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Original Research Article

A RETROSPECTIVE AUTOPSY BASED STUDY OF DEATHS FROM BLUNT ABDOMINAL TRAUMA IN ROAD TRAFFIC ACCIDENTS

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ABSTRACT

Background: Road Traffic Accidents are a significant cause of death in developing countries like India, with abdominal being one of the most commonly injured regions in trauma cases. These injuries are frequently seen in emergency settings and often lead to high morbidity and mortality. The study aimed to explore the frequency and pattern of intra-abdominal injuries in victims of blunt abdominal trauma resulting from road traffic accidents.The autopsy-based research involved 146 victims at GMC Anantapur from 2021 to 2023. Findings revealed a higher incidence of such trauma among males, particularly in the 21-30year age group. The liver was identified as the most frequently injured organ, and haemorrhagic shock was the primary cause of death in most cases

Materials and Methods: This study retrospectively reviewed 146 deaths from blunt abdominal trauma between January 2021 to DECEMBER 2023, excluding assault, genital, and penetrating injury cases. Data from official reports and autopsies covered demographics, injury patterns, and causes of death across all ages and both sexes.

Results: From 2,366 autopsies 148 cases (6.2%) Involved blunt abdominal trauma, mostly in males aged 21-40. Liver was most injured (48.6%), followed by spleen. Haemorrhagic shock (79.6%) was the leading cause of death, followed by septicaemia (9.1%). Chest trauma was a common associated injury. Three- wheeler occupants were frequently affected.

Conclusion: Blunt abdominal trauma from road accidents mainly causes death by haemorrhagic shock, with liver and spleen most often injured. Young adult two-Wheeler riders and pedestrians are most affected.

Keywords: Trauma, Blunt abdominal trauma, cause of death, preventive measures.

INTRODUCTION

Road Traffic Accidents (RTAs) remain a significant public health challenge globally and are a primary cause of death and disability in low-and middle-income countries. According to the World Health Organization (WHO), RTAs account for approximately 1.3 million deaths annually, with up to 50 million more people sustaining injuries or disabilities.[1] India alone contributes to nearly 11% of the global road traffic fatalities, making it one of the worst affected nations.[2] This burden places a significant strain on public health infrastructure and underscores the urgent need for improved trauma management and prevention strategies.

Blunt abdominal trauma (BAT) is frequently encountered in high-impact road traffic collisions and is often underdiagnosed due to its subtle and sometimes delayed presentation.[3] The abdomen, being a large and relatively unprotected area, is susceptible to injury, especially in cases involving motor vehicle collisions, where forces are transmitted directly through seat belts or steering wheels.[4] Major intra-abdominal organs such as the

liver, spleen, pancreas, and intestines are often involved, and haemorrhage from these injuries can lead to rapid deterioration and death if not promptly addressed.[5]

In clinical settings, early diagnose of abdominal injuries is challenging due to nonspecific signs and the need for rapid decision-making. Imaging modalities such as FAST (Focused Assessment with sonography for trauma) and CT scans have image diagnostic accuracy, yet many cases still go undetected until autopsy.[6] Autopsy studies provide a unique and vital opportunity to understand the true incidence, type, and severity of internal injuries, and can inform improvements in emergency care protocols.[7] Numerous studies have demonstrated that blunt abdominal trauma contributes significantly to preventable deaths in RTAs, particularly in settings where pre-hospital care and trauma systems are inadequate.[8] This study aims to provide a detailed autopsy-based evaluation of fatalities due to blunt abdominal trauma in road traffic accidents. By analysing autopsy findings, the study seeks to identify the most commonly affected organs, the associated patterns of trauma, and their contribution to mortality. This information is vital for forensic investigations, clinical awareness, and public health strategies aiming to reduce the burden of road traffic fatalities.

MATERIALS AND METHODS

This study is a retrospective analysis conducted from January 1, 2021 to December 31, 2023, involving 146 cases of death due to blunt trauma to the abdomen. Data were collected on victims of all ages and sexes, excluding cases involving genital, Assault cases, puncture and Penetrating wounds of abdomen. Information was obtained from inquest reports, hospital records, and autopsy reports, including demographics, injury patterns, and cause of death. The focus was on death due to abdominal injuries and associated regional injuries. all age groups and both sex from blunt trauma of abdomen taken for study.

RESULTS

Out of total 2360 cases of medico-legal autopsy cases,148 cases (6.27%) involved deaths due to blunt abdominal trauma [Table 1].

