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Research Article

BURDEN OF TRAUMA AND ROLE OF ANESTHESIOLOGISTS IN THE MANAGEMENT OF TRAUMA PATIENTS

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ABSTRACT

Trauma is the principal public health problem in every country regardless of the level of socio-economic development and modern trauma care. However despite its huge importance, trauma has been called the neglected disease of modern society. Incidence of trauma is increasing with the increasing incidence of road traffic accidents, industrial accidents, violence and assault. Anesthesiologists are prepared to immediate care of patients with any form and severity of injury, which may require any kind of operations regardless of the day time of night. Therefore anesthesiologists offer a unique expertise and skill set that are significantly different from those offered by other medical specialists.

Objectives: To study the burden of trauma in patients presenting at casualty department of Indira Gandhi Medical College, Shimla. To study the mode, pattern of injuries and role of anesthesiologists in the management of trauma victims presenting to Indira Gandhi Medical College, Shimla.

Material and method: This prospective study was conducted in Indira Gandhi Hospital, Shimla over a period of one year from 1st June 2014 to 31st May 2015. A total of 4267 trauma patients, with their hospital stay of more than twelve hours, admitted to various departments of I.G.M.C. Trivial injuries with duration of hospital stay less than twelve hours were excluded from the study. Primary and secondary survey was done by team of anaesthesiologist and surgeons and managed in golden hours.

Results and conclusion: trauma is a major health hazard and due to the process of economic development and modernization, there has been a phenomenal increase in trauma. Trauma is a major cause of disability and mortality in India, but has so far lagged public awareness and is under recognized as a public health problem. The present study confirms these facts and highlights the increase in trauma and major cause of trauma in our part of the state.

Under all circumstances, complete initial resuscitation and stabilization of the patient should be carried out, and before transfer, the patient should be comprehensively monitored to avoid complications during the journey.

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INTRODUCTION

Trauma is a mechanical damage to the body caused by an external force. The trauma patient has been defined as “injured person who requires timely diagnosis and treatment of actual or potential injuries by a multidisciplinary team of health care professionals, supported by the appropriate resources, to diminish or eliminate the risk of death or permanent disability”.

^[1]Worldwide, about 16,000 people die every day as a result of an injury (5.8 million deaths per year) and the projections for 2020 shows that 8.4 million deaths per year are expected^[2,3]

Anesthesiologists and surgeons play an integral role in these multidisciplinary teams. The main aim of anesthesiologists in trauma patients is the resuscitation and perioperative care and management of trauma patients, including pain management.^[4]

If patient got proper management in golden hour markedly decreases the mortality rates from the trauma.^[5] Golden hour is the time elapsed between the occurrence of an injury and definitive management and surgical care given.

Aim and Objectives: To study the burden of trauma in patients presenting at casualty department of Indira Gandhi Medical College, Shimla, ascertain the mode of injuries in trauma

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victims, pattern of injuries and outcome of patients after receiving management in golden hours.

MATERIAL AND METHODS

This prospective study was conducted in the department of surgery of Indira Gandhi Hospital, Shimla over a period of one year from 1st June 2014 to 31st May 2015. A total of 4267 trauma patients, with their hospital stay of more than twelve hours, admitted to various departments of I.G.M.C. i.e. surgery, orthopaedics, ENT, ophthalmology and dental, were included in the study. Trivial injuries with duration of hospital stay less than twelve hours were excluded from the study.

In every trauma patient vitals were taken, iv cannulation done and fluid resuscitation done if needed, simultaneously blood samples was withdrawn and sent for cross match. In every patient spine injury was suspected unless ruled out.

In all Trauma patients' survey done

1. Primary survey
2. Secondary survey

Primary survey includes sequences A, B, C, D, and E of cardiopulmonary resuscitation; these letters indicate the following:

- a. For airway with cervical spine control.
- b. For breathing with ventilatory support.
- c. For circulation and hemorrhage control.
- d. For disability and neurological function assessment.
- e. For exposure without hypothermia.

Secondary survey

After primary survey systematic head-to-toe survey done in all patients to assess the injury and other associated injuries.

