EPIDEMIOLOGY OF POLYTRAUMA IN A TERTIARY CARE CENTRE

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ABSTRACT

Polytrauma is a major cause of morbidity and mortality in both developed and developing countries. The term "Polytrauma" is mainly used to describe blunt trauma patients whose injuries involve multiple body regions or cavities, compromise patient's physiology and potentially cause dysfunction of uninjured organs. This study about epidemiology of fractures in polytrauma patients was carried out in emergency of Orthopaedics Department, Government Medical College, Jammu. The study was done for a duration of one year. Data was collected related to age, sex, mode of injury, date, time of injury and admission, pattern of fractures, associated injuries as per in the standard protocol proforma. Then various mechanisms of trauma were correlated to the type of injuries, to define pattern of injuries encountered in various accidents in polytrauma victims and then analysis of data was done.

KEYWORDS

Polytrauma, Fracture, Injury.

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INTRODUCTION

With the advancement in field of Science and Technology, morbidity and mortality due to infectious and other diseases has decreased, but deaths due to trauma have increased tremendously. In most countries, trauma is the common cause of death after cardiovascular diseases and neoplasia, most common among young people in the age group of 18-44 years worldwide. Polytrauma is a major cause of morbidity and mortality in both developed and developing countries.^[1] The term "Polytrauma" is mainly used to describe blunt trauma patients whose injuries involve multiple body regions or cavities, compromise patient's physiology and potentially cause dysfunction of uninjured organs.^[2] Polytrauma is one of the main causes of death in the world. Since young people are frequently involved, trauma is the leading cause of death under the age of 40.^[3]

Polytrauma is defined as the clinical state following injury to body leading to profound physio-metabolic changes involving multiple systems. The criteria for polytrauma include any one of the following combinations of injuries:

- Two major systems involved along one major lung injury.
- One major system involved along with two major skeletal injury.
- Unstable fracture pelvis with associated visceral injuries.
- One major system injury with one open grade III skeletal injury.

The basic fact and final goal of trauma care can be summarized in one very simple issue.

"The injured patient must obtain the best treatment possible. The heaviest toll of traumatic deaths occurs within the first hour following trauma, often defined as "The golden hour of trauma."^[4] A rough estimate indicates that 15% of all hospitals and clinical beds are occupied by victims, thus making polytrauma as one of the single leading cause of hospital admission.^[5]

For describing patients with multiple injuries and evaluating emergency care, various scoring system have evolved over time like-Injury Severity Score (ISS), Glasgow Coma Scale (GCS), Revised Trauma Score.

AIMS AND OBJECTIVES

1. To study age, sex, mode of injury, time of injury and duration, after which patient came to our hospital.
2. To study about fractures in polytrauma patients in reference to age, sex, bone involvement, associated visceral injuries, etc.
3. To study factors, which influence the accidents and find out preventive aspects for them.
4. To evaluate need of a fully equipped specialized trauma care centre/hospital in this region.

MATERIAL AND METHODS

This study about epidemiology of fractures in polytrauma patients was carried out in Emergency of Orthopaedics Department, Government Medical College, Jammu, which is a provincial referral hospital for Jammu-the winter capital of state of Jammu and Kashmir. The study was done for duration of one year.

The Criteria Laid Down for the Present Study were as Follows:

1. Patients who had injury severity score greater/equal to 16.
2. Patients below 10 years of age were not included.

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3. Polytrauma patients who had sustained injury within 48 to 72 hours were included in the study. Old referred cases were not included.

Those polytrauma patients who had bony injuries along with other associated injuries and fulfilled the above criteria were included in the study. Each patient was assessed regarding his general condition and the injuries. Proper emergency management of the patient consisting of intravenous fluids, medications, blood transfusion, splintages, etc. was done. A detailed history from each victim and his attendants was obtained. The patients were meticulously examined using the primary and secondary survey for all the evidences of trauma and the general condition. All findings were charted for each decedent and recorded as in standard protocol proforma.

