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Forensic Admissions of Geriatric Patients to the Emergency Department and Short-Term Mortality Rates

Geriatrik Hastaların Acil Servise Adli Başvuruları ve Kısa Dönem Mortalite Oranları

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ABSTRACT

Objective: The increasing number of geriatric admissions to emergency departments (EDs) necessitates a separate study of geriatric admissions for forensic reasons. This study investigated the reasons for geriatric forensic cases presented to the ED, the one-month mortality rates of these cases, and the factors affecting mortality.

Methods: This was a retrospective cohort study. All patients 65 years old and older who were reported as forensic cases and presented to the ED of a tertiary care hospital between June 2018 and April 2021 were included. Forensic diagnoses, type of injury, age, gender, Glasgow Coma Scale score, consultation details, outcomes, and 1-month mortality status were recorded.

Results: Among the 10.128 adult forensic presentations, 396 (3.9%) geriatric patient presentations were included in the study. The most common forensic diagnoses were motor vehicle accidents (24.2%) and pedestrian accidents (24.2%). Soft tissue injuries were the most common type of injury, followed by extremity fractures. Logistic regression analysis showed that age [odds ratio (OR): 1.095; 95% confidence interval (CI): 1.027-1.169], GCS (OR: 0.655; 95% CI: 0.560-0.765), number of consultations (OR: 1.840; 95% CI: 1.312-2.581), and pedestrian accidents (OR: 0.052; 95% CI: 0.006-0.460) were significantly associated with 1-month mortality.

Conclusion: Traffic accidents, including motor vehicle and pedestrian accidents, were the most common type of forensic cases in this group of patients. One-month mortality increased with age, number of consultations, low GCS, and absence of pedestrian accident.

Keywords: Geriatrics, forensic medicine, emergency medicine, mortality

Öz

Amaç: Acil servislere geriatrik başvuruların sayısının artması, adli nedenlerle geriatrik başvuruların ayrı bir şekilde incelenmesini gerektirmektedir. Bu çalışmada, acil servise başvuran geriatrik adli olguların nedenleri, bu olguların bir aylık mortalite oranları ve mortaliteyi etkileyen faktörler araştırıldı.

Yöntemler: Çalışma retrospektif bir kohort olarak planlandı. Haziran 2018 ile Nisan 2021 tarihleri arasında üçüncü basamak bir hastanenin acil servisine başvuran ve adli olgu olarak bildirilen 65 yaş ve üzeri tüm hastalar çalışmaya dahil edildi. Adli tanılar, yaralanma tipi, yaş, cinsiyet, Glasgow koma skalası skoru, konsültasyon detayları, sonuçlar ve 1 aylık mortalite durumu kaydedildi.

Bulgular: Acil servise başvuran 10.128 yetişkin adli başvuru arasından 396 (%3,9) geriatrik hasta başvurusu çalışmaya dahil edildi. En yaygın adli tanılar motorlu araç kazaları (%24,2) ve yaya kazaları (%24,2) idi. Yumuşak doku yaralanmaları en sık görülen yaralanma türü olup, bunu ekstremiteler kırıkları takip etti. Lojistik regresyon analizi yaş (odds oranı (OR): 1.095; %95 güven aralığı (CI): 1.027-1.169), GKS (OR: 0.655; %95 CI: 0.560-0.765), konsültasyon sayısı (OR: 1.840; %95 CI: 1.312-2.581) ve yaya kazalarının (OR: 0.052; %95 CI: 0.006-0.460) 1 aylık mortalite ile anlamlı şekilde ilişkili olduğunu göstermiştir.

Sonuç: Motorlu taşıt ve yaya kazalarını içeren trafik kazaları, bu hasta grubunda en sık görülen adli olgu türüydü. Bir aylık mortalite yaş ve konsültasyon sayısının artışı ile, düşük GKS ve yaya kazası olmaması durumu ile artmıştır.

Anahtar Sözcükler: Geriatri, adli tıp, acil tıp, mortalite

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INTRODUCTION

Because of the worldwide increase in the geriatric population, geriatric patients account for an increasingly large percentage of emergency department (ED) visits (1). Members of this vulnerable patient population are more likely to be hospitalized, have more adverse outcomes, and require specialized healthcare (2-4). Atypical presentations, multiple comorbidities, and impaired cognitive function complicate the management of these patients (2). In addition, physiopathological changes leading to mental and physical deterioration with advanced age make geriatric patients more vulnerable to physical trauma and increase the adverse outcomes of trauma caused by themselves or by someone or something else (5). The geriatric patient population comprises approximately 7% of all forensic presentations in EDs (6). The mortality rates of these patients vary, and there is not enough data in the literature regarding the factors that contribute to mortality. On the other hand, longer life expectancy and the development of treatments for chronic diseases have enabled a growing number of older people to lead active lives. This longer life expectancy also increased the proportion of geriatric patients visiting the ED for forensic cases. It is important to analyze forensic cases in the geriatric population and investigate the mortality of these patients to draw attention to the cases and identify preventable causes. This study examined the causes of geriatric forensic cases presenting to the ED, the 1-month mortality of these cases, and the factors affecting mortality.

