Evaluation of Co-relation Between Epidemiological and Clinical Factors and Final Outcome of Polytrauma Patients

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ABSTRACT

Introduction: Traffic accidents constitute a major population of deaths occurring worldwide. The aim of this study was to collect a more detailed descriptive overview of the polytrauma cases in a high volume centre based in a developing country with almost non-existent trauma registry systems.

Material and Methods: The present study was conducted among 100 polytrauma patients who presented to emergency department. Standard ATLS guidelines were followed in the management of the polytrauma patients. Patients were divided into 2 groups, the patients who expired and the patients who were discharged and the various epidemiological and clinical factors were compared with the final outcome of the patient (death or discharge from the hospital).

Results: Most of the patients were of 21-40 year age group with a total of 47 patients (47%) belonging to this age group and the minority belonging to >60 age group with only 7 patients(7%). There were more deaths when patients presented to the hospital more than 1 hour after the injury. In the death group mean RTS ± SD at 0 HR was 9.45±0.82 whereas in the discharge group it was found to be 11.42± 0.97. Patients with low RTS at presentation were more likely to be in the death group. Majority of the patients had an injury severity score (ISS) <20 with a total of 73 (73%) patients out of the total 100. The Mean ISS ±SD was 17.07±11.83. A significant co-relation was found between body region involved and final outcome in case of Head and Neck region.

Conclusion: Influence of alcohol, Time period between injury and presentation to the hospital, SBP and GCS at the time of presentation and at 6,24 and 72 hours after presentation, RTS at the time of presentation, ISS and Injury to Head and Neck were found to be significant factors in predicting the final outcome (Death or Discharge) of the patient.

Keywords: Polytrauma, Road Traffic Accidents, Revised Trauma Score

injury will increase in the developing world with development of industrialization and ongoing armed conflicts.[3]

A huge number of injured subjects from road accidents seek medical attention for every single death occurring. The injured people after undergoing medical treatment do suffer from temporary or permanent disabilities which further lead to worsening of the human sufferings including socio-economic loss. A lot of variations occur regarding the etiologic cause and factors responsible for these trauma cases and injuries, all of these have one thing in common that they result in posing a major health burden on the world's economy. Ninety percent of all deaths occurring worldwide belong to low and middle class economy countries. Annual death count, according to WHO, worldwide is estimated to be 1.3 million.[4]

Over the next two decades, it is estimated that the toll of death caused by accidents will arise to 66 percent. However, the number of deaths differs significantly by a major difference between the rich countries and poor countries.[4] Trauma involving more than body system is a polytrauma. It results from a high energy impact which results in a much higher toll and injury.[5] severe injuries usually result from intentional injuries.[6]

Polytrauma is not truly reflected by the latter one as high degree of morbidity is carried out by the gunshot wound created by a single high speed velocity object. Especially among younger population patients who are at a higher risk of developing intentional and non-intentional injuries, a well described social class gradient is established.[7] The aim of this study was to collect a more detailed descriptive overview of the polytrauma cases in a high volume centre based in a developing country with almost non-existent trauma registry systems. Thus, present study evaluated the epidemiology and clinical profile of patients admitted with polytrauma to the emergency in Rajindra Hospital Patiala with relation to patient age, sex, influence of alcohol, type of injury, mode of injury.

MATERIAL AND METHODS

The present observational prospective observational study was conducted among 100 polytrauma patients who presented to emergency department in Rajindra Hospital Patiala. Standard ATLS guidelines were followed in the management of the

INTRODUCTION

Death of more than one lakh people occurred in 2005 due to road accidents which resulted in hospitalization of approximately two and a half million subjects with minor injuries of more than eight million people. In India, it also resulted in the loss of country's economy of approximately three percent of the gross domestic product (GDP). In whole world, Accident rates in India constitute the highest proportion of thirty five per thousand vehicles. However, for the prevention and rehabilitation of such cases adequate measures have not been taken by the government in India.[1] For being a part of global pandemic, trauma cases completes the criteria for being a part of disease classification. This further resulted in a significant cause of morbidity and mortality over the period of time. Globally, about 5.8 million people die every year as result of injury.[2] Injury is the second most common cause (second only to HIV/AIDS) of disability adjusted years of life lost. Without a doubt, the incidence of

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484

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polytrauma patients.All the patients presenting to the Casualty Department with polytrauma, who met inclusion criteria, were included in the study.

