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Research Article

TO ASCERTAIN THE MODE, PATTERN AND EPIDEMIOLOGY OF VASCULAR AND THORACIC TRAUMA

Vikas Panwar[1]., Praveen Dhaulta[2] and VERMA D K[3]

[1,2]Department of Cardio-thoracic and Vascular Surgery, IGMC, SHIMLA, HP, India
[3]Department of General Surgery, IGMC, SHIMLA, HP, India

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ABSTRACT

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

Method: This prospective study was conducted in the department of cardio thoracic and vascular 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. trauma profile investigation was done.

Results: In the present study of the poly trauma patients amongst thoracic trauma, the most common injury was single or multiple rib fractures (76.5%) followed by lung contusion (15.5%). A simple or tension pneumothorax was present in 10% of the patients whereas a flail segment was present in 7% of the cases. Five percent had an injury to the heart or a large vessel in the chest and 4% had a haemothorax. A further 4% had a sternal fracture. Other injuries included injuries to the airways and thoracic spine.

Amongst the recruited patients, a total of 314 vascular injuries were identified (241 arterial, 73 venous). Two hundred and twenty three patients (87%) had arterial injuries, 37 of whom had concurrent venous injuries. Thirty-three patients (13%) had isolated venous injuries. In terms of anatomical distribution, central vascular injuries were most frequent (48%) followed by extremity (34%) and finally junctional (20%) injuries. In patients with extremity vascular injuries, the distribution of upper and lower limb injuries was similar (47% vs. 53%).

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. However our endeavor to study the pattern of injuries and their mode could have been better if there would have been a dedicated trauma registry at our institution.

INTRODUCTION

Trauma is the principal public health problem in every country regardless of the level of socio-economic development and modern trauma care. 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.1, 2 As per World Health Organization data published in 2002: Worldwide road traffic injuries are the leading cause of injury-related deaths. More than 90% of the world deaths from injuries occur in low-middle income group. The low and middle income countries of Europe have the highest injury mortality rates. Globally, injury among men is twice that among women. Young people between the age of 15-44 years account for almost 50% of the world's injury related mortality. Road traffic injuries in the developing world are now the third highest cause of deaths. Falls account for second leading cause of unintentional injury related deaths worldwide after road traffic injuries 3.

Blunt chest injuries can potentially pose a threat to the airway, breathing and circulation in the traumatised patient, thus directly affecting the clinical course and outcome [4]. In the United States and Europe, the mortality rate in patients with blunt chest trauma can be as high as 60% [4]. Moreover, 20-25% of deaths in polytrauma patients are attributed to chest injury [4]. These numbers justify the presence of extensive literature related to chest injuries where the difference in epidemiology and clinical outcomes between adults and children has been well documented [5] as well as the effects

Corresponding author:* **Vikas Panwar
Department of Cardio-thoracic and Vascular Surgery, IGMC, SHIMLA, HP, India

between patients with flail chest vs. pulmonary contusion [4]. Authors have also effectively analysed the impact of age, rib fractures, pulmonary contusion [6], pelvic fractures, intramedullary nailing and the role of analgesia.

Despite extensive reports relevant to blunt chest trauma in the literature, systematic quantification of the impact of chest injury severity on the outcome of polytraumatised patients has been sparse. Recent evidence has indicated that polytraumatised patients with blunt chest trauma present significant differences in mortality and morbidity among different healthcare systems [7]. This necessitates further analysis of blunt chest trauma and auditing of the factors and treatment strategies that could improve outcome.

Vascular injury resulting from trauma is a leading cause of mortality and morbidity worldwide. Exsanguination is perhaps the most significant cause of potentially preventable death after injury,(1, 2) whilst ischaemic tissue damage leads to high rates of amputation in a characteristically young and active population.(3)

Trauma in India is an increasingly significant problem, particularly in light of rapid development and increasing motorization. Social changes are resulting in alterations in epidemiology of trauma. In the state of Himachal due to the predominantly hilly terrain people are more vulnerable to accidents, resulting in various injuries. Keeping all this in view the present study was conducted to study the pattern, cause, mode and burden of trauma i.e. polytrauma mainly including, chest injury and vascular trauma , presenting in IGMC Shimla, as no such study has been done previously in the state of Himachal Pradesh in the recent past.