MATERIALS AND METHODS

This retrospective cohort study was designed. All patients aged 65 years who were reported as forensic cases and presented to the ED of a tertiary care hospital between June 2018 and April 2021 were included in the study. Ethical approval was obtained from the Gazi University Ethics Committee (approval number: E.88227, date: 21.05.2021). The patient data were evaluated using electronic medical records. Forensic diagnosis, type of injury, age, gender, Glasgow coma scale (GCS), consultation details, outcomes (whether hospitalization, discharge, or death), and 1-month mortality status were recorded. Forensic diagnoses included motor vehicle accidents, pedestrian accidents, falls, physical assaults, occupational accidents, abuse, stab-cut injuries, intoxication, suicides, and suspicious deaths. According to the law in Türkiye, all traffic accidents, occupational accidents, assaults, suicides, abuses, and intoxication should be forensically reported. In cases of falls, sharp injuries, and deaths, forensic reports should be prepared if a forensic incident is suspected. The types of injuries noted were soft tissue injury, fracture of extremity, cut, thorax injury, cranial pathology, vertebral fracture, maxillofacial fracture, pelvic fracture, abdominal pathology, cardiac arrest, drug intake, eye injury, chemical exposure, carbon monoxide poisoning, alcohol intake, and others.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 21 (IBM Corporation, Armonk, NY) and MedCalc® version 15.8 (MedCalc Software Ltd., Ostend, Belgium). Continuous variables are presented as median values and interquartile ranges (IQRs), whereas categorical variables are presented as frequencies and percentages. The normality of the continuous variables was

evaluated using the Kolmogorov-Smirnov test. The differences between the continuous variables were determined using the Mann-Whitney U test. The categorical variables were compared using Pearson's χ^2 test or Fisher's exact test. Odds ratios (ORs) are presented as 95% confidence intervals (CIs). A critical α value of 0.05 was considered statistically significant. A binary logistic regression model was constructed to identify factors predicting 1-month mortality. Each variable was tested in the univariate model, and comparisons with loose p-values of less than 0.1 were then tested in the multivariate model. Parameters containing fewer than 10 patients were not included in the analysis.

RESULTS

During the study period, 10,128 adult forensic patients visited the ED. Of all patients, 396 (3.9%) were geriatric presentations. The proportion of male participants was 56.8%, and the median age was 71 years (IQR 67-78). The most common forensic diagnoses were motor vehicle accidents (24.2%) and pedestrian accidents (24.2%). Seventy-one percent (71%) of patients were discharged from the ED. The number of patients who died within 1-month was 28 (7%). Of the patients diagnosed with abuse, 38.8% died within 1-month, accounting for 25% of the total 1-month mortality. Detailed patient characteristics, forensic diagnoses, and outcomes are summarized in Table 1. Soft tissue injuries (33.3%) were the most common type of injury, followed by extremity fractures (22.2%). Forty-nine patients (12%) had more than one diagnosis. The diagnosis data are presented in Table 2. The most frequently requested consultation was for orthopedics (25%). This was followed by neurosurgery, thoracic surgery, and plastic and reconstructive surgery at decreasing rates (13.1%, 10.3%, and 9.8%, respectively) (Figure 1). Multivariate logistic regression analysis (Hosmer-Lemeshow test, $p=0.968$) was performed to identify factors associated with 1-month mortality. Age (OR: 1.095; 95% CI: 1.027-1.169), GCS (OR: 0.655; 95% CI: 0.560-0.765), number of consultations (OR: 1.840; 95% CI: 1.312-2.581), and pedestrian accidents (OR: 0.052; 95% CI: 0.006-0.460) were predictors of mortality (Table 3).