- Head
- Cervical spine and neck
- Abdomen
- Musculoskeletal
- Maxillofacial
- Chest
- Perineum/rectum/vagina
- Neurological
- Do not forget to examine the back (log roll)

Common Investigations Requested are as Follows

1. Radiography for chest, skull, vertebral column, pelvis, and long bones.
2. Whole body computed tomography scan.
3. Abdominal ultrasound (FAST).
4. CT head for head trauma.
5. Echocardiography (usually avoided as it is time consuming for hemodynamically unstable patients).

Resuscitation was continued concomitantly while a detailed history and physical examination was done for identification of all injuries. In trauma patients chances of going into hypovolemic shock is more so fluid resuscitation done and blood and blood products were arranged.

Perioperative anesthetic management of trauma patients who were planned for operation

Preoperative Assessment is Carried out by

- a. Primary survey.
- b. Secondary survey.
- c. Assessment of the past medical condition by history taking, examination, and investigations.
- d. Assessment of the airway for difficult intubation.
- e. Assessment of risk for aspiration as all trauma patients are considered to have full stomach as gastric emptying stops by the time of the trauma; thus, precautions against aspiration should be taken. [6]

Premedication was avoided.

Intraoperative Anesthetic Management

- a. It is better to delay the surgery for as long as possible to allow for proper preoperative resuscitation together with full trauma survey.
- b. Monitoring is started before inducing anesthesia, and includes the following:
 - i. Five-leads ECG.
 - ii. Noninvasive blood pressure
 - iii. Invasive if hemodynamic unstable
 - iv. Capnography.
 - v. Oxygen saturation.
 - vi. Urine output by using Foley's catheter.
 - vii. Temperature props to avoid hypothermia.
 - viii. Central venous line for fluid management according to patient condition.

General anaesthesia or Regional anaesthesia was given as per the hemodynamic conditions of patients.

Rapid sequence induction by using cricoid pressure was done to avoid aspiration and patient vitals were maintained accordingly. Awake extubation is performed in the lateral position. In case of airway or maxillofacial surgeries, patient is left intubated for several days because of the presence of airway edema.

Postoperative Management

Postoperative Management is Usually carried out in the ICU, and Involves the Following

1. Analgesics.
2. Continuous monitoring.
3. Postoperative complications such as hypothermia, disseminated intravascular coagulopathy, or acute respiratory distress syndrome were ruled out.

Elective Postoperative Ventilation was done in

1. Prolonged hypoperfusion state for any cause.
2. Massive sepsis.
3. Extreme obesity.
4. Aspiration of gastric contents.
5. Previously severe pulmonary disease.
6. Ischemic heart disease.
7. Airway edema

Special attention paid during the management of severe traumatic brain injury (TBI). A significant proportion of patients with TBI have hypotension (systolic blood pressure < 90 mmHg) and/ or hypoxemia (PaO₂ < 60 mmHg), which increases morbidity and mortality. The optimal cerebral perfusion pressure was unknown but cerebral ischemia occurs

below 50–60 mmHg, and thus a minimum of 60 mmHg was maintained.

Trauma Severity Scores

In order to classify the trauma patients an AIS (Abbreviated Injury Score) was used, which is a trauma-specific, anatomically based coding system with two numerical components: (1) an injury descriptor (“predot”) that is unique to each injury and (2) a severity score (“post-dot”) graded from 1 (minor) to 5 (critical injury), all unsurvivable injuries scored (6). Modern trauma scoring methodology uses a combination of an assessment of severity of the anatomical injury with a qualification of the degree of physiological derangement to arrive at scores that correlates with clinical outcomes.

Glasgow Coma Scale (GCS)	Systolic Blood Pressure (SBP)	Respiratory Rate (RR)	Coded Value
13-15	>89	10-29	4
9-12	76-89	>29	3
6-8	50-75	6-9	2
4-5	1-49	1-5	1
3	0	0	0

RTS = 0.9368 GCS + 0.7326 SBP + 0.2908 RR

In head injury patients GCS Scoring was done if less than ≤8 then patient were resuscitated mean BP maintained ≥90mm of Hg intubated and managed accordingly.

Time is of essence in caring for patients with multiple injuries. To emphasize the time-sensitive nature of this care, the critical period immediately following injury was historically termed the “golden hour.” Rapid assessment of injuries and institution of life-preserving measures have helped to reduce the preventable deaths.

