

# Trauma in the elderly patients in Bursa

## Bursa'daki travmalı yaşlı hastalar

Şule AKKÖSE AYDIN,<sup>1</sup> Mehtap BULUT,<sup>1</sup> Recep FEDAKAR,<sup>2</sup> Aylan ÖZGÜRER,<sup>1</sup> Fatma ÖZDEMİR<sup>1</sup>

### BACKGROUND

The aim of this study was to determine the epidemiology and clinical features of the trauma in elderly patients, to investigate the factors influencing mortality and morbidity and to make a contribution to the national trauma data,

### METHODS

We retrospectively investigated the medical records of three hundred seventy-one trauma patients (231 males (62,3%); 140 females (37,7%); mean age 71,9), aged 65 and older presenting to our hospital. Patients' census data, diagnosis, dis-positions, prognosis, trauma scores (GCS (Glasgow Coma Score), RTS (Adult Trauma Score), ISS (Injury Severity Score)), sites of injury were analyzed.

### RESULTS

During the study period 187.326 patients were admitted to our emergency department (ED). A total of 9.520 patients were trauma patients. There were 371 patients 65 years and older. Mean GCS, mean RTS and mean ISS were 13,6, 11,3, and 9,3 respectively. A total of 213 patients were hospitalized. Mean length of stay was 7,9 days. Sixty-six patients were discharged from the ED. Mortality rate was 10,2% (38/371). The mechanism of injury, injury severity, increasing age were predictors of mortality ( $p<0.001$ ). Major injuries included head trauma (36,4%), extremity trauma (36,4%), and thoracic trauma (18%). Head trauma and abdominal trauma were significantly more frequent in the nonsurvivors ( $p<0.001$  and  $p=0.02$  respectively).

### CONCLUSION

Injury severity and increasing age were the predictors of mortality. Also pedestrian- vehicle collision patients were high mortality rate than the other trauma mechanisms. The most common injured organs were head and extremities.

**Key Words:** Aged, trauma; trauma scores; mortality; wounds and injuries/etiology/mortality/therapy.

### AMAÇ

Bu çalışma, yaşlı travma hastalarında demografik ve klinik özellikleri saptamak, mortalite ve morbiditeye etkili faktörleri incelemek ve ülkemizdeki travma verilerine katkıda bulunmak amacıyla yapıldı.

### GEREÇ VE YÖNTEM

Retrospektif olarak 65 yaş ve üstü 371 olgunun (231 erkek (%62,3); 140 kadın (%37,7); ort. yaş 71,9) tıbbi kayıtları incelendi. Olgular, yaş, cinsiyet, travma mekanizması, yaralanma bölgeleri, prognoz, travma skorları (GKS [Glasgow Koma Skoru], RTS [Erişkin Travma Skoru], ISS [Yaralanma Şiddet Skoru] açısından analiz edildi.

### BULGULAR

Çalışma süresi boyunca acil servisimize toplam 187.326 hasta başvurdu. Bu hastaların 9520 tanesi travma olgusu idi. Tüm travma olgularının ise 371 tanesi 65 yaş ve üstü yaş grubuna dahildi. Ortalama travma skorları ise sırasıyla GKS: 13,6, RTS: 11,3 ve ISS: 9,3 idi. Toplam 213 hasta yatırılarak tedavi gördü ve ortalama yatış süresi 7,9 gün idi. Altmış altı olgu ise acil servisten taburcu edildi. Mortalite oranı %10,2 (38/371). Yaralanma mekanizması, yaralanma şiddeti ve yaşın mortaliteyi etkileyen faktörler olduğu saptandı ( $p<0.001$ ). Yaralanma bölgesi açısından kafa travması ve ekstremitre travmasının aynı sıklıkta olduğu (%36,4), toraks travmasının ise ikinci sırayı aldığı (%18) görüldü. Kafa travması ve abdominal travmanın ölen olgularda anlamlı olarak sık görüldüğü saptandı ( $p<0.001$ ;  $p=0.02$ ).

### SONUÇ

Yaralanma şiddeti ve yaş mortaliteyi belirleyen önemli faktörlerdir. Ayrıca araç dışı motorlu taşıt kazaları diğer travma mekanizmalarına göre daha yüksek mortaliteye sahiptir. Yaşlı olgularda yaralanmaya en çok maruz kalan bölgeler kafa ve ekstremitelerdir.