METHOD

This prospective study was conducted in the department of cardio thoracic and vascular 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. Trivial injuries with duration of hospital stay less then twelve hours were excluded from the study.

In all trauma patients an appropriate primary survey i.e. general condition of the patient, pulse rate, blood pressure, respiration, hydration and pallor/cyanosis was noticed and resuscitation was initiated. A detailed history, especially history with particular reference to mode of injury, any history of alcohol /drug intake or substance abuse, time elapsed since presentation to hospital, treatment received before and during the transportation, presenting symptoms, history of allergies, medications, past medical history, last meal or oral intake and events leading to presentation, was taken. Resuscitation was continued concomitantly while a detailed physical examination was done for identification of all injuries which was followed by secondary systemic examination of the patients.

Vascular injuries

The vascular injuries were classified into three anatomical zones based on the injury location. 1) Junctional, which included injuries to the Subclavian and Axillary vessels of the axilla; injuries to the external iliac, common femoral and Profunda Femoris vessels of the groin; injuries to the Carotid, Vertebral and Jugular vessels of the neck and branches of the aortic arch and associated major veins (Brachiocephalic and Jugular) of the Thoracic inlet. 2) Central, which included injuries to any vessels proximal to the junctional zone. 3) Extremity, which included injuries to any vessels distal to the junctional zone.

Chest injuries

The chest injuries were classified according to the Abbreviated Injury Severity score (AIS) [8]. The distribution of patients in each group, their associated vital signs on admission and mortality rates were recorded. Each patient had at least one chest injury. The most severe of these contributed to the patients overall Injury Severity Score (ISS). The most common injury was single or multiple rib fractures (33.3%) followed by lung contusion (15.5%). A simple or tension pneumothorax was present in 10% of the patients whereas a flail segment was present in 7% of the cases. Five percent had an injury to the heart or a large vessel in the chest and 4% had a haemothorax. A further 4% had a sternal fracture. Other injuries included injuries to the airways and thoracic spine.

Trauma profile investigation was done. In patient with lung contusion and spine trauma CT chest was done, Where vascular trauma was associated CTangiography was done.

RESULTS

In the present study, total of 4267 trauma patients were studied, the age of patient ranged from 1-101 years with the mean age of 33.56 years, out of which 2824 (66.18 %) patients were in the age group of less than 40 years with 2263 (53.03 %) patients belonging to 11- 40 years age group. Of 4267 trauma patients included in the study, 3117 (73.05%) were males and 1150 (26.95%) were females In the present study, fall was the commonest mode of injury accounting for 3226 (75.60%) patients of which 898 (27.84%) were females and 2328 (72.16%) were males, RSA was the second with total of709 (16.61%) patients out of which 162 (22.87%) were females and 547(77.12%) were males. There were 161 (3.77%) patients with occupational (labourers) injuries of which 34 (21.11%) were females and 127 (78.88%) were males. Burns accounted for 104 (2.43%) patients of whom females were 39 (37.5%) and males were 65 (62.5%). Animal related injuries like beer bite, leopard bite, bull horn injuries were 12 (0.28%) in no. of which7 (58.33%) were females and 5 (41.66%) were males, gunshot accounted 67 for 8 (.18%) patients males being 6 (75%) in no. and females 2 (25%).There were total of 34 (0.79%) patients with history of assault. Stab accounted for the least no. of patients i.e. 3 (.07%) with single female and3 male patients. Miscellaneous were 10 (0.23%) including sports related injuries, and self-inflicted cut injuries. In the present study, 663 (20.55%) patients with fall, 108 (15.2%) patients of RSA and 8 (23.52%) patients of assault had history of alcohol consumption.

In the present study of the poly trauma patients amongst thoracic trauma, the most common injury was single or multiple rib fractures (76.5%) followed by lung contusion (15.5%). A simple or tension pneumothorax was present in 10% of the patients whereas a flail segment was present in 7% of the cases. Five percent had an injury to the heart or a large

vessel in the chest and 4% had a haemothorax. A further 4% had a sternal fracture. Other injuries included injuries to the airways and thoracic spine.