Observations

The present study was conducted on 4267 patients of trauma having their hospital stay of more than twelve hours, admitted to various departments of I.G.M.C. Following observations were made.

Table 1 Age Distribution

Age Groups (In Years)	No. of Patients	Percentage
0-10	561	13.15%
11-20	600	14.06%
21-30	894	20.95%
31-40	769	18.02%
41-50	643	15.07%
51-60	408	9.56%
61-70	237	5.55%
71-80	98	2.30%
81-90	46	1.08%
91-100	9	0.21%
>100	2	0.05%
TOTAL	4267	100%

2824 (66.18 %) patients were in the age group of less than 40 years which means young age group was more affected. (Table1, Fig 1)

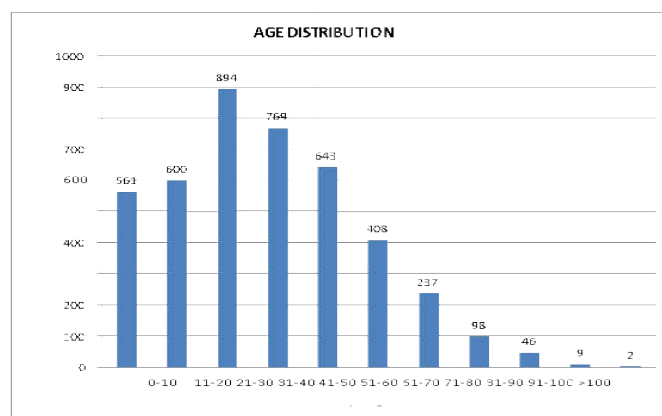


Fig 1

Table 2 Sex Distribution

Sex	No. of Patients	Percentage
Female	1150	26.95
Male	3117	73.05
Total	4267	100.00

Out of 4267 trauma patients included in the study, 3117 (73.05%) were males and 1150 (26.95%) were females (Table 2). Present study showed that male has undergone more trauma because males used to drive vehicle more frequently than females.

Table 3 pattern of injuries

Region	No. Of patients	Percentage
Neurosurgical trauma (head +spine)	1193	27.96
Surgical trauma (thorax+abdominopelvic)	175	4.10
Orthopaedic trauma	2606	61.07
Unspecified (burns,face, neck and other)	293	6.86
Total trauma	4267	100.00

Out of the 4267 patients 864 with isolated head injury, 58 patients suffered contusions that had fall as the most common mode with 50 patients, followed by RSA with total of 8 patients. Patients with SDH, EDH were operated immediately for better recovery.

Isolated Abdominal injuries were seen in 34 of all trauma patients of which Liver was the most common organ injured in 18(52.94%) patients, followed by spleen in 9 (26.47%) patients. Renal injuries were seen in 3 (8.82%) patients. Pancreatic injuries, small bowel, urinary bladder, rectus sheath hematoma, each accounted for 1 patient each. Among 42 patients with blunt trauma abdomen, commonest were those with injury to liver accounting for 17 patients.

In present study we found that orthopedic trauma was more common (61.07%) out of which 224(5.2%) patients with isolated single pelvic injury. We observed that 108 had intertrochanteric fracture, 38 had fracture of neck of femur and 29 had fracture of pubic rami while 17 had hip fracture all of which had fall as the most common mode of injury followed by RSA.

Table 4 Pattern of Injuries in Multiple Spinal Injuries

	Fall	RSA	Total
Cervical With Dorsal Spine	9	0	9
Dorsal With Lumbar Spine	25	8	33
Cervical With Lumbar	1	2	3
Cervical, Dorsal and Lumbar Spine	1	1	2
Total	36	11	47

Among 47 patients with multiple spinal injuries, 33 had dorsal with lumbar spine injury while 9 had cervical with dorsal spine injury, 3 patients had cervical with lumbar spine injury and 2 patients had cervical, dorsal and lumbar spine injury. (Table 4)

Table 5 Deaths

Mode	No. of Patients			
	Male	Female	Total	Percentage
RSA	11	3	14	15.91
Fall	31	11	42	47.73
Burns	11	21	32	36.36
Total	53	35	88	100

There were total of 88 deaths due to trauma accounting for (2.06%) of cases, out of which 42(47.72%) were due to fall, 32(36.36%) due to burns and 14(15.90%) had met RSA. (Table 5)

DISCUSSION

Trauma is the leading cause of death in individuals up to the age of 45 years and the third leading cause of death overall for every age group. Trauma fulfil the disease classification criteria for a global pandemic, this being a recurrent and significant cause of morbidity and mortality over time and across continents despite efforts to control its impact.

