

Assessment of factors affecting the outcome of elderly blunt trauma in Emergency Department

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ABSTRACT

The purpose of this study is to evaluate factors affecting the outcome of elderly blunt trauma in emergency department. The study was conducted on 100 elderly patients age above 60 years with blunt trauma admitted to Emergency Department of Alexandria Main University Hospital. Primary survey, secondary survey and radiological investigations were done for these patients. Evaluation of patient injury severity by injury severity score (ISS) .Patient outcome as regard death, discharge, transfer and complications due to trauma or treatment were reported. Falling down was the most common mechanism of injury in our study occurred in 49% of cases followed by RTA in 27 % of cases but RTA was the most common cause of injury leading to death. 93% of cases had systolic blood pressure ≥ 90 mmHg who considered hemodynamically stable on admission and 7% of cases had systolic blood pressure <90 mmHg who considered hemodynamically unstable on admission. Systolic blood pressure on admission was directly proportional with the outcome ($p<0.001$). GCS of our patients in this study ranged between 4 and 15 with a mean \pm SD of 13.98 ± 2.72 and median of 15. There were 88 % of cases with GCS more than 12 .4% of cases with GCS between 9 and 12 while 8% of cases had a GCS less than or equal to 8, the mortality is inversely proportion to GCS ($p<0.001$) ISS in our study ranged between 1.0 - 35.0 with mean \pm SD of 8.54 ± 9.70 and median of 5, ISS was directly proportional with the outcome and higher ISS was associated with higher mortality. As regard past illness 22 patients had no past illness while the most common past illness was hypertension which presented in 31 patients and the least common past illness was cerebrovascular stroke and psychosis each present in 5 % of cases .Regarding lines of treatment, 55 patients had conservative treatment and 8 patients were unfit for surgery while surgical interventions were done for 37 patients. According to complications in our study, 76 patients (76%) had no complications while 24 patients (24%) had complications where the most common complication was pneumonia which presented in 7 patients (7%) followed by DKA and DIC which presented in 5 patients (5%) in each of them and the most common complication which associated with the highest ratio for mortality after geriatric trauma was DIC.

Key words : outcome, elderly, blunt trauma

INTRODUCTION

Trauma is one of the common causes of presentation of patients to Emergency Department (ED).The clinical outcomes of the trauma patients vary depending on different trauma mechanisms,

injury patterns, populations, and health condition of the patients Mitchell RJ et al (2010) .

One of the most significant demographic changes in our century is the gradual increase in the elderly population rate. The reason for that is the extended life span of people, decrease in newborn

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rate, and the increase in the socioeconomic level of people.

Trauma in the elderly population is frequent and is associated with significant mortality, owing not only to mechanism-related factors, but also to those complicated population factors including increasing age, decreasing physical reserves, underestimation of injury severity, preexisting co morbidity, and insufficient ability for systemic compensation Rickmond TS et al (2002).

Dramatic accidents are not the most common reason why elderly patients present to the trauma unit. The commonest mechanism of injury is the fall. Various factors predispose elderly persons to falls, such as unsteady gait, orthostatic hypotension, and slow reaction time Pudelek B et al (2002) and Macmahon DJ et al (2000).

There may be many reasons why elderly patients have increased morbidity and mortality rates after trauma. They are more likely to have underlying medical conditions that limit their physiologic response to injury. Eighty percent of the population over age 65 have at least one chronic medical condition and 50% have at least two. In addition, elderly patients tend to sustain more severe injuries, and injury severity score (ISS) is one of the strongest predictors of mortality. Age, however, is an independent predictor of poor outcome even when controlled for co morbidities and ISS Taylor MD et al (2002).

Patients and Methods

Patients:

The study was conducted on 100 elderly patients with blunt trauma admitted to Emergency Department of Alexandria Main University Hospital. Patients who are 60 years or older and with blunt trauma were included in the study. Patients who were less than 60 years, those with penetrating trauma and gunshot injuries were excluded from the study.

