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CLINICAL PROFILE AND MANAGEMENT OF POLYTRAUMA PATIENTS IN A TERTIARY CARE CENTER, TELANGANA INDIA

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Abstract:

Introduction: Polytrauma is a major cause of morbidity and mortality in both developed and developing countries. Trauma remains a major public health concern due to the high cost, loss of productive life, and societal dependency due to disability. Recently, Santry et al. have proposed a quadri modal distribution of deaths with the first peak occurs at the scene of injury, the second peak in the emergency department (ED), and the third peak during hospitalization fourth peak occurring after the discharge of the patient. As the consequence of modernization has led to a variety of unintentional injury that has become a global epidemic. The current study was undertaken to assess clinical profile of patients and their management which can be useful for improving the patient outcomes.

Methodology: A prospective observational study was done in 100 adult patients admitted in to ICU with history of trauma during February 2022 to January 2023 in a multidisciplinary 24hour emergency tertiary care hospital after obtaining institutional ethical committee clearance. Patients written informed consent was taken and data was collected using a predefined semi structured questionnaire. The inclusion criteria were adult patients with polytrauma, Injury severity score (ISS) ≥ 16 (calculated using the data). Data represented as frequency, percentages and bar diagram. Data analysis was done using spss version 20. P <0.05 considered as statistically significant.

Results: Majority of the patients belong to age group of 18- 40 years (57%) with mean age of all the patients being 27.4. Majority were males (67%). Based on injury severity score (ISS), patients with score 16- 30 were 2%, 31-45 were 31%, 46-60 were 63 % and 61 – 75 were 4% respectively.Management done included resuscitation in 89%, early appropriate care/ early definitive fixation in 15%, safe definitive surgery in 14%, damage control orthopedics in 27%, early total care in 10 % and MuST surgery (isolated Musculo skeletal surgeries) in 3% of patients respectively.

Conclusion: Trauma is more seen in younger age group and males, with road traffic accidents being the commonest cause. Most common range of ISS reported was 45-60.

Complications reported in this study patients were pulmonary embolism (3%), resuscitation induced coagulopathy (1%), septic shock (4%), sepsis (2%), multi organ failure (7%), pneumonitis acquired under mechanical ventilation (2%) and death (15%).

Keywords: Polytrauma, management, complications, injury severity score.

INTRODUCTION

Polytrauma is a major cause of morbidity andmortality in both developed and developing countries.[1] Theterm "Polytrauma" is mainly used to describe blunt traumapatients whose injuries involve multiple body regions orcavities, compromise patient's physiology and potentiallycause dysfunction of uninjured organs.[2,3]The new Berlin definition of polytrauma was used and defined as follows: a patient with Abbreviated injury severity score ≥ 3 for two or more different body regions with additional one or more variables from the five physiologic parameters, including SBP ≤ 90 mm Hg, GCS score ≤ 8, base excess ≤ 6.0, international normalized ratio ≥ 1.4 or partial thromboplastin time ≥ 40 s, and age ≥ 70 years.[4,5] In order for trauma patients to have good outcomes, all aspects of trauma care must be in place, including a robust prehospital care system, competent human workers, buildings, equipment, and a continuous supply of resources. [6,7,8]

Resuscitation and damage control orthopaedics are two key pillars in the management of polytrauma patient. Trauma-related coagulopathy can be an emerging complication during resuscitation of such patients which should be recognized early so appropriate corrective measures can be undertaken.[8]

Trauma remains a major public health concern due to the high cost, loss of productive life, and societal dependency due to disability. Recently, Santry et al. have proposed a quadri modal distribution of deaths with the first peak occurs at the scene of injury, the second peak in the emergency department (ED), and the third peak during hospitalization fourth peak occurring after the discharge of the patient.[9]

As the consequence of modernization has led to a variety of unintentional injury that has become a global epidemic.[10] The current study was undertaken to assess clinical profile of patients and their management which can be useful for improving the patient outcomes.

METHODOLOGY

A prospective observational study was done in 100 adult patients admitted in to ICU with history of trauma during February 2022 to January 2023 in a multidisciplinary 24hour emergency tertiary care hospital after obtaining institutional ethical committee clearance. Patients written informed consent was taken and data was collected using a predefined semi structured questionnaire. The inclusion criteria were adult patients with polytrauma, Injury severity score (ISS)≥ 16 (calculated using the data). Patients presenting with traumatic injuries involving only one system and those who did not give consent were excluded. Purposive sampling method was used.