**Anahtar Sözcükler:** Yaşlı, travmalı; travma skoru; ölüm oranı; yara ve yaralanma/etyoloji/ölüm oranı/tedavi.

<sup>1</sup>Uludağ Üniversitesi Tıp Fakültesi Acil Tıp Anabilim Dalı,  
<sup>2</sup>Adli Tıp Anabilim Dalı, Bursa.

Departments of <sup>1</sup>Emergency Medicine and <sup>2</sup>Forensic Medicine,  
Uludağ University Medical Faculty, Bursa, Turkey.

Improvements in living standards have consistently increased the elderly population in developed countries as well as in our country. Consequently, the number of aged trauma patients increased also.<sup>[1,2]</sup> Today, people who are 65 years of age or older represent approximately 12% of the population in United States. In the year 2030, this ratio is expected to rise to 21%.<sup>[1,2]</sup> Although elderly people comprise 12% of the population, 25% of the total expenditures for trauma care is made for this age group.<sup>[2]</sup> Approximately 28% of all trauma related deaths occur in the people who are 65 years of age or older.<sup>[1,2]</sup> Trauma is the fifth most common cause of death in this age group.<sup>[3]</sup> The percentage of people older than 65 is 8% in our country and this ratio is expected to rise to 12,2% in 2020.<sup>[4]</sup>

It is generally accepted that trauma patients should be treated with a multidisciplinary approach.<sup>[3]</sup> Age is one of the most important determinants of mortality in trauma patients.<sup>[3-8]</sup> Age-related changes (decreases in physiological reserve, insufficient metabolic and endocrine responses) modify the responses to trauma.<sup>[2,3,6,9]</sup>

Trauma is a serious health concern in Turkey as in other countries. However, epidemiological studies on trauma in Turkey are limited. The aims of this study were to evaluate the records of the trauma patients older than 65 years of age, who attended our hospital, document factors that determine mortality and contribute to the trauma data in our country.

## MATERIALS AND METHODS

### *Study Setting and Patient Population*

This was a retrospective, descriptive study. The study was conducted in a university teaching hospital ED with an EM residency program and a volume of over 25,000 annual visits between January 1, 1996 and July 31, 2003. Trauma patients with 65 years of age or older who attended our emergency department were enrolled. The demographic characteristics, trauma mechanisms, trauma scores, sites of injury, mortality, length of stay and outcome were analyzed.

### *Statistical Analysis*

Statistical analysis was performed by using SPSS 10.0 for Windows. The t-test was used for comparisons of the means and the  $\chi^2$  test for diag-

onal table analysis. Probability values less than 0.05 were considered significant.

## RESULTS

The number of patients who attended the ED during the study period was 187.326. A total of 9.520 patients fit the trauma activation criteria; 371 (3,9%) of these were 65 years of age or older.

Mean age was 71,9 (range: 63-95). 231 were men (62,3%) and 140 were women (37,7%). Mean Glasgow Coma Score (GCS) was 13,6, mean Adult Trauma Score (RTS) was 11,3 and mean Injury Severity Score (ISS) was 9,3. The mechanism of injury was a motor vehicle collision (MVC) in 116 (31,3%), pedestrian- vehicle collision (PVC) in 113 (30,5%), fall in 57 (15,4%), fall from a height in 57 (15,4%), motorcycle accident in 8 (2%), blunt trauma in 10 (2,7%) gunshot in 6 (1,6%), stabbing in 2 (0,5%) and other in 2 (0,5%). The site of injury was the head in 135 (36,4%) patients, abdomen in 14 (3,8%), thorax in 66 (18%), extremity in 135 (36,4%), spinal column in 41 (11%), other body sites in 73 (19,7%).

A total of 213 patients were hospitalized, 77 were referred to other hospitals, 66 were discharged from the ER; 5 patients were dead on arrival and 38 patients died at hospital. The 5 patients who were dead on arrival were excluded from statistical analysis (Fig. 1).

