



Clinical analysis of geriatric patients admitted to the emergency trauma department: A cross-sectional study

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Abstract

Aim: Trauma is one of the important causes of mortality and morbidity affecting both the geriatric section of society and the young population. Especially in the geriatric population, the life comfort of patients decreases significantly due to trauma. In the present study, we examined geriatric trauma patients admitted to the emergency department and investigated the most common reasons for admission, trauma regions, and post-traumatic hospitalization of these patients.

Materials and Methods: 608 geriatric trauma patients aged 65 and over were studied. The patients were evaluated according to their age and sex. The causes of trauma, trauma regions, existing chronic diseases of the patients, and the number of drugs they regularly used per day were examined. The radiological imaging methods requested for the patients and the branches for which consultation was requested due to the post-traumatic injuries of these patients were investigated. The hospitalization and discharge status of the patients and the clinics where they were hospitalized were examined.

Results: The patients consisted of 369 (60.7%) females and 239 (39.3%) males. The most common chronic disease was hypertension (n=214, 35.2%). The most common reason for admission was falling (n=434, 71.4%). Soft tissue trauma was the most common finding in the patients (n=432, 71.1%). The mean age of the patients with fracture or dislocation was significantly higher compared to those with soft tissue trauma. The incidence of fracture or dislocation was significantly higher in females than in males. According to the causes of trauma, the incidence of fracture or dislocation was the highest in fall cases, which was significant.

Conclusion: Geriatric trauma patients are most frequently admitted to emergency departments due to simple falls. With simple measures to be taken in these patients, falls and exposure to trauma will decrease, and thus patients' life comfort will increase significantly.



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Introduction

Trauma is one of the most important causes of mortality and morbidity in the elderly [1]. It is the fourth main cause of death among all ages and one of the leading causes of death in individuals younger than 45 years [2]. This situation has made geriatric traumas an important socioeconomic and public health problem with aging [1,2].

Functional activities tend to decrease after trauma in the elderly, and such patients need to stay in the hospital for a long time for rehabilitation. Thus, elderly patients have to change their lifestyles and experience difficulty doing so [3,4]. In addition to decreased cardiac, pulmonary,

and renal capacity with aging, the emergence of comorbid diseases such as hypertension (HT) and diabetes mellitus (DM) and the use of antiplatelet-anticoagulant drugs also increase [5]. Therefore, geriatric patients exposed to trauma are more sensitive and vulnerable to trauma. Thus, post-traumatic adverse outcomes are likely to occur [5].

People now have a longer life expectancy compared to the old times. Thus, they take part in society more actively in life [6]. While people over 65 constituted 9% of the world's population in 2019, this rate is predicted to be 16% in 2050 [6]. The percentage of geriatric patients, including trauma patients, increases every day [6]. Geriatric traumas differ significantly from those of younger adult patients. Nowadays, geriatric trauma is defined as a different disease with simple falls, delayed diagnosis, and increased mortality [7].

A study found that older adults (defined as individuals

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over 65 years of age) were the only age group with an increase in hospital admissions due to trauma in the last 15 years compared to young adults and children. While there was no increase in young adults, a decrease was observed in pediatric admissions [8]. Geriatric traumas increase in terms of both the number and admissions to trauma centers. While the rate of trauma patients aged over 65 years in level 1 and 2 trauma centers was 23% in 2003 according to the national trauma database, this rate was 30% in 2009 [9]. These rates are likely to vary because most geriatric trauma patients are treated at lower-level centers or non-traumatic centers [9,10]. In the present study, we examined patients over 65 years admitted to the emergency trauma department. We aimed to investigate the reasons for admission, trauma regions, and the results of these patients admitted to the emergency department due to trauma.