Table 1: Number of deaths due to abdominal trauma in all Medico-legal cases

	No. of cases	Percentage
Deaths due to blunt abdominal trauma	148	6.27
Number of medico-legal deaths	2360	100

Table 2: No of Deaths due to abdominal trauma in all Road Traffic Accidents

	No. Of cases	Percentage
No of deaths due to blunt abdominal trauma	148	17.9
No of deaths due to road traffic accidents	826	100

Out of Total 826 deaths due to Road traffic accidents, 148 cases (17.9%) involved deaths due to blunt abdominal trauma [Table 2].

Table 3: Distribution of cases with age differentiation

Age	Total	M	F
0-10 yrs	02	01	01
11-20 yrs	18	16	04
21-30 yrs	57	36	20
31-40 yrs	36	20	14
41-50 yrs	22	16	06
51-60 yrs	11	08	03
>60 yrs	03	02	01
Total	148	99	49
Percentage	100	67%	33%

The study analysed 148 cases of abdominal trauma, with a male predominance (67%) compared to females (33%). The majority of cases (93 out of 148, or 62.8%) occurred in the 21-40 years age group, indicating that young adults were the most affected. Individuals below 20 years accounted for 19 cases (12.8%), while those aged 41-60 years represented 33 cases (22.3%). Male deaths (115) significantly outnumbered female deaths (33), reinforcing a clear male predominance In trauma cases [Table 3].

Table 4: Distribution of Abdominal viscera involvement in abdominal Trauma

Viscera	Number of cases	Percentage
Omentum	23	15.5
Mesentery	42	28.3
Stomach	20	13.5

Intestine	34	23
Liver	62	41.8
Spleen	48	32.4
Kidneys	29	19.6
Bladder	18	12.1
Uterus	00	0.00
Pancreas	00	0.00

The distribution of abdominal viscera involvement in abdominal trauma shows that the liver is the most commonly affected organ, involved in 62 cases (41.8%). The spleen is the second most affected, involved in 48 cases (32.4%), followed by the mesentery in 42 cases (28.3%) and the intestine in 34 cases (23%). The kidneys were affected in 29 cases (19,6%), the omentum in 23 cases (15.5%), and the stomach in 20 cases (13.5%). The bladder was the least affected, involved in 18 cases (12.1%). The uterus and pancreas were not involved in any of the cases [Table 4].

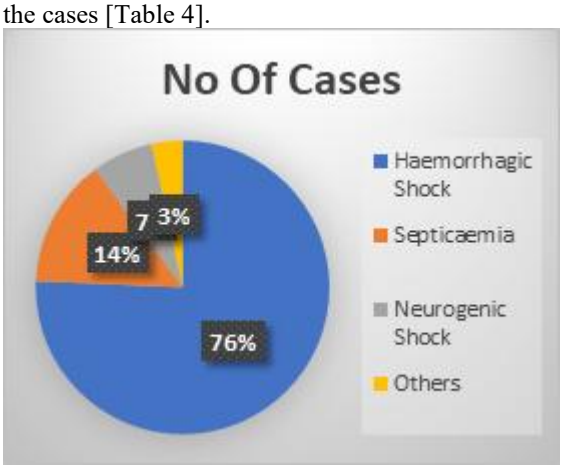

Figure 1: Shows the distribution of Cause of Death among the study

The study highlights that the predominant cause of death among the cases analysed was haemorrhagic shock, accounting around for 76% of the total deaths, with 112 cases, Septicaemia was the second leading cause, contributing to around of 14 % of the deaths with 21 cases, followed by neurogenic shock and other causes, which together accounted for around of 10% (15 cases) [Figure 1].

In terms of injury pattern associated with blunt abdominal trauma, chest injuries were the most frequently observed, present in 27% of the cases, followed by cranio-cerebral injuries in 14.18% of the cases [Figure 2].

