytrauma is serious health problem in Croatia. Despite this epidemiological studies about trauma in Croatia are very poor<sup>8</sup>.

The aims of this study were to evaluate polytraumatized patients over 65 years of age treated in our hospital and to emphasize some clinical implications when treating those patients, as well as importance in continuous medical staff education in trauma principles to minimize mortality rates.

## Material and Methods

This study is a prospective analysis done in Clinical Hospital Centre in Rijeka, in a time period between 2006<sup>th</sup> and 2010<sup>th</sup>. All of the patients here analyzed had

an Injury Severity Score (ISS) above 17. Patients with age of 65 and above were abstracted as a special group.

Demographic factors, injury mechanisms, ISS, pulse and systolic blood pressure, length of intensive care unit (ICU) stay, length of total hospital stay, patients resuscitation protocols, imaging used, co morbidity were included as variables.

We did a comparison in variables surveyed in between the elderly patients group (65 or above) and a group of patients aged 18 to 65 years old. Patients younger than 18 were excluded.

### Statistical Analysis

Statistical analysis was performed using Statistica 6.1 (StatSoft, Inc, Tulsa; USA). The t-test was used for comparasuin of the means and the  $\chi^2$ -test for diagonal table analysis. Probability values less than 0.05 were considered significant.

### Results

We treated 413 polytraumatized patients in Clinical Hospital Centre Rijeka during a four year period (2006<sup>th</sup>–2010<sup>th</sup>). Injury severity score was 17 and above (ISS>17). Out of total number of patients, 52 (13%) were 65 years of age and above, 329 (80%) were aged between 18 and 65 years, and 32 patients (7%) were minors (<18 years old) and therefore excluded from this study. We grouped elderly patients under Group A and patients aged 18–65 years under Group B.

Mean age for Group A was 74 years (65–95) with 30 males (58%) and 22 female patients (42%). Calculated total mortality in this group was 31%.

In Group B mean age was 40 years (18–65) and consisted of 250 males (76%) and 79 female patients (24%). Total mortality in this group was 11%.

Furthermore, we divided mentioned groups into the two subgroups according to treatment outcome. Subgroups A1 and B1 included patients which successfully recovered from injuries sustained and Subgroups A2 and B2 included patients which succumbed to injuries.

Taking into account the mechanism of injury we calculated that 22 (60%) patients in Subgroup A1 were injured due to falling from a height, out of them 18 (80%) fell from a height below 3 meters and 4 patients (20%) fall with a height above 3 meters.

Also, in the same Subgroup, 7 patients (20%) were injured as a pedestrian in a traffic accident, 4 patients (10%) as a motor vehicle driver or a passenger and 1 patient (3%) as a bus passenger.

Mean Glasgow Coma Scale (GCS) in this Subgroup was 15 (range 12–15) upon admittance, mean pulse 94 bpm, systolic blood pressure 111 mm/Hg, mean ISS 25 (range 18 to 54). Mean ICU stay was 9 days (range 2–20), 65% (23) of the patients required mechanical respiratory support with a average duration of 6 days. We found co morbidity to be present in 85% of the cases (ischemic cor-

onary disease, diabetes, neurological impairment etc...) Mean total hospital stay was 19 days (range 5–38 days).

In A2 Subgroup, 11 (67%) patients were injured due to falling from a height and out of them 8 (50%) fell from a height of below 3 meters and 3 patients (17%) with a height of the fall above 3 meters. 4 patients (25%) were injured as a pedestrians in a traffic accident and 1 patient (8%) as a motor vehicle driver or a passenger.

Mean Glasgow Coma Scale (GCS) in Subgroup A2 was 11 upon admittance, mean pulse 95 bpm, systolic blood pressure 109 mm/Hg, mean ISS 27 (range 18 to 43). Mean ICU stay was 5 days (range 1–11) which is also referred do their total survival length, all of the patients required mechanical respiratory support. We found co morbidity to be present in 92% of the cases.

B1 Subgroup consisted of 293 patients. 208 (70%) patients were injured in some form of traffic accident, out of which, 116 (40%) was injured as a motorcycle driver or a passenger, 55 (17%) a car driver or a passenger, 21 (7%) as a pedestrian, 8 (3%) as a bicycle driver and 8 patients (3%) as a truck driver or passenger. Other injury mechanisms in this Subgroup included: fall from height in 78 (27%) patients and other mechanism in 7 or 3% of patients (3 assaulted patients, 3 sustained work related injuries and 1 animal attack).

Mean Glasgow Coma Scale (GCS) in Subgroup B1 was 12 upon admittance, mean pulse 100 bpm, systolic blood pressure 116 mm/Hg, mean ISS 24 (range 18–57). Mean ICU stay was 8 days (range 1–45), 59% (173) of the patients required mechanical respiratory support with a average duration of 5 days. We found co morbidity to be present in 11% of the cases. Mean total hospital stay was 23 days (range 5–206).

B2 Subgroup consisted of 36 patients. 17 (48%) sustained injuries due to fall from height, 16 (44%) patients were injured in some form of traffic accident, out of which, 8 (22%) was injured as a motorcycle driver or a passenger and 8 patients (22%) as a car driver or a passenger. Other injury mechanisms in this Subgroup (8%) included: 1 assaulted patients and 2 patients sustained work related injuries.

Mean Glasgow Coma Scale (GCS) in Subgroup B2 was 6 upon admittance, mean pulse 104 bpm, systolic blood pressure 107 mm/Hg, mean ISS 33 (range 18–59). Mean ICU stay was 8 days (range 1–12) which is also referred do their total survival length, all of the patients required mechanical respiratory support. We found co morbidity to be present in 30% of the cases in this Subgroup.