Materials and Methods

Study collection

Ethics committee approval for the study was obtained from the Clinical Research Ethics Committee of Malatya Turgut Özal University with the decision dated 13.10.2021 and numbered 2021/82. All patients over the age of 65 who applied to the emergency trauma service for 3 months between June and August 2021 were included in the study. During this period, there were 608 patients over 65 years of age who applied and all were included in the study. The patients were evaluated according to their age and sex. The patients' causes of trauma were grouped as fall, sprain, bump, traffic accident, incision, and beating. Trauma regions were evaluated as extremities, head, thorax, pelvis, vertebrae, and abdomen. Extremity regions were divided into 4 groups: upper right, upper left, lower right, and lower left. Injuries due to trauma were analyzed as soft tissue trauma and fracture/dislocation. The existing chronic diseases of the patients and the number of drugs they regularly used per day due to these diseases were examined. The radiological methods (RG=radiography, CT=computed tomography, MRI=magnetic resonance imaging, and USG=ultrasonography) requested for the patients and the branches for which consultation was requested due to the post-traumatic injuries of these patients were investigated. The treatments applied to the patients in the emergency department were classified as medical, splint, Velpeau bandage, reduction, reduction-splint, reduction-Velpeau bandage, and suture. The hospitalization and discharge status of the patients and the clinics where they were hospitalized were examined.

Statistical analysis

SPSS v.22 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The means and standard deviations of continuous variables and the numbers and percentages of categorical data were calculated. Patients were divided into groups in terms of causes of trauma, areas affected by trauma, radiological examinations, results and treatment methods. The chi-square and t-tests were performed to compare the groups. The level of statistical significance was considered as $p < 0.05$.

Results

The patients were aged between 65 and 104 years, and their mean age was 74.9 ± 7.4 years. They consisted of 369 (60.7%) females and 239 (39.3%) males. Three hundred thirty-four (54.9%) patients had at least one chronic disease. The most common chronic disease was HT. Two hundred fourteen (35.2%) patients had HT, 88 (14.5%) had coronary artery disease (CAD), and 72 (11.8%) had DM. One hundred fourteen (18.8%) patients regularly used four or more kinds of drugs per day due to chronic diseases. The most common reason for admission was a fall, and 434 (71.4%) patients were admitted due to this reason. Five hundred thirty-five (88%) patients received outpatient treatment, and 73 (12%) received inpatient treatment. Some demographic and clinical characteristics of the patients and the causes of trauma are presented in Table 1.

When the patients were evaluated according to the affected regions after trauma, it was seen that only one

Table 1. Patients' demographic and clinical characteristics and causes of trauma.

Characteristics (n=608)	Mean±SD or n (%)
Mean age±SD	74.9±7.4
Female	369 (60.7)
Male	239 (39.3)
The presence of a chronic disease	334 (54.9)
No chronic disease	274 (45.1)
Not using drugs or using less than four drugs	494 (81.2)
Using four or more drugs	114 (18.8)
Fall	434 (71.4)
Sprain	82 (13.5)
Bump	62 (10.2)
Traffic accident	14 (2.3)
Incision	11 (1.8)
Beating	5 (0.8)
No hospitalization	535 (88.0)
Hospitalized	73 (12.0)

n: Number of patients.

Table 2. Affected regions after trauma.

Region	n (%) (total n=608)
Entire extremity	401 (65.9)
Right upper extremity	87 (14.3)
Left upper extremity	100 (16.4)
Right lower extremity	123 (20.2)
Left lower extremity	91 (15.0)
Head	131 (21.5)
Thorax	101 (16.6)
Pelvis	78 (12.8)
Vertebra	70 (11.5)
Abdomen	39 (6.4)

n: Number of patients; Note: Some patients had more than one region affected.

Table 3. Clinical findings according to the causes of trauma.

	Fall n (%)	Bump n (%)	Sprain n (%)	TA n (%)	Beatingn (%)	Incisionn (%)	Total n (%)
Soft tissue trauma	280 (64.5)	57 (91.9)	69 (84.1)	10 (71.4)	5 (100.0)	11 (100.0)	432 (71.1)
Femur f	41 (9.4)	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	0 (0.0)	42 (6.9)
Radius f	34 (7.8)	0 (0.0)	1 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	35 (5.8)
Humerus f	17 (3.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	17 (2.8)
Rib f	11 (2.5)	1 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	12 (2.0)
Fibula f	2 (0.5)	0 (0.0)	6 (7.3)	0 (0.0)	0 (0.0)	0 (0.0)	8 (1.3)
Tibia f	6 (1.4)	0 (0.0)	1 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	7 (1.2)
Nasal f	7 (1.6)	1 (1.6)	0 (0.0)	1 (7.1)	0 (0.0)	0 (0.0)	9 (1.5)
Dislocation	9 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9 (1.5)
Vertebra f	8 (1.8)	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	0 (0.0)	9 (1.5)
Foot bone f	4 (0.9)	1 (1.6)	3 (3.7)	0 (0.0)	0 (0.0)	0 (0.0)	8 (1.3)
Hand bone f	3 (0.7)	2 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (0.8)
Other f	8 (1.8)	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	0 (0.0)	9 (1.5)
Multiple f	4 (0.9)	0 (0.0)	2 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)	6 (1.0)
Total	434 (100.0)	62 (100.0)	82 (100.0)	14 (100.0)	5 (100.0)	11 (100.0)	608 (100.0)

