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Prospective Analysis of Geriatric Patients Admitted to Emergency Department with Trauma

Acil Anabilim Dalına Travma Sonrası Kabul Edilen Geriatrik Hastaların İleriye Dönük Analizi

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ABSTRACT

Purpose: The aim of this study is to reveal the demographic characteristics, causes of trauma, physical examination findings, the presence of fractures and the status of the outcome of the geriatric trauma patients admitted to the emergency department of an educational research hospital.

Material and Methods: This study covers all the cases over 65 years who were admitted to emergency department with trauma between September 1 2011-31 August 2012. The demographic characteristics of the patients such as, age, gender, date of application and as well as the causes of trauma, physical examination findings and outcome situation in the emergency department were evaluated. The study was performed prospectively. SPSS V.20 was used for statistical analysis of the data obtained.

Results: Total 175 patients were included to the study, 74 were male (42.28%) and 101 were female (57.72%). The mean age of male patients were 75.01 ± 6.557 while the mean age of female patients were 76.10 ± 7.353. The most common cause of trauma in both gender was falls. This rate was 91.1% in female and 8.9% in male patients. 40.6% of the female patients and 27% of the male patients were admitted to the hospital before because of any trauma. The most common form of trauma according to exposed body localization in both gender was extremity traumas. It was seen in 51.5% of the females and 56.8% of the males. 30 female patients (29.7%) and 13 male patients (17.6%) had fracture in limbs. 78.3% of all patients were discharged from the emergency department and 21.7% of the patients were hospitalised. None of the patients were died in emergency department and none of the patients were referred to another institution from the emergency department. Total 38 patients were hospitalised, 32 of them were discharged, 2 of them were referred to another institution, and 4 of them were died. 26 of 38 hospitalised patients had undergone surgery while 20 of them were orthopedic surgeries.

Conclusions: Most of the geriatric trauma patients constitute of traffic accidents and falls from height. These injuries can lead to serious morbidity and mortality in elderly people, and these problems can be prevented significantly by giving information and education to family members and caregivers in terms of preventive measures.

Anahtar Kelimeler: Emergency service, geriatrics, trauma.

ÖZET

Amaç: Bu çalışma, eğitim araştırma hastanesinin acil bölümüne giriş yapan geriatrik travma hastalarının demografik karakteristiklerini, travma nedenlerini, fizik muayene bulgularını, kırıkların varlığını ve sonuç statülerini ortaya çıkarmayı amaçlamaktadır.

Materyal ve Metod: Bu çalışma, 1 Eylül 2011-31 Ağustos 2012 tarihleri arasında acil bölümüne giriş yapmış travmalı 65 yaş üstü hastaları içermektedir. Acil bölümünde ki hastaların travma nedenleri, fizik muayene bulguları ve sonuç

statülerinin yanı sıra yaş, cinsiyet, başvuru tarihi gibi demografik karakteristikleri de değerlendirilmiştir. Çalışma prospektif olarak yapıldı. Elde edilen dataların istatistik analizleri için SPSS V.20 programı kullanıldı.

Bulgular: Çalışmaya 74 (%42,28)'ü erkek, 101 (%57,72)'i kadın olmak üzere 175 kişi dahil edildi. Kadın hastaların yaş ortalaması 76.10 ± 7.353 iken erkek hastaların yaş ortalaması 75.01 ± 6.557 idi. Her 2 cinsiyette de en yaygın travma nedeni; düşmelerdi. Bu oran kadın hastalarda %91,1 iken erkek hastalarda %8,9'du. Kadın hastaların %40,6'sı, erkek hastaların ise %27'si herhangi bir travma nedeni olmadan önce hastaneye baş vurdu. Her iki cinsiyette de vücut lokalizasyonuna göre en yaygın travma; ekstremite travmasıydı. Bu oran kadınlarda %51,5, erkeklerde ise %56,8 olarak bulundu. Kadın hastaların 30'unda (%29,7) ve erkek hastaların 13'ünde (%17,6) bacak kırığı vardı. Tüm hastaların %78,3'ü acil bölümünden taburcu edildi, %21,7'si ise hastanede yatmaya devam etti. Acil bölümünde hastaların hiç biri ölmedi ve başka bir kuruma sevk edilmedi. Hastanede yatan toplam 38 hastanın 32'si taburcu edildi, 2'si başka bir kuruma sevk edildi ve 4'ü öldü. Hastanede yatan 38 hastanın 26'sı cerrahi müdahaleye maruz kaldı ki bunların 20'si ortopedik ameliyatlardı.