All polytrauma patients were initially evaluated and assessed, proper history of the injury elicited, rapid systematic assessment is performed immediately to identify the possible life

threatening conditions, fracture characteristics, associated injuries, medical comorbidities, and the timing and techniques of provisional treatment were documented. Appropriate blood investigations (includes total count, haematocrit, blood grouping, arterial blood gas values, lactic acid, ph and base excess) were obtained and resuscitation done accordingly. Various organ systems involved in trauma were assessed and ISS scoring system was applied to grade the severity of polytrauma. Injury Severity Score (ISS) >16 were involved in the study. Following initial assessment, stabilization and trauma scoring patients were shifted to ICU for further management, depending on the severity of injury and acidosis, patients managed by giving crystalloids, colloids and sodium bicarbonates, blood in case of patients with severe blood loss and in haemorrhagic shock. The second sample to asses haematocrit values, Hb, arterial blood gas values, lactic acid, ph and base excess was sent 8 hours following admission preoperatively following correction of acidosis and blood loss. The injury was classified according to the anatomical area of injury like traumatic brain injury/ skull fracture, maxillofacial injury, chest wall injury, abdominal injury, extremity injury, and soft tissue injuries. A physiological score of the injury was calculated using injury severity score (ISS). Once the acidosis is corrected which is assessed by ph, lactic acid and base excess values, patients were taken up for definitive surgeries according to fracture pattern and type of anaesthesia. Following surgery patients shifted to ICU for post operative care, proper post operative care was done by ICU intensivist. Treatment details (included need for various modalities in management of trauma like resuscitation, damage control orthopaedics, early appropriate care, trauma induced coagulopathy and second hit injury) were recorded. Complications associated to polytrauma and its treatment were assessed, like local wound infections or sepsis if associated, septic shock, pulmonary complications like adult respiratory distress syndrome, pulmonary embolism, pneumonia due to longer ICU stay, acute renal failure, multiple organ dysfunction syndrome (MODS), and deep venous thrombosis (DVT) and death. Patients were followed up for one month to assess the above mentioned complications.

The Early Appropriate Care protocol was followed which relies on continuous reassessment of acidosis as response to resuscitation, Surgery is permitted when specific laboratory criteria are met, and definitive fixation occurs within 36 hours of injury. The protocol will reduce pulmonary and other complications and will also reduce length of hospital stay.[11, 12, 13,14]

Data represented as frequency, percentages and bar diagram. Data analysis was done using spss version 20. $P < 0.05$ considered as statistically significant.

RESULTS

Majority of the patients belong to age group of 18- 40 years (57%) with mean age of all the patients being 27.4. Majority were males (67%). Most common mode of injury was road traffic accident (69%) followed by fall from height (20%). Mean time to hospital since injury was 3.8 hrs. (table 1)

Table 1: Distribution by patient's characteristics and mode of injury

PARAMETERS	Sub- group	Frequency	Percentage
Age (years)	18 – 40 years	57	57
	41 – 60 years	35	35
	➢ 60 years	8	8
➢ Age (years) Mean±SD		27.43±12.89	
Sex	Male	67	67
	Female	33	33
Mode of injury	Road traffic accidents	69	69%
	Fall from height	20	20%
	Assault	4	4%
	Miscellaneous	7	7%
Time to hospital since injury (hours)	3.8±7.76 hours(mean and SD)		

Extremities fracture was the most common injury in 52% of patients followed by soft tissue injury (44%), traumatic brain injury and skull fractures (25%), Maxillofacial injuries (19%), abdominal injuries (16%), chest wall injuries (12%) and spine injuries (7%). (table 2)

Table 2: Type of injury sustained

Injuries sustained	Frequency	Percentage
Extremities fracture	52	52
Traumatic brain injury/ skull fracture	25	25
Soft tissue injury	44	44
Spine injury	7	7
Abdominal injury	16	16
Maxillo facial injuries	19	19
Chest wall injuries	12	12