Detailed clinical historyandand mode of injury were noted as per performa.Patients were managed according to the guidelines set under Advanced trauma life support (ATLS) guidelines. Breathing and circulation was assessed. Disability (brief neurologial examination) was assessed. Patient was completely undressed taking care to prevent hypothermia. Primary survey and resuscitation were conducted. Investigations depending on the type of injury and general condition of the patient were carried out consisting of X rays of chest, cervical spine and pelvis, FAST (focused assessment with sonography for trauma). ECG monitoring, catheter and nasogastric tube insertion, pulse oximetry, BP charting were done depending on the patient's condition. After patient stabilization, resuscitation and ruling out immediately life threatening conditions, patient history was taken to further assess the time, mode and type of injury.Expert opinions were sent to various departments due to multiple system involvement and coordinated efforts were carried out between the different departments.A secondary survey was then carried out with a thorough head-to-toe evaluation and systemic examination and more specific investigations were carried out depending on the type of injury.The patient's BP, Respiratory rate and GCS were assessed at the time of presentation and an unweighted Revised Trauma Score was calculated. Follow-up of the patients was done at 6, 24 and 72 hours after presentation to the hospital, the SBP, RR and GCS were measured and an unweighted Revised Trauma Score was calculated at the above mentioned intervals.

Patient were intubated if advised by the treating doctor and RTS was not calculated in intubated patients for the duration of intubation. After all the necessary investigations, abbreviated injury scale for different body regions were calculated based on the 2005 classification given by Association for the Advancement of Automotive Medicine (AAAM). Injury Severity Score was calculated from the AIS scores, and co-related with the final outcome of the patient at discharge or death.

Patients were divided into 2 groups, the patients who expired and the patients who were discharged and the various epidemiological and clinical factors were compared with the final outcome of the patient (death or discharge from the hospital).

RESULTS

Among the 100 patients who were admitted for polytrauma, the majority belonged to 21-40 years age group with a total of 47(47%) patients. The highest number of polytrauma deaths were also reported in 21-40 age group with a total of 6 (54.55%) deaths out of the total 11 deaths. Least number of polytrauma deaths were seen in the >60 (2) with no death in0-20 age group. The relationship between age of the patient and final outcome in terms of death or discharge was not found to be significant (Table 1).

Out of the total 100polytrauma patients, 17(17%) were found to be under the influence of alcohol. Number of deaths were 5 (45.45%) of the total 11 in the group of patients who were found to be under the influence of alcohol. There were more deaths in the group where patients were under the influence of alcohol. The relationship between influence of alcohol and final outcome of patient was found to be statistically significant (p=0.008) (table 2).

Majority of the patients (59) were brought to the hospital within 60 mins after injury. In the group where the patients expired, majority were brought 61-120mins after injury (7 out of the total 11). In the group of discharge patients, most of them were bought within 60mins after injury (53 out of the 89). More deaths occurred when patients were brought to the hospital after 1 hours of sustaining the injury.The relationship between the time interval between injury and presentation to the hospital and the final outcome in terms of death or discharge of the patient was found to be statistically significant(p=0.046) (table 3).

RTS was measured at the time of presentation to hospital at 0 HR, 6, 24 and 72 hours after presentation to the hospital. A significant co-relation was found between RTS at 0 HR after presentation with respective p value of < 0.001. Patients with a lower RTS at the time of presentation were more likely to die than those with a higher RTS at 0 HR. Mean RTS ±SD at 0HR was 9.45± 0.82whereas it was 11.42± 0.97at 0HR, in the group where patients were discharged. RTS could not be calculated in the death group at 6HR, 24HR and 72HR because of death of patients in the respective periods (table 4).