There was a statistically significant difference between the ages of the survivors and nonsurvivors ( $p<0.001$ ). Also, GCS, RTS and ISS differed significantly between the two groups; the scores were significantly higher ( $p<0.001$  for each) in the nonsurvivors in comparison with the survivors (Table 1). The two groups did not differ significantly with respect to gender. Cranial trauma and abdominal trauma were significantly more frequent in the nonsurvivors ( $p<0.001$  and  $p=0.02$ , respectively). There were no differences with respect to other sites such as thorax, extremity and the spinal column (Table 2). Finally, when PVC and MVC patients were compared, there were statistically significant differences between survivors and nonsurvivors ( $p<0.001$ , OR: 6.67,  $1.77<OR<29.57$ ).

When PVCs were compared with falls from a height, there was a statistically significant difference between survivors and nonsurvivors

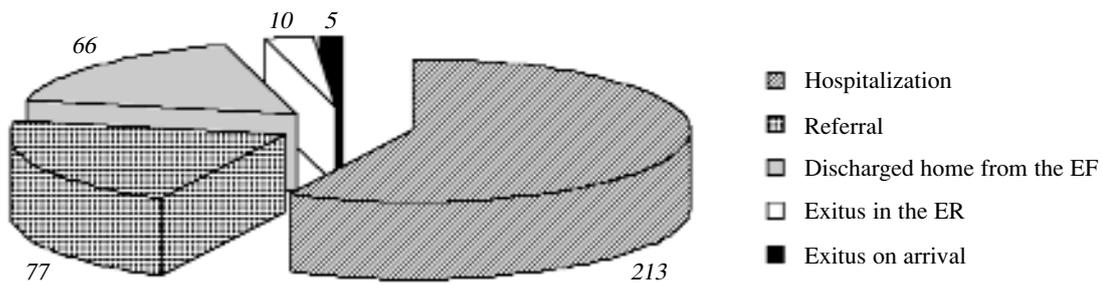


Fig. 1. The outcomes of the patients.

( $p=0.002$ , OR 7.6,  $1.65 < OR < 34.59$ ). When MVCs were compared with motorcycle accidents, there was a statistically significant difference between patients who died and survived ( $p=0.013$ , OR 5.65,  $1.05 < OR < 30.64$ ) When PVCs were compared with motorcycle accidents, there was a statistically significant difference between patients who died and survived ( $p=0.044$ , OR 5.33,  $0.89 < OR < 32.87$ ) (Table 3).

The number of hospitalized patients was 213; the hospitalization period of 130 could be determined: mean (range) 7,9 days (1-50).

The available information on previous medical history and concomitant diseases was insufficient in the majority of the cases. Adequate data had been recorded in the charts of 48 patients; 64% had hypertension, 31% had coronary artery disease, 21% had diabetes mellitus and 12% had neurological problems. Diabetes mellitus and neurological diseases were associated with mortality.

### DISCUSSION

In developed countries, approximately 25% of the population experience injuries of various mechanisms and severity annually. Approximately 50% of the victims need a visit to the emergency unit and 12% of these are hospitalized. Of the hospitalized patients, 3% die and 8% become disabled.<sup>[10]</sup> The leading mechanism of general body trauma all over the world is the traffic accident. In our country, 60 to 66% of the trauma cases are due to traffic accidents. This is followed by falls (20%), assaults (8%), stab wounds (6-8%), and gunshots (4%).<sup>[11,12]</sup> The pattern of trauma mechanisms in patients older than 65 differs from that in younger people. In a multicenter study from Tehran on 675 patients who were 65 years of age or older, in a 13-month period, 70% had experienced falls at home or on the street.<sup>[13]</sup> In a 7-year retrospective study in Canada, on the elderly population, falls and the consequent isolated extremity fractures were most common.<sup>[14]</sup>

Table 1. Comparison of survivors and nonsurvivors with respect to age, GCS, RTS and ISS

|              | Mean age | Mean GCS | Mean RTS | Mean ISS |
|--------------|----------|----------|----------|----------|
| Nonsurvivors | 75       | 8.5      | 8.3      | 20       |
| Survivors    | 71.6     | 14.2     | 11.6     | 8        |

$p < 0.001$ .