n: Number of patients; TA: Traffic accident; f: Fracture.

Table 4. Incidence of soft tissue trauma and fracture or dislocation according to age, sex, and cause of falling.

	STT n (%) or mean±SD	Fracture or dislocation n (%) or mean±SD	Total n (%) or mean±SD	p
Mean age±SD	74.4±7.3	76.0±7.6	74.9±7.4	0.021
Female	248 (67.2)	121 (32.8)	369 (100.0)	0.009
Male	184 (77.0)	55 (23.0)	239 (100.0)	
Fall	280 (64.5)	154 (35.5)	434 (100.0)	<0.001
Sprain	69 (84.1)	13 (15.9)	82 (100.0)	
Bump	57 (91.9)	5 (8.1)	62 (100.0)	
Traffic accident	10 (71.4)	4 (28.6)	14 (100.0)	
Incision	11 (100.0)	0 (0.0)	11 (100.0)	
Beating	5 (100.0)	0 (0.0)	5 (100.0)	

STT: Soft tissue trauma; n: Number of patients; SD: Standard deviation; The t test was used to compare the mean ages, and the chi-square test was used when comparing other groups.

Table 5. Radiological imaging methods according to the patients' diagnoses.

Radiological imaging method	STT n (%)	Fracture n (%)	Dislocation n (%)	Total n (%)
Only RG	214 (49.5)	74 (44.3)	7 (77.8)	295 (48.5)
Only CT	125 (28.9)	18 (10.8)	0 (0.0)	143 (23.5)
RG and CT	71 (16.4)	65 (38.9)	2 (22.2)	138 (22.7)
RG and USG	3 (0.7)	0 (0.0)	0 (0.0)	3 (0.5)
CT and USG	8 (1.9)	2 (1.2)	0 (0.0)	10 (1.6)
CT and MRI	2 (0.5)	3 (1.8)	0 (0.0)	5 (0.8)
RG, USG, and CT	9 (2.1)	3 (1.8)	0 (0.0)	12 (2.0)
RG, CT, and MRI	0 (0.0)	2 (1.2)	0 (0.0)	2 (0.3)
Total	432 (100.0)	167 (100.0)	9 (100.0)	608 (100.0)

n: Number of patients; STT: Soft tissue trauma; RG: Radiography; CT: Computed tomography; USG; Ultrasonography; MRI: Magnetic resonance imaging.

Table 6. Treatment methods applied in the emergency department.

Treatment method	Discharge n (%)	Hospitalization n (%)	Total n (%)
Medical	355 (58.3)	54 (9.0)	409 (67.3)
Splint	100 (16.4)	10 (1.6)	110 (18.1)
Velpeau bandage	33 (5.5)	1 (0.1)	34 (5.6)
Reduction	2 (0.3)	0 (0.0)	2 (0.3)
Reduction and splint	30 (4.9)	7 (1.2)	37 (6.1)
Reduction and Velpeau bandage	6 (1.0)	1 (0.1)	7 (1.1)
Suture	9 (1.5)	0 (0.0)	9 (1.5)
Total	535 (88.0)	73 (12.0)	608 (100.0)

n: Number of patients.

region was affected in 474 (78.0%) patients. More than one region was affected in 134 (22.0%) patients. The most frequently affected region was the extremities in 401 (65.9%) patients, and the second most common region was the head in 131 (21.5%) patients (Table 2).