Methods:

Primary survey and secondary survey done for patients, radiological investigations lines of treatment. Evaluation of patient injury severity by injury severity score (ISS). Patient outcome as regard death,

discharge, transfer and complications due to trauma or treatment were reported

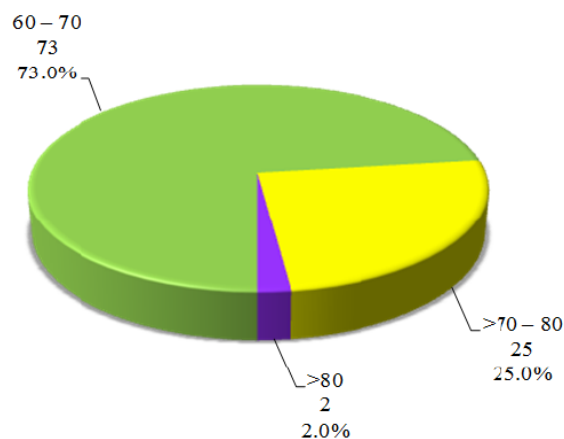
Statistical analysis:

Comparison between different groups regarding categorical variables was tested using Chi-square test. When more than 20% of the cells have expected count less than 5, correction for chi-square was conducted using Monte Carlo correction. The distributions of quantitative variables were tested for normality using Kolmogorov-Smirnov test, Shapiro-Wilk test and D'Agstino test, also Histogram and QQ plot were used for vision test. If it reveals normal data distribution, parametric tests was applied. If the data were abnormally distributed, non-parametric tests were used. For normally distributed data, comparison between more than two independent populations were done using F-test (ANOVA) to be used and Post Hoc test (LSD). For abnormally distributed data, comparison between more than two independent population were done using Kruskal Wallis test was used to compare between different groups and pair wise comparison was assessed using Mann-Whitney test.

Results and Discussion

Elderly patients today have an increased risk for trauma from an increasingly active life style and from impaired motor and cognitive functions. The elderly require far less mechanism to produce injuries. For all of these reasons the dramatic growth experienced in the number and severity of geriatric trauma patients can be expected to continue Broos P et al (1993).

Figure-1. Distribution of the studied cases according to age



The present study was a prospective one that was performed on one hundred elderly patients admitted to the Emergency Department of the

Alexandria Main University Hospital suffered from blunt trauma. Our aim was assessment of factors affecting the outcome of elderly blunt trauma. Regarding age distribution in our study there were found that the average age of patients was 66.6 years with median age 65 years ranging from 60-86 years.

The distribution of blunt trauma patients according to mechanism of trauma was as follows: the most common was falling down accounting for 49 patients (49%) followed by RTA accounting for 27 patients (27%) and the least common mechanism was accidental trauma by blunt heavy object accounting for 4 patients (4%). This is agreed with Rob Gowing et al (2007) where Falls were the most frequent injuries and accounted for 64% of all trauma admissions in elderly trauma and RTA were the next most common and accounted for 27% of admissions. also In other studies as Yilmaz S et al (2006) and Donmez L et al (2003) falling down has been proven to be the most common cause of elderly trauma.

Falls are more frequently observed in elderly population than in younger one due to problems such as poor vision, lack of balance, slowing of movements, other health problems and receiving many drugs, moreover, failure of the adaptation mechanism of the body to trauma also increases the severity of injuries.

Table-1. Distribution of the studied cases according to mechanism of trauma (n = 100).

Mechanism of trauma	No.	%
Falling down	49	49.0
Road traffic accident	27	27.0
Pedestrian	17	17.0
Vehicle occupant	10	10.0
Alleged assault by blunt object	13	13.0
Falling from height (FFH)	7	7.0
Accidental trauma by blunt heavy object	4	4.0

According to table (2), 22 patients had no past illness while the most common past illness was hypertension which presented in 31 patients and the least common past illness was cerebrovascular stroke and psychosis which presented in 5 patients in each of them This is agreed with José Gustavo Parreira et al (2010) where the most common past illness was hypertension (13.7%) followed by diabetes mellitus(4.7%) while in Rogério Silva Lima et al (2011), the most common past illness was hypertension (50%) followed by heart disease (19.4%) then diabetes mellitus(14.8%).