Radiographic scanning was done in all cases and other necessary investigations were done as per the need of the patient. The injuries were graded according to abbreviated injury scale. From this information, the injury severity score was calculated.

Following data was collected: age, sex, mode of injury, date, time of injury and admission, pattern of fractures, associated injuries as per in the standard protocol proforma. Then various mechanisms of trauma were correlated to the type of injuries, to define pattern of injuries encountered in various accidents in polytrauma victims and then analysis of data was done.

OBSERVATIONS

Age in Years	No. of Patients	Percentage
10-20	43	16.7
21-30	80	31.0
31-40	69	26.7
41-50	38	14.7
51-60	17	6.6
>60	11	4.3
Total	258	100

Table 1: Age Distribution

The age of patients in this study varied from 11 to 66 years. It was observed that majority of the polytrauma victims were in the age group of 21-40 years (57.7 percent). The mean age of the patients was 31.5 years.

INJURY SEVERITY SCORE

Age Group	16-25	26-35	36-45	46-55	56-65	66-75	Total
10-20	23	15	3	2			43
21-30	43	25	6	5	1		80

31-40	46	17	4	2			69
41-50	21	12	3	2			38
51-60	11	2	2				17
>60	11						11
Total	155	71	18	11	1		258

Table 2: Relationship Between Injury Severity Score and Various Age Groups

The severity of various injuries occurring among polytrauma victims was most, in the age group of 21-40 years. Highest injury score ranging from 55-65 was observed in 1 patient within the age group of 21-30 years. The mean ISS score value observed was 26.7.

Sex	No. of Patients	Percentage
Male	204	79.1
Female	54	20.9
Total	258	100

Table 3: Sex Distribution

It was observed that males were predominant over females among polytrauma victims. There were 204 males (79.1 percent) and 54 females (20.9 percent). Male-to-female ratio was 3.8:1.

Time before Hospitalization (In Hours)	No. of Patients	Percentage
0-4	177	68.6
5-8	27	10.4
9-12	14	5.4
13-16	11	4.3
17-20	9	3.5
21-24	8	3.1
25-28	5	1.9
29-32	3	1.2
33-36	2	0.8
>36	2	0.8
Total	258	100

Table 4: Time Elapsed Before Hospitalization

In our study, we observed that 68.6 percent (177) of cases reached to the hospital in less than 4 hours after the injury. Average time before hospitalization was 5.1 hours. Those patients who reported late were usually from the far flung areas.

Sl. No.	Mode of Injury	No. of Cases	Percentage
1	Road traffic accidents	197	76.4
2	Fall from height	27	10.5
3	Assault	11	4.3
	Sharp	8	3.1
	Blunt	9	3.5
	Missile		
	Assault Total	28	10.9
4	Miscellaneous	6	2.2
	Total	258	100

Table 5: Mode of Injury

The commonest mode of injury seen among polytrauma victims was road traffic accidents. It accounted for 76.4 percent of cases followed by assault, which accounted for 10.9 percent of cases; 4.3 percent of assault cases were injured by sharp edged objects; 3.1 percent of cases by blunt objects and another 3.5 percent of cases due to missile injury. Fall from height like unprotected balcony, from tree, from hill, etc. resulted in injuries among 10.5 percent of polytrauma victims; 2.2 percent of polytrauma victims suffered injuries due to miscellaneous causes.

Sl. No.	Type of Vehicle Involved	No. of Cases	Percentage
1.	Jeep/Car	30	15.2
2.	Two wheeler	53	26.9
3.	Bus/Truck	56	28.4
4.	Tractor	5	2.5
5.	Bicycle	3	1.5
6.	Pedestrian	50	25.4
	Total	197	100

Table 6: Distribution of Different Class of Road Traffic Accidents

Among polytrauma victims who suffered injuries due to road traffic accidents, bus or truck was the most common vehicle involved in 28.4 percent (56) patients. It was followed by two wheelers in 26.9 percent (56) cases. Pedestrians formed the third group in 25.4 percent (50) cases followed by car/jeep in 15.2 percent (30) cases. In Indian conditions where tractor is used for multipurpose, it was involved in 2.5 percent (5) cases.

