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Falls from Heights in and Around the City of Kars in Turkey

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Abstract

Aim: Falls and fall-related injuries are important public health problems and need attention. Our aim in this study was to review and present our data on the cases presenting to the Emergency Department of Kars Kafkas University following a fall.

Material and Method: We included a total of 200 cases that had presented to the emergency service of Kafkas University Faculty of Medicine between January 2012 and July 2017 in the study. The medical charts were reviewed retrospectively. The demographic features of the patients, fall distance, fall type, organs injured, treatment types, and mortality rates were recorded. All patients were seen from their charts to have been resuscitated according to the Advanced Trauma Life Support Program. The Glasgow Coma Scale scores had been recorded. The Kars province has a population of 289,786. The rural population is involved in agriculture and animal husbandry. They are involved in agricultural work from May to the end of September. Falls from horses and donkeys in rural areas are therefore seen in the summer. The urban population presents with falls from construction sites during the summer period when construction work is more active. We collected the admission and discharge data of the fall from height cases from the charts. Information for the fatal cases was collected from autopsy reports. The following groups were used in the study: 1) Falls from animals, 2) Falls from a height (household accidents, fall from a garden wall or the roof), and 3) Falls while working at a construction site. We excluded cases of suspicious death, cases that had been referred to us from other hospitals after treatment, and cases that did not come for follow-up after initial treatment at our hospital.

Results: There was a total of 200 patients, consisting of 184 males and 16 females, that had fallen from a height in this study. A total of176 were admitted while 24 were sent home from the emergency service after the treatment was arranged. The mean age was 29+/-11.2 years. The mean height was 6+/-2 meters. All the falls were accidental. The Glasgow coma scale score was lower than 8 in falls from less than 5 meters. The number of falls from an animal was 55, from a height 62 and from a construction site 83. There were 32 patients who had fallen from a height of 5+/-2 meters and had been working at construction sites. These patients died because of hemorrhagic shock and multiple organ injuries. The distribution of injuries was 122 with extremity injuries, 16 with thoracic injuries, 20 with intraabdominal injuries, 10 with head injuries and 32 with multiple organ injuries. We had 77 patients with upper extremity injury and 45 with lower extremity injury. The thoracic injuries consisted of 9 cases with pneumothorax and 7 cases with lung contusion. The intraabdominal injuries involved the liver in 8, small intestines in 5, spleen in 4 and kidney in 3. Once the cases were admitted to the emergency services, the surgical indication was determined according to the physical examination, laboratory tests and radiological imaging results. The mortality rate was21%. There were 13 patients aged over 65 years. The mean inpatient duration was 20.2+/-14.3 days.

Discussion: Falls from heights need to be evaluated in a multidisciplinary fashion as supported by imaging methods to determine the trauma severity. Taking the necessary measures and increasing the socioeconomic level of the patients will decrease exposure to such trauma.

Keywords: Emergency; Fall from Height; Kars

Introduction

Falls and fall-related injuries are important public health problems and need attention. Falls may involve falls from the same level, a height or other unidentified cases. More than 15,000 deaths due on falls occur annually in the United States [1]. Falls from height are the most common cause of traumatic deaths in developed countries. The reason of the relationship between the cause of trauma and fall from height is unexplained [1]. Falls from height can occur with falls while working at home, the workplace or construction sites and on animals in areas involved in animal husbandry. It was reported in a study conducted in USA that falls are mostly seen in those working at construction sites and the mortality rate under the age of 15 is around 12% [2] The most common cause of falls from height was reported to be falls from the roof in a study conducted in the southeast region of Turkey because of the high rate of sleeping on the roof due to the very hot climate in this region. In conclusion, falls that occur accidentally are an important public problem irrespective of region and gender [3]. Our aim in this study was to review and present our data on the cases presenting to the Emergency Department of Kars Kafkas University following a fall.