DISCUSSION

In our study, most of the geriatric forensic cases that visited the ED were due to motor vehicle accidents and pedestrian accidents, accounting for half of all forensic cases. The most common types of injuries were soft tissue injuries and extremity fractures. The rate of 1-month mortality was 7%. Advanced age, lower GCS score at presentation, increased number of consultations, and absence of pedestrian accidents were associated with higher mortality rates. Many studies have found that traffic accidents are the most common forensic diagnosis in forensic cases involving EDs (7,8). With the increase in the elderly population, there has been an increase in the number of elderly people participating in traffic as drivers, passengers, and pedestrians (9). In this study, we classified traffic accidents as motor vehicle accidents and pedestrian accidents. The most common forensic diagnoses were motor vehicle accidents (24.2%) and pedestrian accidents (24.2%). In a study by Korkmaz et al. (10) 48.3% of the geriatric forensic cases involved traffic accidents, of which 6.3% involved pedestrian accidents. Dağar et al. (6) found that 53% of forensic cases involved motor vehicle collisions. According to a study by Lee et al. (9), the mortality rate of traffic

Table 1. Patient characteristics, forensic diagnoses, and outcomes and their association with one-month mortality

	Total n=396	One-month mortality Present n=28	One-month mortality Absent n=368	p
Age, median (IQR)	71 (67-78)	79.5 (75-90)	71 (67-76)	<0.001
Male gender, n (%)	225 (56.8)	18 (64.3)	207 (56.3)	0.408
GCS, median (min.-max.)	15 (3-15)	13.5 (3-14)	15 (15-15)	<0.001
Number of consultations, median (IQR)	1 (0-1)	2 (1-3)	1 (0-1)	<0.001
Forensic diagnoses, n (%)				
Motor vehicle accident	96 (24.2)	2 (7.1)	94 (25.5)	0.029
Pedestrian accident	96 (24.2)	3 (10.7)	93 (25.3)	0.083
Fall	53 (13.4)	5 (17.9)	48 (13)	0.562
Physical assault	44 (11.1)	0 (0)	44 (12)	0.058
Occupational accident	29 (7.3)	1 (3.6)	28 (7.6)	0.709
Abuse	18 (4.5)	7 (25)	11 (3)	<0.001
Stab-cut injuries	17 (4.3)	0 (0)	17 (4.6)	0.622
Intoxication	16 (4)	0 (0)	16 (4.3)	0.617
Suicide	13 (3.3)	2 (7.1)	11 (3)	0.232
Suspicious death	8 (2)	8 (28.6)	0 (0)	<0.001
Other	6 (1.5)	0 (0)	6 (1.6)	1.000
Outcome, n (%)				
Discharge from the ED	281 (71)	3 (10.7)	278 (75.5)	<0.001
Death in the ED	9 (2.3)	9 (32.1)	0 (0)	<0.001
Admitted to the ward	68 (17.2)	2 (7.1)	66 (17.9)	0.195
Admitted to the ICU	38 (9.6)	14 (50)	24 (6.5)	<0.001

GCS: Glasgow Coma Scale, IQR: Interquartile range, ED: Emergency department, ICU: Intensive care unit

Table 2. Injury types of forensic cases

Type of injury*	n (%)
Soft tissue injury	132 (33.3)
Fracture of the extremity	88 (22.2)
Cut	55 (13.8)
Thorax injury	51 (12.8)
Cranial pathology	29 (7.3)
Vertebral fracture	23 (5.8)
Maxillofacial fracture	17 (4.2)
Pelvic fracture	14 (3.5)
Abdominal pathology	10 (2.5)
Other	10 (2.5)
Cardiac arrest	9 (2.2)
Drug intake	9 (2.2)
Eye injury	7 (1.7)
Chemical exposure	6 (1.5)
Carbon monoxide poisoning	4 (1.0)
Alcohol intake	3 (0.7)

* One patient could have more than one diagnosis

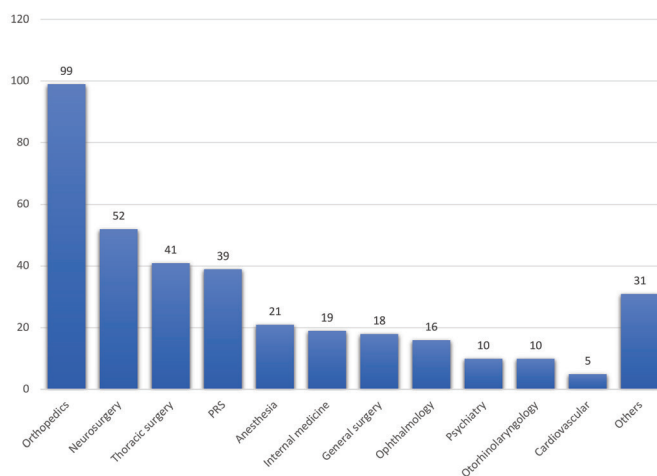


Figure 1. Number of consultations of forensic cases*

*One patient could have more than one consultation, PRS: Plastic and reconstructive surgery