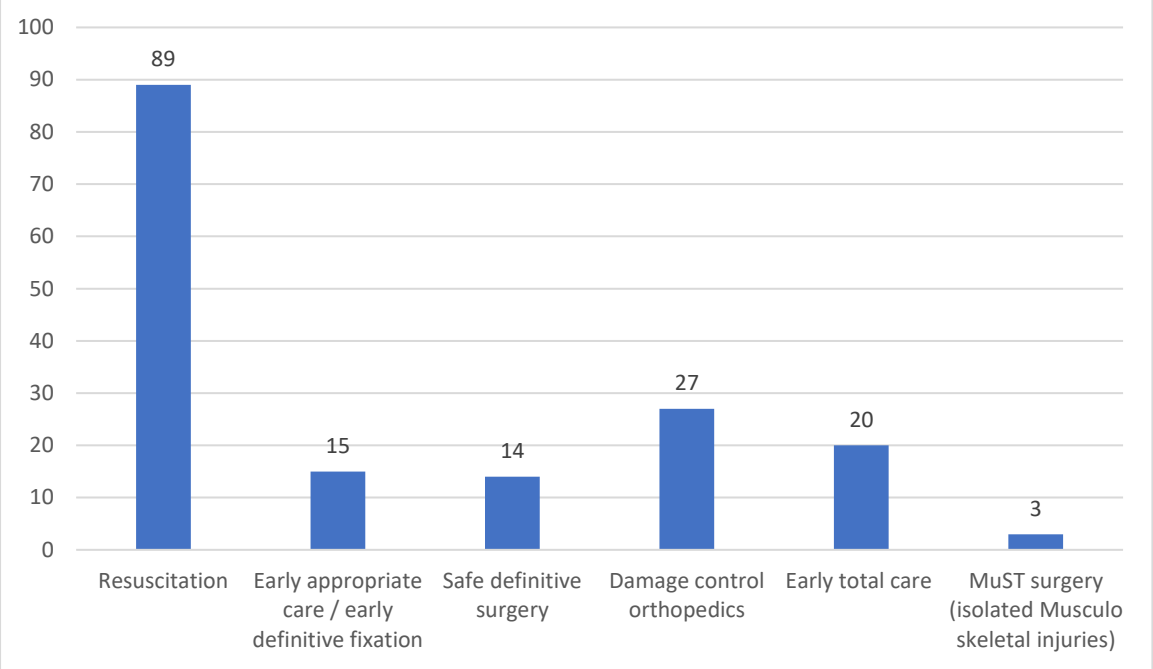
Based on injury severity score (ISS), patients with score 16- 30 were 2%, 31-45 were 31%, 46-60were 63 % and 61 – 75 were 4% respectively.(Table3)

Table 3: Injury severity score

Injury severity score (≥ 16)	Frequency	Percentage
16- 30	2	2%
31-45	31	31%
46-60	63	63%
61 - 75	4	4%

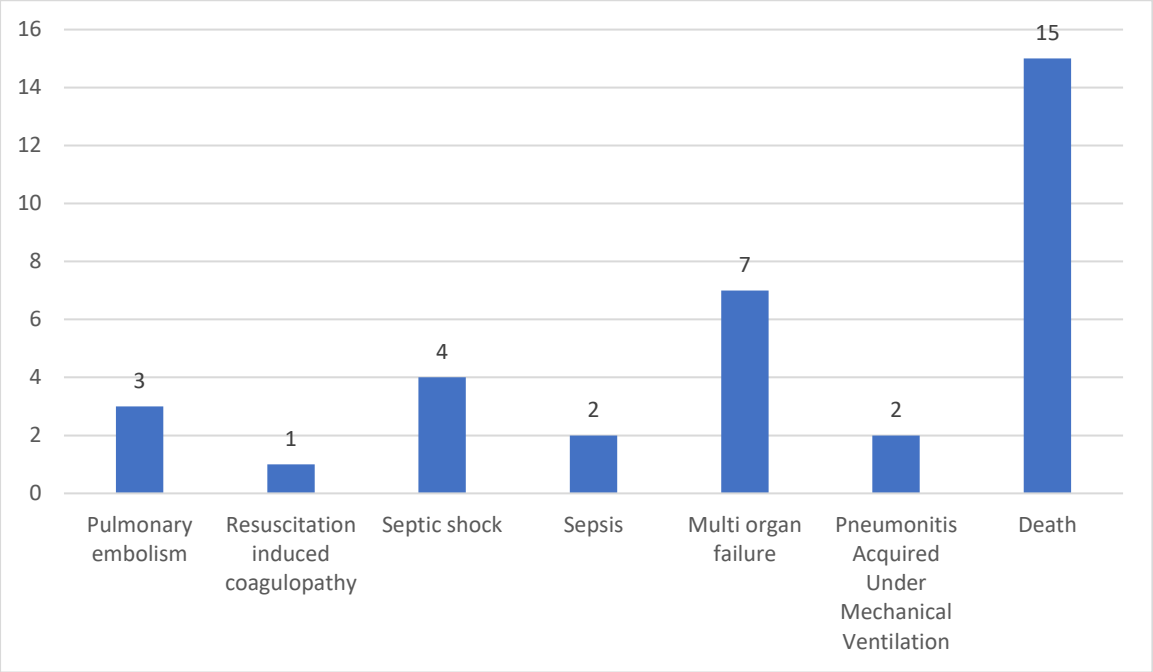
Management done included resuscitation in 89%, early appropriate care/ early definitive fixation in 15%, safe definitive surgery in 14%, damage control orthopedics in 27%, early total care in 10 % and MuST surgery (isolated Musculo skeletal surgeries) in 3% of patients respectively

Figure 1: Management done in polytrauma patients



Complications reported in patients were pulmonary embolism (3%), resuscitation induced coagulopathy(1%), septic shock (4%), sepsis (2%), multi organ failure (7%), pneumonitis acquired under mechanical ventilation (2%) and death (15%).