Amongst the recruited patients, a total of 314 vascular injuries were identified (241 arterial, 73 venous). Two hundred and twenty three patients (87%) had arterial injuries, 37 of whom had concurrent venous injuries. Thirty-three patients (13%) had isolated venous injuries. In terms of anatomical distribution, central vascular injuries were most frequent (48%) followed by extremity (34%) and finally junctional (20%) injuries. In patients with extremity vascular injuries, the distribution of upper and lower limb injuries was similar (47% vs. 53%).

Forty percent of patients who died had suffered a cardiac arrest either pre-hospital or on arrival to the Emergency Department, and prior to any opportunity for intervention. However, a third (5/14) of patients with penetrating vascular injuries and 10% (1/10) of individuals with blunt vascular injuries, who suffered a cardiac arrest prior to intervention, survived to discharge.
Fifteen patients underwent limb amputation and all amputations were the result of blunt vascular trauma. In nine cases revascularisation was not possible and primary amputation was performed. Limb revascularisation was performed in 34 patients and was successful in 29 (85%), the remaining five patients underwent a delayed amputation. One patient with a ligated femoral vein injury required a delayed amputation.

DISCUSSION

In analyzing specific association between injury mechanisms and sites of injury, we identified that the patients who sustained isolated regional injuries as a result of fall, extremity injuries were commonest (9).72%. Kerry A Stewart *et al* (2013)(10) in their study on traumatic injuries in developing countries reported that falls were the most common cause of injuries, accounting for over 40% of injuries and that the extremities were most commonly injured (55% of injuries) regardless of age or sex. Shailvi *et al* (2015)(11) in their study on injuries in Nepal, reported that fall was the commonest mode of injury with extremity injuries being the commonest 73.2%. Chun Sung Byun *et al* (2015)(12) in their study on epidemiology of 98 trauma patients and mortality reported that the most common injury sitewere extremities with fall being most prominent cause. Our results were comparable to above mentioned studies.

In thoracic injuries it was observed that fracture ribs (76.5%) were the commonest to occur. Dr. P Murkey *et al* (2012) (13) in their study on patterns of chest injuries in central India reported that rib fractures were seen in 94% of the cases. Mehboob Alam Pasha *et al* (2015)(14) in a 10 year retrospective review of chest trauma in Hospital University Sains, Malaysia, reported that the most frequent injury was fracture of ribs seen in 76.2% of the patients.

In their series of 1,495 blunt polytrauma patients with thoracic injury, Pape *et al*. [15] concluded that radiographically determined injuries to the lung parenchyma have a closer association with adverse outcome than chest wall injuries but are often not diagnosed 24 hours after injury.

Clark *et al*. [16] reviewed 144 trauma patients with flail chest and/or pulmonary contusion. In this series the mortality rate was more than doubled when a combined pulmonary contusion and flail chest (42%) were present. Overall, factors found to be associated with a higher morbidity and mortality included severe associated thoracic injuries, a high ISS, the presence of shock, falls from heights, and the combination of pulmonary contusion and flail chest.

Our results are in keeping with published data from countries with organised trauma systems. Reports from mature trauma centres in Australia and the United States (US) describe vascular trauma as responsible for between 1% and 2.5% of general trauma admissions with penetrating trauma a significant source of these injuries.(17,18,19) These reports also consistently report that torso vascular injuries account for approximately two thirds of vascular trauma and overall mortality is high, between 23% and 26%..(17,18,19)In the few small case series that exist, the majority (>75%) of vascular injuries involved extremity vessels and the overall mortality is low, between 0 and 4%.

Limitations

One of the limitations of the present study is that it 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), have not been accounted for in this present study.

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. 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. However our endeavour to study the pattern of injuries and their mode could have been better if there would have been a dedicated trauma registry at our institution. 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 General Surgeons, Cardiovascular & Thoracic Surgeons, Neurosurgeons & Orthopedic Surgeons and constant education. 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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