TYPE OF VEHICLE INVOLVED

Sl. No.	Age in Years	No. of Patients	Percentage
1.	6.00 am to 10.00 am	13	6.6
2.	10.00 am to 2.00 pm	41	20.8
3.	2.00 pm to 6.00 pm	68	34.5
4.	6.00 pm to 10.00 pm	39	19.8
5.	10.00 pm to 6.00 am	36	18.3
	Total	197	100

Table 7: Involvement Rate of Traffic Accidents at Different Hours of the Day

It was observed that maximum brunt of road traffic accidents was seen during afternoon hours between 2.00 to 6.00 pm. Out of 197 cases, 34.5 percent (68) occurred during these hours of day light. Between 10.00 am to 2.00 pm we found 20.8 percent (41) cases, while between 6.00 and 10.00 am only 6.6 percent (13) cases occurred. Between 6.00 pm to 10.00 pm 19.8 percent cases (39) occurred. During night hours between 10.00 pm and 6.00 am only 18.3 percent (36) cases occurred.

INVOLVEMENT RATE OF ROAD TRAFFIC ACCIDENTS AT DIFFERENT HOURS OF THE DAY

Sl. No.	Basic Cause of Accident	No. of Cases	Percentage
1.	Due to driving while intoxicated with alcohol	19	9.6
2.	Due to other reasons	178	90.4
	Total	197	100

Table 8: Association of Driving while Intoxicated with Alcohol as Cause of Traffic Accidents

Out of polytrauma cases who suffered injuries because of traffic accidents, 33 were drivers, 114 were non-drivers and 50 were pedestrians. Out of 33 drivers, 19 were intoxicated with alcohol.

Fracture Pattern

	Humerus	Radius and Ulna	Hand	Clavicle
Fractures (Total No.)	70	104	57	27
Fractures (% of all)	8.5	12.6	6.9	3.3
Fractures Closed (%)	77.1	71.2	71.9	100
Fractures Open (%)	22.9	28.8	28.1	0

Table 9: Incidence of Fractures in Upper Extremity

There were 825 fractures in our series of 258 polytrauma patients. Upper limb fractures were 31.3 percent (258) of total series.

	Femur	Tibia and Fibula	Patella	Ankle	Foot Bones
Fractures (Total No.)	151	187	33	90	106
Fractures (% of all)	18.3	26.7	4	10.9	12.8
Fractures Closed (%)	71.5	59.9	78.8	76.7	75.5
Fractures Open (%)	28.5	40.1	21.2	23.3	24.5

Table 10: Incidence of Fractures in Lower Extremity

The lower limb bones were more frequently involved than upper limb bones and axial skeleton. Lower limb fractures were 68.7 percent (567) of total series.

	Humerus	Radius and Ulna	Hand Bones	Clavicle
Simple (76%)	54	74	41	27
Compound (24%)	16	30	16	0

Table 11: Fracture of Upper Limb Bones as per Type

In upper limb fractures 76 percent (196) were simple and 24 percent (62) were compound.

	Femur	Tibia and Fibula	Patella	Ankle	Foot Bones
Simple (69.7)	108	112	26	69	80
Compound (30.3)	43	75	7	21	26

Table 12: Fracture of Lower Limb Bones as per Type

In lower limb fractures, 69.7 percent (395) were simple and 30.3 percent (172) were compound.

	Spine	Pelvis
Simple	22	27
Compound	0	3

Table 13: Fracture of Spine and Pelvis as per Type

Fractures of spine and pelvis were 2.7 percent (22) and 3.6 percent (30) respectively. In fractures of spine, no compound fracture was seen. In case of pelvic fractures 90 percent (27) were simple and 10 percent (3) were compound.