Figure 2: Complications in polytrauma patients



DISCUSSION

There has been an evolution in the recommendations about fracture care in polytrauma. Both the unreflected total care strategy and the avoidance of early definitive fixation have yielded into more detailed management strategies. [15]

In this study majority of the patients belong to age group of 18- 40 years (57%) with mean age of all the patients being 27.4. In study by Jain M et al age group 21–30 years were affected the most.[16]Most studies report young adults (20–40) are more prone to injuries.[17,18,19,20,21,22]

In this study majority were males (67%) compared with females similar to many studies.[17,18,19,20]In study by Jain M et al majority were male (n = 407, 82%) and 18% were females (n = 93).[16]

In this study, mean time to hospital since injury was 3.8 hrs. In study by Garg A et al, Latent period is the interval between the time of injury to the time of admission. In study by Garg 128 (40%) out of 300 patients were admitted within 2 hours of injury and of this mortalityof26patientswasobserved.Mostofthe patients (48.33%)presentedbetween2 to 8 hours since injury. [23]

Type of injury sustained in the current study was, extremities fracture in 52% of patients followed by soft tissue injury (44%), traumatic brain injury and skull fractures (25%), Maxillofacial injuries (19%), abdominal injuries (16%), chest wall injuries (12%) and spine injuries(7%).Where as in study by Tesfaye Abebe Soft tissue injury was the most common injury type, accounting for 160 (44.2%), and extremities fracture is the second most common injury type accounting for 87 (24%), followed by Traumatic Brain injury/Depressed Skull fracture (TBI/DSF) and Polytrauma, which account for 42 (11.6%) and 33 (9.1%), respectively. [24]

Fractures were the most common injuries in our study similar to Pathak *et al*. and Mitra *et al*.[25,26] Wui *et al*. and Kashid *et al*. have seen head injury as the most prevalent injury in their data,[27,28]

In this study based on injury severity score (ISS), patients with score 16- 30 were 2%, 31-45 were 31%, 46-60 were 63 % and 61 – 75 were 4% respectively. In study by Jain M et al the median ± IQR ± range of ISS was 17 (11–26) [4–75]. Among the pattern of injury recorded, extremity injury (54% fractures) and head injury (50%) were the frontrunners, Polytrauma (ISS > 15) was seen in 261 (52%) cases.[16]In study by Sandeep DN et al Range of ISS was 19 – 66 with Mean and S.D being 36.97 ± 10.86. [29]In study by Garg A et al, mean ISS was found to be greater at 23.51±11.32 while it was only 19.9±13.7 in the findings of Ali etal.[30]

In our study Most common mode of injury was road traffic accident (69%) followed by fall from height (20%). In study by Sandeep DN et al mode of injury in all patients was road traffic accidents. This could be attributed to increased mobility in urban working people.[29]Similarly in study by Garg A et al, the most common mode of injury observed in

the study was road traffic accidents (51%), followed by fall from height which contributed 25% cases. [23]

Management done in this study included resuscitation in 89%, early appropriate care / early definitive fixation in 15%, safe definitive surgery in 14%, damage control orthopedics in 27%, early total care in 10 %, MuST surgery (isolated Musculo skeletal surgeries) in 3% of patients respectively. Complications reported in this study patients were pulmonary embolism (3%), resuscitation induced coagulopathy (1%), septic shock (4%), sepsis (2%), multi organ failure (7%), pneumonitis acquired under mechanical ventilation (2%) and death (15%). No previous studies reported modality of management and complications.

CONCLUSION

Trauma is more seen in younger age group and males, with road traffic accidents being the commonest cause. Most common range of ISS reported was 45-60. Extremities fracture was seen in 52% of patients followed by soft tissue injury (44%). Management done in this study included resuscitation in 89%, early appropriate care/ early definitive fixation in 15%, safe definitive surgery in 14%, damage control orthopedicsin 27%, early total care in 10 % and MuST surgery (isolated Musculo skeletal surgeries) in 3% of patients respectively. Complications reported in this study patients were pulmonary embolism (3%), resuscitation induced coagulopathy (1%), septic shock (4%), sepsis (2%), multi organ failure (7%), pneumonitis acquired under mechanical ventilation (2%) and death (15%).

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