The majority of the patients i.e. 2263 (53.03%) were between 11-40 years of age group (Table-1, Figure 1) and similar age incidence was observed in Uthkarsh PS *et al.*^[7]

Out of 4267 patients, 3117 (73.05%) were males and 1150 (26.95%) were females. The male to female ratio was 2.7:1. (Table-2) similar results were found in Dsouza C *et al* and M Swarnkar *et al.*^[8, 9]

In this study, fall was the commonest mode of injury accounting for 75.60% patients, RSA was the second in mode of injuries with total of 16.61% patients followed by occupational injuries accounting for 3.73%, and burns accounting for 2.43%, animal related injuries were 0.28%, whereas 0.18% patients were victims of assault while Kalaiselvan *et al* concluded in their study that most common cause of trauma is road traffic accidents.^[10]

In the present study, 72.84% patients were with injuries to single region, 11.72% patients had multiple injuries within a region, poly trauma accounted for 13.01% of patients while rest were those with burns 2.44%. The commonest region to be injured with in the single body region was the extremities accounting for 75.20% out of which upper extremity was most frequent accounting for 35.69% similar to Verma V *et al* and Dr. Mohammad Zafar Equabal *et al.*^[11,12]

In the present study, the most common cause of spinal cord injury was falls (71.98%), while RTA (26.59%) constituted the second most common cause of spinal cord injury. This is in contrast to studies from developed countries where RTA has

been incriminated as the most common cause of spinal cord injury.^[13] In this study, trauma mortality as 2.0% (88 of 4267 patients) same results found in Sogut *et al* and Sanddal *et al.*^[14,15]

Limitations of the present study

- ✓ Study was not carried out in multiple centres but was limited to one regional emergency centre for 1 year and thus the sample size and terms were somewhat limited.
- ✓ Present study included only those patients who had their hospital stay more than twelve hours. More over because of absence of trauma injury registry at our institution detailed data could not be collected.
- ✓ One final limit is the fact that deaths outside of the emergency centre such as discharge against the advice / left against the advice (LAMA).

Summary

1. Injuries were more common in 21-40 years age group 1663 (38.97%).
2. Male’s preponderance was seen in the present study, with male: female ratio being 2.7:1.
3. In patients with head injury 372 (12.13%) were part of isolated regional injuries and 122 (21.98%) as part of poly trauma. Contusions (33.92%) were the most common type of head injury. Cervical spine (52.17%) and facial injuries (32.79%) were most commonly associated with head injury.
4. Fall was the most common mode of head injury accounting for 418 (84.27%) of cases.
5. Liver 18 (52.94%) was the most common abdominal organ injured followed by spleen with 9 (26.47%) patients each.
6. Among spinal injuries dorsal spine injuries were 119 (42.19%), lumbar 120 (42.5%) and cervical spine 43 (15.2%). Cervical spine fractures 25 (58.13%) were most commonly associated with neurological deficit.
7. Over all traumatic brain injury was the commonest mode of death accounting for 32 (36.36%) deaths.
8. Patients who received proper resuscitation in golden hours come out with better outcome.

CONCLUSION

To conclude, trauma is a major health hazard and due to the process of economic development and modernization, there has been a phenomenal increase in trauma. The present study confirms these facts and highlights the increase in trauma.

We would like to retreat the need for prioritizing attention in trauma patients and organized system of care from rapid evacuation and transport to rapid sequence management on the basis of ATLS. Definitive management requires effective trauma team approaches involving Anaesthesiologist, General Surgeons, Cardiovascular & Thoracic Surgeons, Neurosurgeons and Orthopedic Surgeons and constant education. We observed that patient outcome is better if trauma patient got rapid sequence management in golden hours. So trauma centres with adequately well trained manpower is the need of the hour. Educating the public at large about trauma is paramount, as trauma is better prevented than cured.

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