Assessment of severity of injury in our study was done using anatomical score namely the injury severity score (ISS), we primarily used all clinical and

radiological data to calculate it. ISS ranged between 1.0 - 35.0 with mean± SD of 8.54 ± 9.70 and median of 5 where 81 patients (81%) had ISS ranged between 1-16 and 7 patients (7%) had ISS ranged between >16 – 24 and 12 patients (12%) had ISS more than 24.

Table-2. Distribution of the studied cases according to Past illness (n = 100).

Past illness	No.	% of patients
None	22	22.0
Hypertension	31	31.0
Diabetes mellitus	26	26.0
Ischemic heart disease	9	9.0
Chronic obstructive pulmonary disease	8	8.0
liver disease	8	8.0
Renal disease	6	6.0
Cerebrovascular stroke	5	5.0
Psychosis	5	5.0

Also in Cheng-Shyuan Rau et al (2014) , the ISS mean± SD was 9.3±4.4 where87.6% of patients had ISS ranged between 1-16 and 9.5% of patients had ISS ranged between >16 – 24 and 2.8% of patients had ISS more than 24.

Table-3.Statistical analysis of the studied cases according to ISS (n = 100)

ISS	No.	%
1 – 16	81	81.0
>16 – 24	7	7.0
>24	12	12.0
Min. – Max.	1.0 – 35.0	
Mean ± SD.	8.54 ± 9.70	
Median	5.0	

According to complications: 76 patients (76%) had no complications while 24 patients (24%) had complications as follows: 7 patients (7%) had pneumonia,5 patients (5%) had diabetic ketoacidosis coma (DKA), 5 patients (5%) had disseminated intravascular coagulopathy (DIC), 4 patients (4%) had cardiac complications, 2 patients (2%) became paraplegic and 1 patient (1%) had acute kidney injury (AKI).

Regarding outcome, 81 patients (81%) discharged at home and 13 patients (13%) died while 6 patients (6%) were transferred to another hospital.

Table-5 shows the relation between systolic blood pressure of the studied patients on admission and the outcome In discharged patient systolic blood pressure ranged between 100.0–180.0 (mmHg) with mean ± SD of 138.52 ± 16.36 (mmHg) and median of

140 (mmHg), while in transferred patient it ranged between 130.0 – 180.0 (mmHg) with mean ± SD of 155.0 ± 16.43 (mmHg) and median of 155 (mmHg) and in deaths it ranged between 60.0 -200.0 (mmHg) with mean ± SD of 101.54 ± 44.51 (mmHg) and median of 80 (mmHg) . This table also shows significant direct proportion between systolic blood pressure and the outcome with p value less than 0.001 which was considered statistically highly significant . this agreed with Knudson MM et al (1994) and Horst HM et al (1986) studies which showed that in elderly blunt trauma a systolic blood pressure less than 90mm Hg was associated with mortality rates of 82% to 100%.

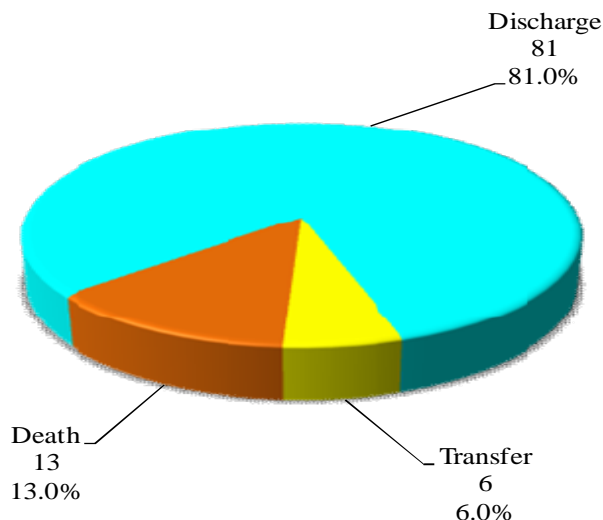
deaths it ranged between 4.0 – 15.0 with mean ± SD of 9.31 ± 4.46 and median of 8, also the correlation between GCS and outcome revealed that, GCS was directly proportional to the outcome with p value less than 0.001 which was considered statistically highly significant. , also this was agreed with Rozzelle CJ et al (1995) and Reuter F (1989) where they reported that the elderly have uniformly poor outcomes with scores less than 8.