The most common finding in patients was soft tissue trauma, which was present in 432 (71.1%) patients. Extremity fracture was the second most common finding (20.4%), and the most common extremity fracture was observed in the femur (6.9%). The clinical findings of the patients according to the causes of trauma are presented in Table 3.

The patients were divided into 2 groups: those with soft tissue trauma and those with fractures or dislocations. The mean age of the patients with fracture or dislocation was significantly higher compared to those with soft tissue trauma ($p=0.021$). In terms of sex, the incidence of fracture or dislocation was significantly higher in females compared to males ($p=0.009$). In terms of the causes of trauma, the incidence of fracture or dislocation was the highest in fall cases, which was significant ($p<0.001$) (Table 4).

RG was the most common radiological imaging method at the stage of diagnosis, while CT was the second most common method. Two hundred ninety-five (48.5%) patients underwent only RG, 143 (23.5%) underwent only CT, and 170 (28.0%) underwent more than one examination. The distribution of the examinations performed according to the patients' clinical findings is presented in Table 5.

The consultation was requested from at least one department for 225 (37.0%) patients. The most frequently requested department for consultation was orthopedics, and orthopedic consultation was asked for 182 (29.9%) patients. The neurosurgery department was the second most frequently requested department for consultation for 22 (3.6%) patients. Medical treatment was applied to 409 (67.3%) of the 608 patients in the emergency department. A splint was applied to 110 (18.1%) patients in the emergency department (Table 6). Fifty-five (75.3%) and ten (13.7%) of 73 patients who received inpatient treatment were treated in the orthopedic ward and thoracic surgery ward, respectively.

Discussion

The elderly population has started to increase since the middle of the 20th century and increases with each passing day. Increasing age, physiological changes, and the diseases added to these over time in the elderly cause them to be exposed to trauma more easily [11]. Old age can be defined as an important period of life when a person weakens both physically and mentally, leading to a life dependent on the environment, and when the risk of accidents and traumas increases for these reasons [12]. Since elderly patients constitute a significant part of the population, there are many studies on this population, especially in terms of trauma. In one of these studies, 250 patients over 65 years of age admitted to the emergency department with a complaint of falling were included in the study. Of these patients, 60.8% ($n=152$) and 39.2% ($n=98$) were females and males, respectively, and the patients' mean age was 79.0 ± 8.5 years [13]. In another study

conducted with 250 patients over 65 years of age admitted due to trauma, 51.6% ($n=129$) and 48.4% ($n=121$) of the patients were females and males, respectively, and the patients' mean age was 73.3 [14]. In a more comprehensive study conducted with 4554 geriatric trauma patients over four years, 61.7% ($n=2809$) and 38.3% ($n=1745$) of the patients were females and males, respectively, and all patients were between the ages of 65 and 103 [15]. In another study including 406 geriatric blunt trauma patients, 66% ($n=268$) and 34% ($n=138$) of the patients were females and males, respectively, and the mean age was 75.6 ± 70 [16]. As is seen in the studies conducted, female patients in the geriatric population are more frequently exposed to trauma [13-16]. In our study, 60.7% ($n=369$) and 39.3% ($n=239$) of the patients were females and males, respectively. The age of our patients varied between 65 and 104 years, and the patients' mean age was 74.9 ± 7.4 years. The results of our study are consistent with the literature. With the total population in society, the number of the geriatric population, an important part of this population, also increases. In a study examining the injuries of elderly patients, elderly individuals constituted 18.4% of the 14.9-million population in 1996. In 2010, the population increased by 27% to 18.8 million, and the rate of the elderly was 17.3% [8]. Furthermore, studies demonstrated an increase in the number of geriatric traumas between 2005 and 2015, but this increase varied between 18% and 30%. During the same period, it was observed that the number of traumas under 65 years of age decreased [2]. In a study conducted with patients over 65 years of age admitted to the emergency department with blunt trauma, considering the patients' chronic diseases, the most common comorbid disease was HT with 51.2% ($n=208$), followed by DM with 22.4% ($n=91$) and CAD with 14.3% ($n=58$). Due to chronic diseases, 14.9% ($n=56$) of these patients used 5 or more drugs per day [16]. In another study, trauma patients over 65 years were grouped as 65-74, 75-84, and 85 years and older, and the most common comorbid disease in all three groups was HT, followed by CAD [15]. In our study, the most common chronic disease was HT, followed by CAD and DM. One hundred fourteen (18.8%) patients regularly used four or more kinds of drugs per day due to their chronic diseases. Our results were similar to the results in the literature. Considering the causes of trauma in geriatric patients, in a study including 131,088 geriatric trauma patients, patients were grouped as 65-79 years old and 80 years old and over (70,707 patients in the 65-79 age group and 60,381 patients in the ≥ 80 age group), and falls were observed to be the most common cause of trauma in geriatric patients in both groups (age 65-79, 56.7% and age ≥ 80 , 78.9%) [1]. In another study, the most common cause was low-energy falls with 79.6% ($n=323$), followed by sprain, crushes, and bumps with 6.9% ($n=28$) [16]. Considering the affected regions after trauma in geriatric trauma patients, the extremities were the most frequently affected regions, followed by head trauma, and the least affected region was the abdomen [15,16,17]. In our study, the most common cause of trauma was falls, followed by sprains. The most frequently affected region was the extremities, the second most frequently affected region was the head, and the least affected region