Sonuç: Geriatrik travmaların çoğu trafik kazaları ve yüksekten düşmeler sonucu meydana gelmektedir. Bu yaralanmalar yaşlı kişilerde ciddi hastalıklara ve ölümlere neden olabilir. Bu problemler, bakıcılara ve aile bireylerine iyi bir eğitim ve gerekli bilgiler verilerek önemli derecede önlenebilir.

Anahtar Kelimeler: Acil servis, geriatrik, travma.

INTRODUCTION

Aging is a set of irreversible structural and functional changes in organism, organs and systems. Elderliness is characterized by a decrease in the biological capacities and has physiological, psychological, economic, and social aspects. Chronologically the age of 65 and over is considered old age. Dependency begins in terms of health, productivity decreases in working life and retirement period begins in old age. The most important factor that determines the lifetime is genetics. However, several factors, such as, lifestyle, environmental factors, diseases and individual's ways of coping with adverse conditions, involve in determining the life expectancy[1].

Elderly population represents a large and growing portion of society. The number of elderly in the World population has been rising due to declining birth rates and rising life expectancy. The ratio of the elderly population has transcended the young population over the years. The elderly population is increasing in our country as well as around the world. According to World Health Organization numbers healthy life expectancy is 61.2 years for men, 62.8 years for women and 68 years for men and 73 years for women, in our country.[2] Therefore as the number of elderly people in the population continues to increase, the frequency of health problems, and trauma, due to old age will continue to increase[1].

Elderly people are more liable to trauma because of age-related deterioration of motor and cognitive functions and because they lead a more active lifestyle. Older adults may be exposed to trauma due to falls, motor vehicle accidents, pedestrian injuries, burns, violence or abuse. Even small traumas can lead to more serious injuries in the elderly. Trauma causes more serious injuries in the elderly due to physiological changes such as decreased bone mass, decreased fat storage, osteoporosis, loss of subcutaneous tissue, and muscle atrophy[3]. Although the risk of exposure to trauma is lesser in the elderly, post-traumatic mortality rates are higher than other age groups. People over 65 years of age constitute approximately 28% of deaths due to accidents. In elderly patients, even moderate injuries may be critical and require long-term hospitalization or rehabilitation. Similar injuries may often require

more health care in elderly when compared to younger patients.

The purpose of this study is to explain, demographic characteristics, causes of trauma, physical examination findings and termination in the emergency room of geriatric trauma patients admitted to the emergency department of our hospital.

MATERIAL and METHODS

This prospective study includes trauma patients aged 65 years and older, who admitted to emergency department between September 1 2011- August 31 2012. The study was initiated after approval from the hospital ethics committee. Routine examinations of the patients included in this study were performed by emergency medicine assistants. Registration forms were filled out by the assistants who performed the treatment. The forms were checked daily and inadequacies were completed in consultation with the physician who performed the emergency care. The patients whose forms were absent or uncompleted were excluded from the study.

The cases were assessed in terms of age, gender, date of the event (in months), Glasgow Coma Scale (GCS) in admission, causes of injury, localization of the injury, presence of old lesions, the presence of broken limbs, history of previous admissions due to trauma or non-traumatic reasons, laboratory and imaging tests and presence of life-threatening conditions. The patients were also evaluated in terms of termination in the emergency room, clinic of hospitalization, duration of hospitalization, and the outcome in the clinic.

Student's t test was used for comparison of continuous variables between groups with and without pathology. Fisher's exact test was used to compare categorical variables. Evaluation of the difference between the two groups of $p < 0.05$ in type 1 error 95% confidence interval (CI) were considered statistically significant. SPSS V.20 was used for statistical evaluation.

RESULTS

Totally 175 patients over the age of 65 who presented to the emergency department with trauma during the study period were included to our study. Approximately 0.08% percent of admissions to emergency department were trauma emergencies of patients over 65 years. Of the patients included in the study, 74 of the patients were male (42.28%), and 101 of them were female (57.72%). The mean age of all patients was 76.07 years. The mean age of male patients were 75.01 ± 6.557 years, while the mean age of female patients were 76.10 ± 7.353 years. The admissions were usually in November and May (13.1%). The least admissions were in December and July (5.1%). There was no statistically significant difference between them ($p > 0.05$).