Table-4. Distribution of the studied cases according to associated complications (n =100)

Associated Complications	No.	%
None	76	76.0
Pneumonia	7	7.0
Diabetic ketoacidosis coma	5	5.0
Disseminated intravascular coagulopathy	5	5.0
Cardiac complications	4	4.0
Paraplegia	2	2.0
Acute kidney injury	1	1.0

Analysis of the relation between GCS on admission and outcome revealed that, GCS ranged from 14.0 to 15.0 with mean ± SD of 14.93 ± 0.26 and median of 15 in discharged patients, while in transferred patients it ranged between 5.0 – 15.0 with mean ± SD of 11.33 ± 3.78 and median of 12 and in

Figure-2. Distribution of the studied cases according to Outcome



Conflict of Interests:

The authors declare that there is no conflict of interests regarding the publication of this paper.

Table-5. Relation between the outcome and systolic blood pressure

	The Outcome						Test of sig.	P
	Discharge (n = 81)		Transfer (n = 6)		Death (n = 13)			
	No.	%	No.	%	No.	%		
Systolic								
<90	0	0.0	0	0.0	7	7.0	$\chi^2= 29.739^*$ MCp <0.001*	
≥90	81	81.0	6	6.0	6	6.0		
Min. – Max.	100.0 – 180.0		130.0 – 180.0		60.0 – 200.0			
Mean ± SD.	138.52 ± 16.36		155.0 ± 16.43		101.54 ± 44.51		F= 18.705*	<0.001*
Median	140.0		155.0		80.0			
Sig. bet. Stage	p ₁ =0.078, p ₂ <0.001*, p ₃ <0.001*							

χ^2 : Value for Chi square

MC: Monte Carlo test

F: F test (ANOVA)

p₁ : p value for Post Hoc test (LSD) for comparing between Discharge with Transfer

p₂ : p value for Post Hoc test (LSD) for comparing between Discharge with Death

p₃ : p value for Post Hoc test (LSD) for comparing between Transfer with Death

*: Statistically significant at p ≤ 0.05

Table-6. Relation between the outcome and GCS

	The Outcome						Test of sig.	P
	Discharge (n = 81)		Transfer (n = 6)		Death (n = 13)			
	No.	%	No.	%	No.	%		
GSC								
≤8	0	0.0	1	1.0	7	7.0	$\chi^2=$ 49.186*	MCp <0.001*
>8 – >13	0	0.0	2	2.0	2	2.0		
13 – 15	81	81.0	3	3.0	4	4.0		
Min. – Max.	14.0 – 15.0		5.0 – 15.0		4.0 – 15.0		KW $\chi^2=$ 47.303*	<0.001*
Mean ± SD.	14.93 ± 0.26		11.33 ± 3.78		9.31 ± 4.64			
Median	15.0		12.0		8.0			
Sig. bet. Stage	p ₁ <0.001*, p ₂ <0.001*, p ₃ = 0.422							

χ^2 : Value for Chi square

MC: Monte Carlo test

χ^2 : Chi square for Kruskal Wallis test

p₁ : p value for Mann Whitney test for comparing between Discharge with Transfer

p₂ : p value for Mann Whitney test for comparing between Discharge with Death

p₃ : p value for Mann Whitney test for comparing between Transfer with Death

*: Statistically significant at p ≤ 0.05

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