Table 2. Comparison of survivors and nonsurvivors with respect to site of injury

|              | Cranial trauma<br>+/- | Extremity trauma<br>+/- | Thoracic trauma<br>+/- | Abdominal trauma<br>+/- | Spinal trauma<br>+/- | Other<br>+/- |
|--------------|-----------------------|-------------------------|------------------------|-------------------------|----------------------|--------------|
| Nonsurvivors | 28/10                 | 11/27                   | 10/28                  | 4/34                    | 3/35                 | 3/35         |
| Survivors    | 107/226               | 124/209                 | 56/277                 | 10/323                  | 38/295               | 70/263       |
| <i>p</i>     | $< 0.001$             | $= 0.314$               | $= 0.147$              | $= 0.021$               | $= 0.512$            | $= 0.054$    |

+/-: present/absent.

**Table 3.** Comparison of survivors and nonsurvivors with respect to mechanism of injury

|                              | Survivors | Nonsurvivors |
|------------------------------|-----------|--------------|
| Motor vehicle collision      | 113       | 3            |
| Pedestrian-vehicle collision | 96        | 17           |
| Fall                         | 54        | 3            |
| Fall from a height           | 48        | 9            |
| Gunshot                      | 5         | 1            |
| Stabbing                     | 2         | 0            |
| Blunt trauma                 | 10        | 0            |
| Motorcycle accident          | 4         | 4            |
| Other                        | 1         | 1            |

$p < 0.001$ .

In another study, falls and traffic accidents were the most frequent mechanism of trauma in the elderly population.<sup>[15]</sup>

In the present study on the elderly patients, traffic accident was the most frequent mechanism (62%) followed by falls (31%). Falls became more prominent in the advanced age group (75 years of age or higher).

The head and the extremities were the most frequently injured organs (36,4%). In many studies, the head was the most frequently injured organ in elderly patients.<sup>[16,17]</sup> In the elderly patients, traumatic injury has a less favorable course in comparison with young patients due to age-related changes. It has been shown that for the same magnitude of harmful event, the trauma scores of the elderly people are higher than those of the younger people.<sup>[18]</sup> In patients 65 years of age or older, there are significant decrease in cardiac index, oxygen distribution and consumption and this is a useful prognostic factor.<sup>[19]</sup> Also, the risk of femoral fracture is higher in the elderly population in comparison to young people due to osteoporosis and osteoarthritis.<sup>[20]</sup> In another study, the investigators concluded that a patient age of 70 years or older should be an activation criteria for the trauma team.<sup>[21]</sup>

Of the 371 patients included in this study, 38 died (10,2%). We tried to identify factors responsible for mortality by comparing survivors and nonsurvivors. The nonsurvivors were significantly older (Table 1), which is in accordance with the literature.<sup>[16,21]</sup> Also, the GCS, RTS and ISS differed significantly between survivors and non survivors-

a finding in accordance with the literature.<sup>[22-25]</sup> The higher frequency of head and abdominal trauma in the nonsurvivors is also in accordance with the literature.<sup>[16,25]</sup> Vehicle accidents were significantly more lethal. In the present study, 213 patients were hospitalized and the hospital stay of 130 could be calculated. Mean hospital stay was 7,9 days (1-50). The greater degree of damage caused by the same magnitude of trauma may cause long hospitalization periods. The reported interval is 8-11,5 days.<sup>[26-28]</sup> In patients 65 years of age or older, mean hospital stay was 45 days. When the population trends in a 20 year period was investigated in the elderly population, it was observed that patients older than 65 or older spent less time at the hospital but required a higher frequency of nursing care.<sup>[29]</sup>

Concomitant illnesses and of the elderly population affect hospital stay and morbidity.<sup>[20,24,30,31]</sup> Unfortunately, we were not able to acquire sufficient data on all cases. Only 48 patients could be evaluated. In accordance with the literature, concomitant conditions increased the mortality.

Overall mortality was 10,2% (38/371). The mortality of the elderly trauma population varies between 10% and 34%.<sup>[2,16,26,28]</sup>

In conclusion, improving living standards is associated with an expansion of the elderly population. The risk of trauma in the elderly population is higher. It should be kept in mind that age is a determinant of mortality. Age-related changes in the body and associated insufficiencies should be managed meticulously with a multidisciplinary approach.

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