According to the analysis of the patients' GCS score at admission, 172 patients had mild (14-15), 2 patients had moderate (9-13), and 1 patient had severe (<9) score. There was no significant difference in the distribution of GCS score by gender ($p > 0.05$).

The most common cause of traumas in both gender was falls from height. The rate of falls were 91.1% for females, whereas 68.9% for males. Falls from height in female patients, and road traffic accidents in male patients were significantly more common ($p < 0.0001$). It was observed that falls were 14.5 times more often in females than men (odds ratio = 14.5) (Figure 1,3).

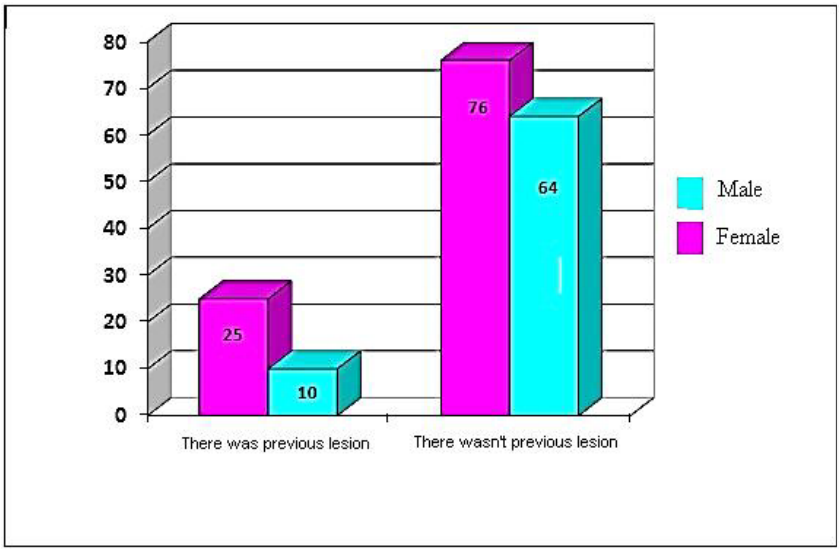

Figure 1. Presence of previous lesion in physical examination

Limb traumas were the most common type of trauma localization in both gender. This rate was 51.5% for female, and 56.8% for male. There was no statistically significant difference between them (p> 0.05). However, the possibility of exposure to head trauma in male patients were 4.69 times higher than female patients (odds ratio = 4.69).

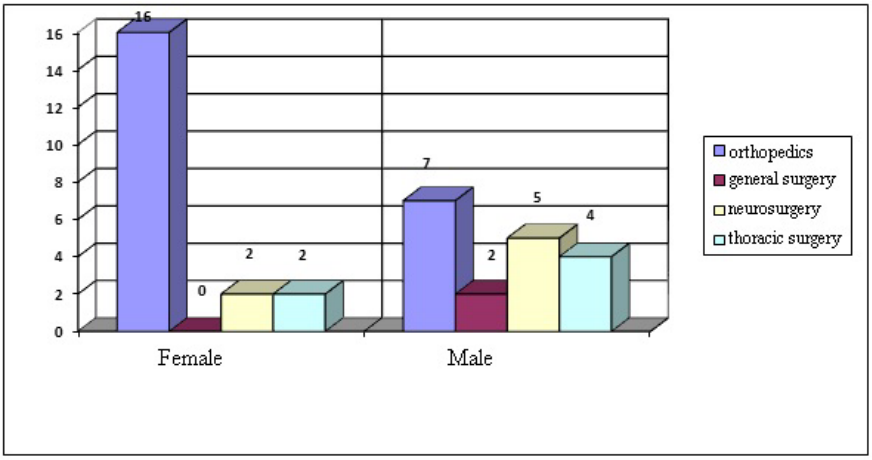

Figure 3. Distribution of the patients admitted to clinics

According to the physical examination findings, there was sensitivity in the localization of injury in 84.2% of female, and 79.7% of male patients. This rate was not statistically significant. The risk of deformity were four times higher in males than females (odds ratio = 4.02), and this ratio was statistically significant (p <0.05). Other physical examination findings and the rates are given in Table 1.