Associated Complications	Humerus	Radius and Ulna	Hand Bones	Clavicle
Nerve injury	24	18	5	0
Vascular injury	8	13	6	0
Compartment syndrome	2	19	11	0

Table 14: Associated Complications with Upper Limb Bones Fractures

In upper limb, humerus fractures were most commonly associated with nerve injuries. Both vascular injury and compartment syndrome were most commonly associated with fractures of radius and ulna.

Associated Complications	Femur	Tibia and Fibula	Ankle	Foot Bones
Nerve injury	5	26	5	8
Vascular injury	11	34	6	8
Compartment syndrome	0	37	3	11

Table 15: Associated Complications with Lower Limb Bones Fractures

In lower limb, both neurovascular injury and compartment syndrome were most commonly associated with fractures of tibia and fibula.

Type of Associated Injuries	No. of Patients	Percentage
Head injury	128	49.6
Chest injury	81	31.4
Abdominal injury	89	34.5
Facial injury	25	9.7

Table 16: Associated Injuries with Fractures in Polytrauma Patients

Head injuries were the commonest associated injuries and were present in 49.6 percent patients.

Day of the Week	No. of Patients	Percentage
Monday	42	16.3
Tuesday	32	12.4
Wednesday	35	13.6
Thu	34	13.2
Fri	33	12.8
Sat	38	14.7
Sun	44	17.1

Table 17: Association of Polytrauma Patients with Days of Week

Summary and Conclusion

This prospective study about epidemiology of fractures in polytrauma patients was conducted for a duration of one year; 258 patients who attended the Emergency of Orthopaedic Department, Government Medical College, Jammu, were included in the study. Observations recorded were subjected to critical analysis. The available literature on the subject was critically reviewed. On the basis of the present study following conclusions may be drawn:

- Majority of the patients were within the age group of 21-40 years.
- The severity of various injuries occurring among polytrauma victims was most in the age group of 21-40 years.
- Majority of the patients reached hospital in less than 4 hours.
- The commonest mode of injury seen was RTA followed by assault and fall from height. Most common vehicle seen involved in RTA was bus/truck followed by two wheeler and maximum RTA were seen between 2.00 to 6.00 pm.
- The lower extremity fractures were most frequent among polytrauma victims followed by upper limb fractures. The commonest fractures in order of frequency were those of tibia and fibula, femur, foot bones, ankle, radius and ulna, hand bones, patella and clavicle.
- Compound fractures were more common in lower limb than upper limb. In lower limbs, maximum compound fractures were seen in tibia and fibula and in upper limbs in radius and ulna.
- In upper limb, maximum nerve injuries associated fractures were seen with humerus, maximum vascular injuries with fractures of radius and ulna and maximum compartment syndrome with fractures of radius and ulna.

- In lower limb maximum nerve and vascular injuries and compartment syndrome associated fractures were seen with fracture of tibia and fibula.
- Overall, maximum neurovascular injuries and compartment syndromes were seen with fractures of tibia and fibula.
- Head injury was the commonest associated injury seen fractures.
- If health care services are truly committed for reducing preventable deaths or morbidity, then designation of trauma care and implementation of trauma system is necessary. To avoid any delay and to have a best initial management of polytrauma, patient triage is important. The triage is sorting out of patients, based on the need of treatment and available resources to provide for the treatment.^[6]
- There is clearly a need for road safety education and it should be directed towards road users, who are frequently involved and injured in RTAs (e.g. Students). An integrated programme of road safety education is suggested.
 - a. Pre-school children may be introduced to the elementary concepts of road safety through stories involving the animal world.
 - b. Primary school children may be given practice guidance on the use of sidewalks and road crossing techniques.
 - c. For middle school students - road signs and bicycle riding.
 - d. High school students can be taught about reaction time, braking distance, defensive driving and hazards of alcoholic drinks.

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