Material and Method

We included a total of 200 cases that had presented to the emergency service of Kafkas University Faculty of Medicine between January 2012 and July 2017 in the study. The medical charts were reviewed retrospectively. The demographic features of the patients, fall distance, fall type, organs injured, treatment types, and mortality rates were recorded for the study. All patients were seen from their charts to have been resuscitated according to the Advanced Trauma Life Support Program. The Glasgow Coma Scale scores had been recorded. The Kars province has a population of 289.786. The rural population earns its money from agriculture and animal husbandry. They are involved in agricultural work from May to the end of September. Falls from horses and donkeys in rural areas are therefore seen in the summer. The urban population presents with falls from construction sites during the summer period when construction work is more active. We collected the admission and discharge data of the fall from height cases from the charts. Information for the fatal cases was collected from autopsy reports. The following groups were included in our study. 1) Falls from animals, 2) Falls from a height (household accidents, fall from a garden wall or the roof), and 3) Falls while working at a construction site. We excluded cases of suspicious death, cases that had been referred to us from other hospitals after treatment, and cases that did not come for follow-up after initial treatment at our hospital table 1.

Height (Meter)	Male	Female
0-1	21	3
01-Mar	97	13
03-May	50	-
5- ↑	16	-

Table 1: The number of patients by the fall height.

Results

There was a total of 200 patients, consisting of 184 males and 16 females, who had fallen from a height in this study. A total of 176 were admitted while 24 were sent home after the treatment was arranged from the emergency service. The mean age was 29+/-11.2 years. The mean height was 4+/-2 meters. All the falls were accidental. The Glasgow coma scale score was lower than 8 in falls from less than 5 meters. The number of falls from an animal was 55, from a height 62 and from a construction site 83. There were 32 patients who had fallen from a height of 4+/-2 meters and had been working at construction sites. The number of patients according to the fall height is presented in table 1.

The fatal cases died because of hemorrhagic shock and multiple organ injuries. The distribution of injuries was 122 with extremity injuries, 16 with thoracic injuries, 20 with intraabdominal injuries, 10 with head injuries and 32 with multiple organ injuries. We had 77 patients with upper extremity injury and 45 with lower extremity injury. The thoracic injuries consisted of 9 cases with pneumothorax and 7 cases with lung contusion. The intraabdominal injuries involved the liver in 8, small intestines in 5, spleen in 4 and kidney 3. Once the cases presented to the emergency service, the surgical indication was determined according to the physical examination, laboratory tests and radiological imaging results. The distribution of the organs injured based on the cases and interventions is presented in table 2.

Injured Organs	Number and Percentage of Cases	Interventions
Scapular injury	3	Conservative, Velpeau bandage
Clavicular fracture	12	Stabilization with external fixator + Debridement
Humerus fracture	9	Debridement + plaque screw osteosynthesis + stabilization with external fixator
Femur fracture	9	Stabilization with external fixator + plate screw osteosynthesis
Patella fracture	4	Osteosynthesis with Kirschner wire and cerclage wire
Radius and/or Ulna Fracture	33	Plaque screw osteosynthesis + Stabilization with external fixator
Foot tarsal and metatarsal and facial fractures	7	Plaque screw osteosynthesis, Kirschner wire osteosynthesis
Tibia, fibula fracture	17	Stabilization with external fixator + Debridement
Vertebral and Neurospinal injuries	8	Dorsal spondylodesis, decompression
Cranial injuries	10	Death
Kidney	3	Nephrectomy
Spleen	4	Splenectomy
Liver	8	3 cases of primary repair + 5 cases of right hepatectomy
Small intestine	5	Resection + anastomosis
Thoracic injury	9	Chest tube insertion
Multiple organ injury	32	Death

Table 2: The distribution of the injured organs and the interventions used.

The mortality rate was 21%. There were 13 patients aged over 65 years. The mean inpatient duration was 20.2+/-14.3 days. The mortality rate of the patients by age is presented in table 3.

AGE	MALE	FEMALE	MORTALITY
0-10	56	-	3
10-20	74	-	7
20-30	13	9	11
30-40	5	7	8
40-50	2	-	-
50-65	9	-	5
65 - ↑	25	-	13

Table 3: Mortality rate by age.