We concluded that there is a statistical significance in mortality rates between A and B groups ( $p<0.001$ ). Comparing Subgroups A1 and B1 according to injury mechanism, we also concluded that the main mechanism for injury sustained in Subgroup A1 is fall from a height and in Subgroup B1 is a various form of traffic accident. As far as Subgroups with patients who didn't survive injuries inflicted (A2 and B2), there is no statistical significance and fall from heights is singled out as a major mechanism of injury and death ( $p=0.446$ ).

When analyzing GCS score, we found out that there is a statistical significance between A1 and B1 ( $p=0.005$ ), A2 and B2 ( $p<0.001$ ), A1 and A2 ( $p=0.013$ ) and B1 and B2 ( $p<0.001$ ) Subgroups. We found no statistical significance when analyzing pulse and systolic blood pressure, except for difference in blood pressure measurements between B1 and B2 Subgroups ( $p=0.047$ ). When analyzing ISS in between Subgroups, we concluded that there was only statistical significant relation between B1 and B2 ( $p<0.001$ ) and A2 and B2 ( $p=0.023$ ). When comparing ICU length of stay, we found a statistical significance between subgroups A1 and A2 ( $p=0.003$ ), B1 and B2 ( $p<0.001$ ), but none when comparing Subgroups (A1 and B1).

There is no statistical significant difference between A and B Groups in requirements for mechanical respiratory support ( $p=0.719$ ). Total length of hospital stay is significantly shorter in elderly patients ( $p<0.001$ ). Furthermore in A group, co morbidity is greatly present (A1 85%, A2 92%) than in B Group (B1 11%, B2 30%). Unfortunately, we couldn't statistically analyze it further due to incomplete past medical history.

## Discussion and Conclusion

Of all polytraumatized patients, elderly are present in 13% of the cases. This data is consistent with elderly presence in overall population<sup>1,2</sup>.

Older age is one of the most important factors of predicted mortality rates<sup>4,9</sup>. Calculated mortality rate in our group of elderly patients was 31%, while in younger patients deaths occurred in 11% of cases. This results are in accordance with other published papers, where mortality rates of elderly polytraumatized patients are up to 34%<sup>10,11</sup>.

There is also a significant differentiation between injury mechanisms. In elderly patient the most important and common injury cause was fall from a height (found

in 63% of the cases) followed by injuries sustained in traffic accidents in 33% of the cases. In younger population the most common cause for injuries are traffic accidents in 68% followed by a fall from height as an injury mechanism in 29% of the cases.

The most important cause for mortality in both groups was fall from height, followed by traffic accident injuries with ratio between 67%:33% for group A and 48%:44% for group B.

According to a majority of other written studies the most often present are head injuries in a population above 65 years of age with a general accord that injury response in elderly is different from younger population<sup>12–14</sup>. A relatively high GCS score upon hospital admittance is of no relevance to a positive outcome in elderly patients as seen in this study. We also concluded that elderly patients which eventually died had a statistically significant lower GCS score than younger patients from the same subgroup (27 vs. 33). Pulse and blood pressure have a small relevance if any to the final outcome as the mean values of both of these variables are inside normal parameters or of no clinical importance. All of the patients were treated in ICU with a mean stay duration of 9 days, without an inter group difference. Requirements for mechanical ventilator support in elderly was present in 65% of the cases and was similar to other group with 59% of the patients on support.

In this study mean total hospital stay was shorter in elderly patients (19 vs 23 days). Co morbidity in elderly has a significant negative impact on final outcome and was present in 89% of the cases<sup>15,16</sup>.

In conclusion we found that elderly patients form a significant portion of all polytraumatized patients and represent a peculiar problem according to their vulnerability, attenuated trauma stress response and high prevalence of co morbidity and all of this complicates their treatment.

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## **POLITRAUMATIZAM U STARIJOJ ŽIVOTNOJ DOBI**

### **S A Ž E T A K**

Cilj je rada prikazati posebnosti liječenja politraumatiziranih bolesnika u dobnoj skupini starijoj od 65 godina liječenih u našoj ustanovi. Rad predstavlja analizu provedenu u Kliničkom bolničkom centru Rijeka u 4-godišnjem razdoblju (2006.–2010.). Analizom su obuhvaćeni politraumatizirani bolesnici liječeni u našoj ustanovi čiji je Injury Severity Score (ISS) iznosio više od 17. Posebno su izdvojeni politraumatizirani bolesnici stariji od 65 godina. Obuhvaćeni su demografski podaci, etiologija politraumatizma, hitna terapija i dijagnostika, itd. U 4-godišnjem razdoblju bilo je 413 bolesnika s ISS > 17. Od ukupnog broja politraumatiziranih, 52 bolesnika je bilo starije od 65 godina, što iznosi 13%. U toj skupini bolesnika bilo je 30 muškaraca (58%) te 22 žene (42%) prosječne dobi 74 godine (max 95 godina). Smrtnost u skupini bolesnika starijih od 65 godina iznosila je 31%, dok je u skupini bolesnika mlađoj od 65 godina ona iznosila 12%. Uz gore navedene podatke poseban je naglasak dat na posebnosti intenzivnog te kirurškog liječenja osoba starije životne dobi. U skupini politraumatiziranih bolesnika značajan udio čine bolesnici starije životne dobi. Bolesnici stariji od 65 godina imaju veći postotak smrtnosti sa nižim ISS-om u skupini umrlih, a najčešći mehanizam ozljede je pad. Ovim radom pokušali smo ukazati na posebnosti i značajke te skupine bolesnika te na važnost educiranosti u principe liječenja traumatiziranih te životne dobi.