Table 1: Physical examination findings

Gender	Physical Examination Findings						
	Incision	**Laceration**	**Abrasion**	**Ecchymosis**	**Deformity**	**Sensibility**	**Burn**
Female	14 (%13,9)	4 (%4)	11 (%10,9)	13 (%12,9)	31 (%30,7)	85 (%84,2)	1 (%1)
Male	15 (%20,3)	8 (%10,8)	14 (%18,9)	11 (%14,9)	13 (%17,6)	59 (%79,7)	5 (%6,8)

Thirty female patients (29.7%), and 13 male patients (17.6%) had extremity fractures. According to the classification of extremity fractures, 13 of them were in upper extremities, and 17 of them were in the lower extremities in females, while 4 of them were in upper extremities, and 9 of them were in the lower extremities in male patients. The possibility of fracture incidence in female patients were 3.4 times higher than male patients (odds ratio = 3.4).

X-ray radiography was the most used imaging method in both males (89.2%) and females (99%). There was no statistically significant difference between them (p> 0.05). Ultrasound usage rate was 8.9% for female, while 23% for men. There was a statistically significant difference between them (p< 0.05). The possibility of the Ultrasound usage in females was 6,6 times higher than males (odds ratio = 6.6).

According to the physical examination findings, 24.8% of the female and 13.5% of the male patients had the risk of old lesions, and this difference was statistically significant (p <0.0001) (Figure 2). The possibility of an old lesion detection in male patients were 3.4 times more than female patients (odds ratio = 3.489).

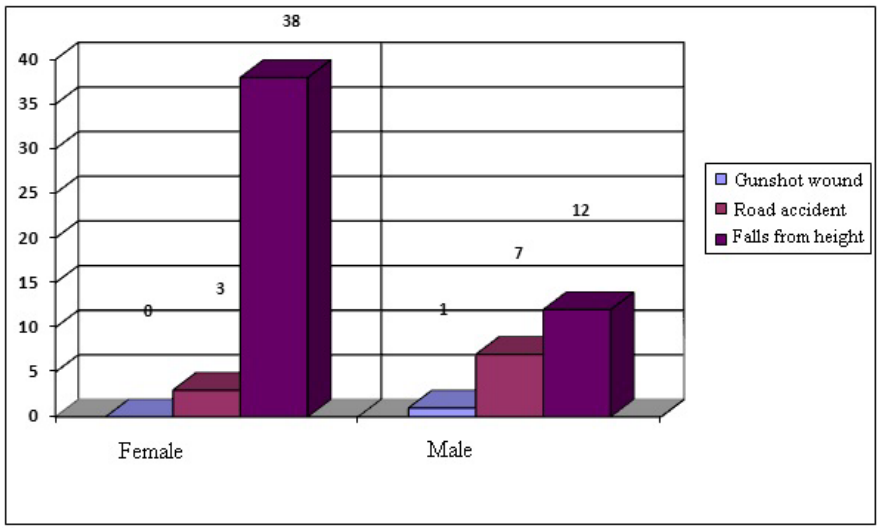

Figure 2. Distribution of the causes of trauma according to the gender

The previous admission rate to hospital due to trauma is 40.6% for female patients and 27% for male patients, and this risk was 3.5 times higher in females (odds ratio = 3.5).

According to the outcome of all patients from emergency department, 78.3% percent were discharged from the emergency department, 21.7% percent were hospitalised, and no patient was not sent to another institution. The most common hospitalization place for both sexes was the department of orthopedics (80% for females,

38.8% for male patients). The probability of hospitalization rate to department of orthopedics for female patients were 7.4 times higher than male patients (odds ratio = 7.42). According to the situation of the outcome of the hospitalised patients, 32 of the 38 patients (84.2%) were discharged from hospital, 2 patients were transferred to another institution, and 4 patients were died (Figure 4). Totally 26 of 38 hospitalised (68.4%) patients were operated, and 20 of them (52.6%) were orthopedic surgeries.

According to the written forensic reports, 12.9% of the female patients and 16.2% of the male patients had a danger of life. In addition, 17.8% of female patients and 21.6% of male patients had injuries defined as that could not be removed with a simple medical intervention.