Discussion

The fall distance is the most important indicator of the severity of the resultant trauma after falling from a height. The reason for the fall from height may vary in children and adults. It occurs mostly due to accidents in children and due to accident, suicide and crime in adults. Most subjects are male [3]. The male to female ratio has been reported as 2 to 1 [2,3]. The majority of our cases were also male. This finding could be related to the working conditions of men. The injury rate has been reported to be higher in patients falling from higher than 5 meters in the literature. Minor injuries such as abrasion, contusion, and laceration have been found after falls from less than 3 meters while a fall from a mean height of 5 meters has been fatal [4,5]. We observed more severe trauma in patients who fell from a height of more than 5 meters while the severity decreased with decreasing height. We had 24 patients with a fall from a height of less than 1 meter who were treated as an outpatient and sent home. As the height of fall increases, the duration of hospitalization also increases in trauma patients. A relationship was found between the age and the severity of the trauma in multiple trauma. In general, the older the age, the worse was the physical condition. As age increases, there is an increase in the fragility of bones and higher mortality and morbidity rates. Mortality rates following falls from less than 5 meters have been shown to be high in patients over the age of 50 [6,7]. The mortality rate was even higher in patients over the age of 65 in our study. As the relevant height increases, the head trauma as well as chest, abdominal, and extremity injury rates also increase [8].

There were multiple traumas in 32 of our patients with head trauma. The treatment is planned according to the fall position and trauma region in upper and lower extremity injuries. Early interventions for orthopedic trauma will decrease the mortality rate while ensuring early mobilization and decreasing the inpatient duration. Debridement and external fixation were performed followed by open reduction and internal fixation for the open and contaminated trauma cases in our study. Respiratory and hemodynamic resuscitation should initially be performed in general once the patients are admitted to hospital after accidental trauma. Mortality, number of anatomic sites involved and trauma severity tend to increase with increased height of fall and age [4]. The mortality rate is 100% for head trauma and 16.6% for abdominal, thorax, and extremity injuries in the literature [8]. Mortality was observed in 10 patients with head trauma and 32 patients with multiple trauma in our study. The majority of the cases who had fallen from heights were under the age of 20 in various studies [4,9]. Similarly, most of our patients were below the age of 20. This could be related to young people in low-income families working in jobs in the construction or similar sectors. Falls from height in Kars occur due to the structural and demographic characteristics of the families, inadequate care of children, low economic level and inadequate occupational safety measures.

Conclusion

In conclusion, patients who fall from heights should be evaluated with a multidisciplinary approach. Identification of the trauma severity needs support by imaging methods. As the necessary preventive measures are taken and the socioeconomic levels of the families are improved, the exposure to such trauma will be further decreased.

References

1. Peng TA, Lee CC, Lin JC, Shun CT, Shaw KP, et al. (2014) Fatal falls from height in Taiwan. J Forensic Sci 59: 978-982.
2. Alizo G, Sciarretta JD, Gibson S, Muertos K, Romano A, et al. (2017) Fall from heights: does height really matter?. Eur J Trauma Emerg Surg 22.
3. Al B, Yıldırım C, Çoban S (2009) Falls from heights in and around the city of Batman. Ulus Travma Acil Cerrahi Derg 15: 141-147.
4. Demetriades D, Murray J, Brown C, Velmahos G, Salim A, et al. (2005) High-level falls: type and severity of injuries and survival outcome according to age. J Trauma 58: 342-345.
5. Rozycki GS, Maull KI (1991) Injuries sustained by falls. Arch Emerg Med 8: 245-252.
6. Berghaus G (1978) Mathematic-statistical discrimination between suicide and accident in falls from height (author's transl). Z Rechtsmed 80: 273-286.
7. Con J, Friese RS, Long DM, Zangbar B, O'Keeffe T, et al. (2014) Falls from ladders: age matters more than height. J Surg Res 191: 262-267.
8. Gupta SM, Chandra J, Dogra TD (1982) Blunt force lesions related to the heights of a fall. Am J Forensic Med Pathol 3: 35-43.
9. Grivna M, Al-Marzouqi HM, Al-Ali MR, Al-Saadi NN, Abu-Zidan FM (2017) Pediatric falls from windows and balconies: incidents and risk factors as reported by newspapers in the United Arab Emirates. World J Emerg Surg 12: 45