90 percent of the polytrauma patients had ISS value less than 29 and 10 (10%) had ISS value more than 29. Number of patients with ISS value less than 29 in death group were 4 and 86 in discharged group. Number of patients with ISS value

Age	Deaths		Discharge		P value	Significance
	Number	Percentage	Number	Percentage		
0-20	0	0.0	18	20.22	0.259	NS
21-40	6	54.55	40	44.94		
41-60	3	27.27	25	28.09		
61-80	2	18.18	6	6.75		
Total	11	100.0	89	100.0		
Table-1: Correlation of age withoutcome of the patient						

Influence of Alcohol	Deaths		Discharge		P value	Significance
	Number	Percentage	Number	Percentage		
Yes	5	45.45	12	13.48	0.008	S
No	6	54.55	77	86.52		
Total	11	100.0	89	100.0		
Table-2: Correlation of influence of alcohol with outcome of the patient						

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485

more than 29 in death group were 7 and 3 in discharged group. Relationship between injury severity score and final outcome in terms of death or discharged of patient was found to be statistically significant (p= <0.001) (table 5).

A significant co-relation was found between body region involved and final outcome in case of Head and Neck region. There were more deaths in the group with injury to Head and Neck region (p= 0.048) (table 6).

DISCUSSION

The initial management of a patient with polytrauma is of vital importance in minimizing both patient morbidity and mortality.[8] The main principle behind trauma management is an organized team approach. The initial evaluation of a person who is injured critically from multiple traumas is a challenging task and every minute can make a difference between life and death. The delay from any member of the team may lead to death of the patient. The receiving facility ideally should be designated to receive seriously injured patients and the resources and expertise to adequately manage their injuries.[9]The management was carried out according to the principles of ATLS.

The final outcome of the polytrauma patients however depends on a multitude of factors with great variations in the epidemiological profile. In our study majority of the patients belonged to the 21-40 year age group with a total of 47 patients(47%) belonging to this age group and the minority belonging to >60 age group with only 7 patients(7%). This was similar to most studies where the majority of the patients belonging to the 20-40 year age group. Karwan K et al[10] and Matar et al[11] found the majority of the patient belonging to the 20-40 year age group. The mean age for all the patients in our study was 34.81± 16.30 years (range 3-75 years) whereas Karwan K et al[10] found the mean age to be 41 years and Diouf et al[12] found the mean age to be 31 years. However the relationship between the age of the patient and the final outcome of the patient was not found to be significant (P= 0.259)

17 out of the total 100 patients were found to be under the influence of alcohol(17%). The relationship between influence of alcohol and final outcome of the patient (death vs. discharge) was found to be significant (p= 0.008). Myers et al[13] found that a total of 26% of the total polytrauma patients in their study were under the influence of alcohol. Commensurate with

Time interval between injury and presentation to hospital (in Mins)	Deaths		Discharge		P value	Significance
	Number	Percentage	Number	Percentage		
<=60	4	36.36	53	59.55	0.046	S
61-120 mins	7	63.64	25	28.09		
121-180 mins	0	0.0	11	12.36		
Total	11	100.0	89	100.0		
Mean±S.D	95.91±13.46		73.71±33.08			

Table-3: Correlation of time interval between injury and presentation to the hospital withoutcome of the patient

RTS	Deaths		Discharge		P value	Significance
	Mean	S.D	Mean	S.D		
0 HR	9.45	.82	11.42	0.97	<0.001	HS
6 HR	-	-	11.70	0.75	<0.001	HS
24 HR	-	-	11.82	0.61	<0.001	HS
72 HR	-	-	11.93	0.53		

Table-4: Correlation of revised trauma scorewith outcome of the patient

ISS	Deaths		Discharge		P value	Significance
	Number	Percentage	Number	Percentage		
≤ 29	4	36.36	86	96.63	<0.001	HS
>29	7	63.64	3	3.37		
Total	11	100.0	89	100.0		
Mean±S.D	31.45±16.97		15.12±9.86			