DISCUSSION

Although the variability of the characteristics based on socio-economic and socio-cultural properties of the societies, the ageing causes the slowdown in mental activity, perception disorders, attention deficit, reduction in sensory functions such as vision and hearing, latency of reflexes, general muscle weakness and disorders of movement. All of these negative changes increases the risk of exposure to trauma in the elderly[4].

The evaluation of hospital emergency department admissions according to age groups showed that 8-23% of them is made by geriatric patients group[5]. In 2020, this ratio is expected to be up to 25% according to the increase in life expectancy of the community. Therefore, care of elderly patients in the emergency services is gaining importance day by day.

In the studies, geriatric emergency admissions is 5% to 9.9%. (86-87) 0.8% of total 20 860 geriatric patients admitted to the emergency department during our study was traumas. This rate was significantly lower compared to the literature. The new emergency service was under construction during the study period and the distance between emergency service and main hospital building was 10 kilometres. The number of outpatients and 112 ambulance service admissions with trauma may have decreased because of this reason.

According to the studies about evaluation of elderly patients admitted to the emergency service, 65.23% of all cases in Fama et al's study[6] and 76% of all cases in McGwin and colleagues study[7] were women. In another study made by Eric and his colleagues, 65.8% of geriatric trauma cases were found to be male.[8] 42.28% of the patients included in our study were men and 57.72% percent were female. These rates are similar to the literature.

In the literature, traumas are often due to falls, and realized in the residential areas of the elderly, especially in their homes[9]. Females more often have falls and domestic accidents, because of their less muscle tissue, increased frequency of osteoporosis in postmenopausal period and more active life at home.[10] According to the studies about geriatric patient admissions to the emergency department, the mean age was 75.6 ± 7 years in Atilla and his colleagues study[11] and 73 ± 5.2 years in another study made by Aktas et al.[12] In our study, the average age of all patients was 76.07 years. The mean age of male patients were 75.01 ± 6.557 years and the mean age of female patients was found to be 76.10 ± 7.353 years. Our study is similar to the literature.

Akoglu et al. found that 32% of geriatric trauma patient admissions were in spring months, 31% per cent in autumn, 25% per cent in winter, and 11% per cent in summer.[13] In our study, 33% percent of all patients admissions were in spring, 26% in autumn, 22% in winter and 19% in summer months. The city center of Adana is extremely hot in summer, so the elderly lives out of the city (in mountain or sea hosuses) on hot summer days, and they are often in a closed areas on cold winter days. For this reason, frequency of admissions to emergency services decreases. In the other national studies, it is observed that the number of

patient admissions differed due to the seasonal time periods. However, in almost all regions, patients most commonly seen in the months of spring[14].

In our study, the most common cause of trauma was falls (81.7%). The other common causes were traffic accidents (12.6%), assault-algebra (2.3%) and burns (2.3%), respectively. In Abdulhayoglu et al. study, falls were 81.2%, traffic accidents were 9% and burns were 4.2%.[1] In another study made by Aktas and colleagues, falls were 76.9% of the patients, a traffic accident were 21% of the patients.[12] Results of our study is similar to the literature. In consequence of the decrease in vision and hearing with aging, walking problems due to decreased motor strength and balance problems, the frequency of falls in the elderly are increasing[1,15]. Emergency physicians should seek for the metabolic, endocrine and physiological disorders in the falling cases, especially in geriatric age group. In general, the most common cause of falls is known to be syncope. Syncope may occur secondary to the problems such as anemia, arrhythmias, hypoxia, hypoglycemia, peripheral autonomic nervous system changes, venous congestion and drug use. Considering all of these reasons, all necessary tests must be carried out[15].

In our study, we found that falls were 14.5 times more frequent in women than men when the causes of trauma were evaluated according to sex. In the literature, the majority of traumas were falls due to the home accidents.[16] We think that the frequency of falls in female patients of our study is more often, because they spend more time at home.

In our study, road traffic accidents were more common in men (20%) than women (7%). We think that this situation is the reason of a more active role of elderly men in social life, and their more frequently vehicle usage in our country.

According to the literature, the most common trauma regions are head and limbs in the elderly. The frequency of extremity traumas 38.7%, head traumas 35.3%, chest traumas 15.8%, spine traumas 11.2%, abdominal traumas 5.4%, and other local traumas were 17% (pelvis, maxillofacial) in Güneytepe et al. study.[17] Our study is similar to the literature. The frequency of extremity traumas were 53.7%, head traumas 35.4%, chest traumas 18.9%, abdominal traumas 11.4%, pelvic traumas 10.9% and vertebral traumas were 8% in our study.