was the abdomen. Since geriatric patients constitute a group of patients sensitive in every respect, many studies have been conducted especially in terms of traumas in this group of patients. One of these studies evaluating geriatric trauma patients found that soft tissue trauma was the most common among these patients (31.87%), followed by femur/hip fracture (23.58%) [18]. A study on injuries after geriatric falls revealed that femur fractures were the most common in the lower extremities, while radius fractures were the most common in the upper extremities [19]. In our study, similar to the literature, the most common finding was soft tissue trauma, and we found that the second most frequent finding was an extremity fracture. Femur fracture was the most common in the lower extremity, whereas radius fracture was the most common in the upper extremity. In general, the most common extremity fracture was observed in the femur. Furthermore, another study determined that hip fractures were observed at a higher rate in females compared to males [15]. Likewise, in our study, the incidence of fractures or dislocations was significantly higher in females than males. In the study examining geriatric trauma patients admitted to the emergency department, considering the consultations requested in the emergency department, it was seen that no consultation was requested for 34.4% (n=86) patients and orthopedic consultation was requested the most by 31.6% (n=79). Neurosurgery consultation was the second most frequently requested consultation by 17.6% (n=44) [14]. In our patients, the most frequently requested department for consultation was orthopedics, followed by the neurosurgery department. In a study including 3,731 geriatric trauma patients, 94 (2.5%) of these patients were hospitalized, and the most common trauma in these patients was blunt trauma caused most frequently by slips and falls [5]. Moreover, it was observed that geriatric patients hospitalized due to trauma experienced a decrease in their quality of life in various dimensions [5]. In our study, 535 (88%) patients received outpatient treatment and 73 (12%) patients received inpatient treatment. The most common cause of trauma in hospitalized patients was falls. The hospitalization rate in our study was higher compared to the literature.

Conclusion

In geriatric patients, traumas most commonly occur due to falls. We also observed that these traumas were most commonly soft tissue trauma, but fractures/dislocations also occurred at a significant rate. Furthermore, we observed that females were more frequently exposed to trauma and the incidence of fracture/dislocation due to trauma was higher in females. We found that the mean age of the patients with fracture/dislocation was higher compared to those with soft tissue trauma, indicating that fracture/dislocation occurred at a higher rate with advancing age. In conclusion, geriatric patients are faced with soft tissue traumas and traumas resulting in fractures/dislocations and significantly impairing their life comfort. We believe that especially for geriatric patients, falls and exposure to trauma can be reduced with simple measures that can be applied, and thus, life comfort will also increase. To this end, conducting comprehensive

prospective studies after implementing these measures will further contribute to the literature.

Limitations of the study

The limitations of our study are that it is retrospective, the number of patients is small, and it is a single-center study.

Conflict of interests

The authors declare that they have no competing interest.

Financial disclosure

All authors declare no financial support.

Ethics approval

The study was approved by Clinical Research Ethics Committee of Malatya Turgut Özal University with the decision dated 13.10.2021 and numbered 2021/82.

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