Table 3. Multivariate logistic analysis of factors associated with 1-month mortality

	OR	95% CI	p
Age	1.095	1.027-1.169	0.006
GCS	0.655	0.560-0.765	<0.001
Number of consultations (n=8)	1.840	1.312-2.581	<0.001
Pedestrian accident	0.052	0.006-0.460	0.008
Motor vehicle accident	0.452	0.084-2.444	0.356
Physical assault	0.000	0.000	-
Abuse	1.255	0.323-4.876	0.743

GCS: Glasgow Coma Scale, OR: Odds ratio, CI: Confidence interval

accidents was higher in elderly people than in those under 65 years of age. Since traffic accidents constitute almost half of all geriatric forensic cases, appropriate protective measures should be taken for this population. In the literature, falls constitute between 15% and 30% of geriatric cases presenting to the ED (2). Most geriatric patients presenting with trauma are fall cases (11,12). In our study, 13.4% of patients experienced falls. In a study on geriatric forensic cases, the rate of presentation of falls was 7% (6). Fall rates in geriatric forensic cases may not reflect all geriatric falls because not all falls are considered forensic cases. Previous studies have shown that abuse of elderly people has been detected at rates of up to 10% in high-income countries (13). Elderly abuse can occur in various forms, ranging from physical abuse to neglect (2). In our study, 4.5% of the forensic cases were cases of abuse, and 38.8% of the patients died within 1-month. Because diagnosis is not always easy, especially in cases of neglect, clinician suspicion is decisive. In the literature, it has also been noted that elder abuse is under-recognized by ED professionals (14). Various rates of abuse can arise from sociocultural differences, official practices, and different perspectives. In a study by Dağar et al. (6) an increase in in-hospital mortality was observed with increasing age in geriatric forensic cases, and falls from height were found to be associated with mortality. In the present study, advanced age was also associated with mortality. In addition, an increase in the number of consultations and a low GCS score were associated with mortality. These results are consistent with the patient's condition and disease severity, and it is important to draw the attention of clinicians to manage patients more carefully in the ED. In our study, orthopedics was the most consulted department (25%). Korkmaz et al. (10) reported the same results. In a study by Bağcı et al. (15) geriatric trauma patients were mostly hospitalized in the orthopedic clinic due to trauma presentations. In our study, 26.8% of the geriatric forensic cases were hospitalized in the ward or intensive care unit. In a study by Bağcı et al. (15) 30.1% of patients were hospitalized. Korkmaz et al. (10) reported that 35% of patients were hospitalized. The hospitalization rate was 14.7% in another study that analyzed all forensic cases (16). In a study by Çınar et al. (17) on forensic cases aged 18 years and younger, the hospitalization rate was 15%. These results show that geriatric forensic cases often require hospitalization. The single-center nature of the study is an important limitation. Therefore, the results of this study cannot be generalized to all patient groups. Since it is predicted that different forensic cases may be common in different regions, it is important to conduct multicenter studies to generalize the results. In addition, we only evaluated geriatric forensic cases and did not have data

comparing them with young cases. Comparisons with all forensic cases may be necessary to obtain a better understanding of the specific conditions of geriatric cases. The study period overlaps the pandemic period. This was thought to have affected the number of patients, especially due to social restrictions.

CONCLUSION

By analyzing the presentations of this specific patient group, we found that traffic accidents, including motor vehicle and pedestrian accidents, are the most common types of geriatric forensic cases. In addition, the 1-month mortality rate of the patients increased with increasing age, a lower GCS score at presentation, an increased number of consultations, and an absence of pedestrian accident age. The growing elderly population and their increased involvement in active life are expected to increase the number of presentations of forensic incidents. Overall, the findings suggest that geriatric forensic cases are an important area of study and that efforts to prevent and treat these incidents will be increasingly important as the elderly population continues to grow.

Ethics

Ethics Committee Approval: Ethical approval was obtained from the Gazi University Ethics Committee (approval number: E.88227, date: 21.05.2021).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Concept: S.Y., M.A., F.B., Design: S.Y., M.A., Supervision: F.B., Resources: S.Y., M.A., Material: S.Y., Data Collection or Processing: S.Y., Analysis or Interpretation: M.A., Literature Search: S.Y., Writing: S.Y., Critical Review: M.A., F.F.

Conflict of Interest: No conflict of interest was declared by the authors.

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