Table-5: Correlation of injury severity score with outcome of the patient

Body Region	Deaths		Discharge		P value	Significance
	Number	Percentage	Number	Percentage		
Head and Neck	5		66		0.048	S
Skin	5		49		0.547	NS
Chest	1		19		0.338	NS
Abdomen	3		9		0.098	NS
Face	5		42		0.913	NS
Pelvis	0		4		0.473	NS
Extremity	1		5		0.647	NS

Table-6: Co-relation between body regions involved and final outcome in terms of death or discharge

driving-while-intoxicated prevention programs, the percentage of intoxicated patients significantly (p= 0.03) decreased from 45% to 34% over the same 7-year period.

Majority of the patients presented within 60minutes after sustaining the injury. The mean time interval between injury and presentation to the hospital for the entire group of patients despite the final outcome was 74± 31.94 min (range 25-155 min). However, the mean time interval between injury and presentation to the hospital for the death group was 95.91±13.46 minutes whereas it was 73.71± 33.08 minutes for the discharge group. This difference was found to be statistically significant (p=0.046). Also there were more deaths when patients presented to the hospital more than 1 hour after the injury. This correlation between the time interval between injury and presentation to the hospital and final outcome of the patients was found to be statistically significant. Therefore when thetime interval between injury and presentation to the hospital was longer patient was more likely to be in the death group. In the study done by Bartolomeoet al[5] it was found that Pre-hospital evaluation was done in 98.4% of all polytrauma patients. Also it was found that majority of the patients were transferred to a definitive hospital within the first 2 hours after injury. According to Dioufet al[12] 77.4% of cases patients were evacuated without prehospital care.

Revised trauma score (RTS)could not be calculated in the death group at 6HR, 24HR and 72HR because of death of patients in the respective periods. So RTS comparison between the death and the discharge group was possible only at the time of presentation to the hospital. For all the polytrauma patients, the mean RTS ± SD at 0 HR was 11.21± 1.139 range 5-12) and it increased to 11.93± .539 (range7-12) at 72 HR. In the death group mean RTS ± SD at 0 HR was 9.45±0.82 whereas in the discharge group it was found to be 11.42± 0.97. The correlation between RTS at the time of presentation and the final outcome of the patient was found to be statistically significant (p=<0.001). Patients with low RTS at presentation were more likely to be in the death group. In the study by Karwan K et al[10] the mean RTS for a group of 72 polytrauma patients was 7.841. However the correlation between RTS at presentation and the final outcome of the patient was not elevated. In a study by Myers et al[13] in the 753 polytrauma deaths that were evaluated, the mean RTS at presentation was found to be 4.

Majority of the patients had an injury severity score (ISS) <20 with a total of 73 (73%) patients out of the total 100. Bartolomeoet al,[5] the mean ISS was found to be 30.0 where as Pape et al[14], the mean ISS was found to be 20.7. The mean ISS was reported by Myer et al to be 41.[13] Significant association was observed between the patient's final outcome and mean ISS. In the present study, we observed a significant association between body region involved and final outcome in case of Head and Neck region. Traumatic brain injury (TBI) is one of the most devastating types of injury. It affects all ages; however majority of road traffic injuries (RTI) occurs in young adults of productive age group. As per report by the ministry of road transport, Government of India (2007) 1.4 lakhs road accident happened in 2007 with 40,612 people killed and 1.5 lakhs people injured.[1] Hence, India is leading the world in fatalities due to road accidents. TBI is also associated with significant socioeconomic losses in India as well as in other developing countries.[15]

Similar studies should be conducted among a larger group of Polytrauma patients and in hospitals with a dedicated Trauma team Approach for Polytrauma patients to further validate our results.

CONCLUSION

Influence of alcohol, Time period between injury and presentation to the hospital, SBP and GCS at the time of presentation and at 6,24 and 72 hours after presentation, RTS at the time of presentation, ISS and Injury to Head and Neck were found to be significant factors in predicting the final outcome (Death or Discharge) of the patient.

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