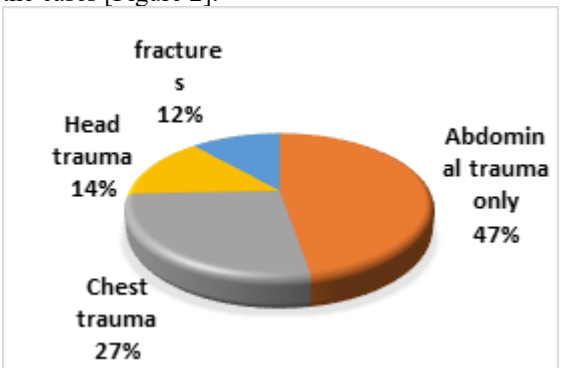

Figure 2: Shows the pattern of Associated injuries

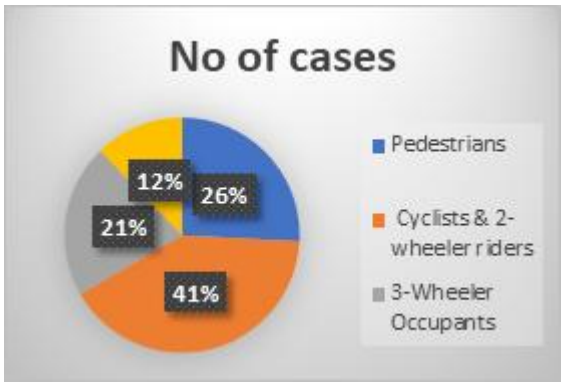

Figure 3: Shows the pattern of vehicular injuries

Furthermore, an analysis of 72 deaths resulting from motor vehicle accidents showed that 37 deaths were due to injuries caused by 3-wheelers, 30 were pedestrian fatalities, and 9 deaths were attributed 4-wheelers and other unspecified causes. These findings underscore the significant impact of vehicular injuries and trauma-related complications as leading contributors to mortality in the studied population [Figure 3]

DISCUSSION

Blunt abdominal trauma continues to be a major cause of death in road traffic accidents. This study highlights that in this period, a total of 2360 autopsies were reported of which 148 deaths were due to blunt abdominal trauma. Blunt abdominal trauma deaths accounted for 6.27% of total autopsies as shown in table no1, observations are matching with Shubhendu k et al, Bordoni PH et al & Anand Rao BVS et al.[9-11]

The Majority of deaths were males representing for 67% and female accounting for 33% shown in Table no3, observations are matching with Gushinge M et al &Suguthaet al.[12,13]

The majority of victims were in the age group of 21-30 years age group (38.5%). Followed by the 31-40 years group (24.3%) Observations were matching with Sugatha et al,[13]& Vinod Kumar Garg et al.[14] This reflect those young adults, being the most active and mobile population, are at higher risk of sustaining fatal injuries in road traffic accidents. There were 19 deaths reported below 20 years, 11 cases are reported between 51-60 and 03 deaths are reported above 60 years.

This Study showed that parenchymatous visceral trauma is common than hollow visceral trauma in both sexes. Similar observations were also seen in

Kunjan Kumar Modi et alstudy.[15] Most of the cases multiple organ involvement was commonly observed, matching with Kunjan Kumar Modi et al & Naik et al.[15,16]

Analysis of abdominal viscera involvement revealed that the liver was the most commonly injured organ (41.8%), followed by the spleen (32.4%), mesentery (28.3%), and intestines (23%). The pancreas and uterus showed no injury involvement in this study. Liver and spleen injuries are critical due to their anatomical positions, high vascularity, explaining their frequent association with fatal haemorrhagic outcomes. Observations are matching with Bordoni PH et al,[10] and Hardik J. Solanki et al,[17] who reported more hepatic and splenic injuries in blunt traumas than in the penetrating injuries. Study differences reported in Sugatha et al,[13]& Vinod Kumar Garg et al,[14] found that after liver injury, the intestines are the second commonest organ involved in blunt trauma of abdomen.

This study shows most common cause of death in blunt abdominal trauma is haemorrhagic shock in 76% cases followed by infections, Neurogenic shock and others contributing 14%, neurogenic shock and others are around 10% respectively. matching with Vinod Kumar Garg et al &Kunjan Kumar Modi et al.[14,15]

This study highlights that in 47.3% of cases, abdominal trauma occurred without other associated injuries. Whereas 27% also had chest trauma, 14% had head trauma, and 12% had fractures. The high incidence of isolated abdominal trauma underscores the vulnerability of the abdomen in blunt force impact. This Study is similar with Ananda Rao BVS et al,[11]& Kunjan Kumar Modi et al.[15]

In this study, findings are alarming and consistent with global trends that identify vulnerable road users as being at the highest risk for fatal injuries. In terms of the mode of transportation, the most affected group were cyclist and two-wheeler riders 41%, followed by pedestrians 26%. Occupants of three- and four- wheelers accounted for fewer fatalities, at 21% and 12% respectively. Study variations reported in Ranjana Singh et al,[18] shows number of deaths from vehicular occupants is more than number of deaths from 2-wheeler riders.