In our study, physical examination findings were evaluated according to the gender of the patients, 84.2% percent of the females have tenderness on the injury region, and the other findings were deformity (30.7%), cuts (13.9%), bruises (12.9%), abrasions (10.9%), lacerations (4%), and burns (1%). The most common injury in males was the tenderness on the injury region (79.7%) and other common causes were cuts (20.3%), abrasions (18.9%), deformity (17.6%), ecchymosis (14.9%), laceration (10.8%) and burns (6.8%). Deformity was seen more often in females, and burns were more often seen in males. The most commonly detected physical examination finding was tenderness in the injury region, because the falls were the most common cause of trauma in both genders. A significant correlation was found between the frequency of the deformity and the incidence of fractures in both sexes. Fracture rate of females (lower-upper extremity) were 29.7% and deformity percentage was 30.7%. Fracture rate was 17.6% and deformity percentage was 17.6% in males. According to the literature on the incidence of fractures in geriatric patients, incidence of fractures was 40.718% in Bilgin et al. study, 36.31% in Abdulhayoglu et al. study, 32% in Ozsaker et al. study. In our study, fracture rate (24.5%) was lower than that described in the literature. 14.8% of the fractures were in the lower extremities, while 9.7% were in upper extremity. Compared to other studies, low fracture rate was detected in our study, it may be associated with the low mean age of the patients and the less ratio of female patients. Fractures of the lower extremities were seen more often than the upper

extremity fractures, this may be related to the reason of osteoporosis and contusion of trochanter major.

Some imaging methods are used for the detection of the presence of trauma to the patients, such as CXR, computed tomography (CT), magnetic resonance imaging (MRI) and ultrasonography (U.S.). In the study of Abdulhayoglu et al, it was detected that radiography (82.1%), CT (44.4%), MRI (3.2%), the ultrasound examinations (2.7%) were requested from the patients[1]. According to our study, radiography (94.8%), CT (37.7%) and the ultrasound examinations (14.8%) were requested from the patients. MRI was not requested for any patient, because MRI is not available at our hospital. The high level of USG usage in our study may be due to the fact that all emergency physicians can use the USG device in our emergency department. The rate of positive findings on applied imaging techniques were 39.6% for female and 29.7% for male patients. This rate is low, because the physicians may be worried about missing the diagnosis of possible injuries (fracture, bleeding), especially in elderly patients. However, patients exposition to radiation, and excess of unnecessary tests may be the subject of debate to the financial burden of the country's economy. Hospital police was informed about all of the geriatric trauma patients regardless of the severity and the causes of trauma. According to the written forensic reports of our study, 15% of the patients' had life threat. Traumas of 19.4% percent of the patients were not be removed with a simple medical intervention. In the study of Bilgin et al, 20% of the patients' had life threat[18].

Looking at the outcome status of the patients in the emergency department, 78.3% percent of all patients were discharged from the emergency department, 21.7% of them were hospitalised, and any patient was not sent to another institution. The most hospitalisation place of the patients in both genders was orthopedic department (60.5%), and the other clinics were brain surgery department (18.4%) and thoracic surgery department (15.7%). In the study of Abdulhayoglu et al, 67.3% of patients were discharged from the emergency department, 22.4% of the patients were hospitalised (68.7% of them in orthopedic department, 13.3% of them in brain surgery department, 5.3% of them in general surgery department).[1] These results were similar to our study.

Looking at the outcome of the hospitalised patients, 32 of 38 patients were discharged to home, 2 patients were transferred to another institution, and 4 patients were died. Three of the patients who died were in Neurosurgical Department and one of them was in orthopedics department. In the study of Kandis et al, 38 of 224 patients were hospitalised and 5 of these patients were died. Four patients who died had head trauma.[15] The most of the patients were hospitalised to orthopedics and brain surgery department, and deaths were occurred in these clinics parallel to their high hospitalisation rate.

In conclusion, most of the geriatric trauma patients constitute of traffic accidents and falls from height. These injuries can lead to serious morbidity and mortality in elderly people, and these problems can be prevented significantly by giving information and education to family members and caregivers in terms of preventive measures.

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