Overall, the pattern of injuries, demographics, and causes of death in this study closely align with global trauma literature and underscores the need for preventive strategies targeting young adults and vulnerable road users.

CONCLUSION

The autopsy-based study on blunt abdominal trauma in road traffic accidents revealed that haemorrhagic shock is the leading cause of death, with liver and spleen being the most commonly injured abdominal organs, Cyclists, two-wheeler riders, and pedestrians constitute the majority of fatalities, and the most affected age group is young adults (21-30 years).

Image 1: Multiple lacerations are present on anterior surface of Liver

Preventive measures such as stricter traffic regulations, promoting helmet and safety gear usage, public education on road safety, and improving trauma care facilities, particularly targeting young and vulnerable populations, are essential to reduce mortality due to blunt abdominal trauma.

REFERENCES

1. World Health Organization. Global Status Report on Road Safety 2018.Geneva: WHO; 2018.
2. Ministry of Road Transport and Highways. Road Accidents in India- 2021. Government of India.
3. Shanmuganathan K, Mirvis SE. Imaging diagnosis of non-haemorrhagic abdominal visceral Injuries. Radiol Clin North Am. 1999;37(3):533-548.
4. Natarajan M, Reddy AK. Patterns of abdominal injuries in fatal road traffic accidents: an autopsy-based study, Indian J Forensic Med Pathol.2017;10(2):35-39.
5. Sharma BR, harish d, Sharma A, Vij K. Road traffic accidents- a demographic analysis. Med Sci Law. 2001; 41(3):266-274
6. Poletti Pa, Mirvis SE, Shanmuganathan K. CT criteria for management of blunt liver trauma: correlation with surgical findings. Radiology.2000;216(2):418-427.
7. Saukko P, Knight B. Knight's Forensic Pathology.3rd ed. Arnold publishers; 2004
8. Mohanty S, Kumar R, Mohanty MK. Fatal blunt abdominal trauma in road traffic accidents. J Indian Aca Forensic Med. 2006; 28(2);80-84.
9. Shubhendu K, Bhengra A, Matho T, et al. Analysis of blunt abdominal trauma with respect to associated injuries, period of survival and mechanism of death among autopsies conducted in Dept. of FMT, RIMS, Ranchi. IOSR Journal of Dental and Medical Sciences 2016; 15(10): 74-78.
10. Bordoni PH, Santos DMMD, Teixeira JS, et al. Deaths from abdominal trauma; analysis of 1888 Forensic autopsies. Revista do Colegio Brasilleiro de Cirurgioes. 2017 Nov; 44:582-595.
11. Ananda Rao BVS, Rajesh Beemsetty, Raja Sekhar Uppu. Study of deaths due to blunt injury abdomen in and around Visakhapatnam. Journal of Evidence Based Medicine and Health care. 2018 Dec; 5(51):3466-3469.
12. Gushinge MC, Govindwar SO, Patel TE. An autopsy study of thoraco-abdominal injuries in road traffic accidents. Asian J pharm clin res. 2023;16(6):71-73.

13. Sugatha M, Kumar K. Assessment of forensic autopsies due to blunt injury abdomen among the patients admitted to the hospital: a retrospective study. ICJMR 2019, 6(4):4-7.
14. Vinod Kumar Garg, Meena SK, Tatwal B. a profile study of deaths due to blunt trauma to abdomen. IP inter J Forensic Med Toxic Sci. 2020;5(1):24-26.
15. Kunjan Kumar Modi, Joshiyara R, Momin SG. A profile study of death due to blunt abdominal trauma in BJ Medical college, Ahmedabad. Int Journal of Med Toxic & Legal Medicine 2017 July; 20(3):40-43
16. Naik BV, Jakkam S, Blunt Injuries of abdomen in Warangal area an analytical study. JIAFM 2013:35(4):328-331.
17. Solanki HJ, Himanshu Patel. Blunt abdomen trauma: a study of 50 cases in M.P Shah Med College, Jamnagar, Gujarat. Int Surgery Journal 2018 may; 5(5):1763-1769.
18. Ranjana Singh, Hemant Kumar Singh, Gupta SC. Pattern, Severity and Circumstances of Injuries Sustained in Road Traffic Accidents; A Tertiary Care Hospital- based study. Indian Journal of Community Med 2014 Mar; 39(1): 30-34.