

Pattern of Thoraco-Abdominal Injuries in Various Accidents Including Fatal Road Traffic Accidents

Raju Surwase

Associate Professor, Department of Forensic Medicine and Toxicology, Parbhani Medical College and R.P. Hospital and Research Institute, Parbhani, Maharashtra

Received: 10-10-2022/ Revised: 25-10-2022 / Accepted: 18-11-2022

Corresponding author: Dr. Raju Surwase

Conflict of interest: Nil

Abstract

Background: An unintended collision between two motor vehicles, a stationary object, or a person result in a road traffic accident (RTA), which may cause injuries, fatalities, or property loss. In developing nations, the importance of road traffic accident mortality and morbidity is greater. RTA injuries are predicted to be the second most common cause of disability in the developing world and the third most common cause of disability worldwide. The frequency of brain injuries resulting from traffic accidents has reduced since the strict enforcement of the helmet law, while injuries to the thoracic and abdominal regions are still on the rise.

Aim: The aim of the study is to find out the Pattern of Thoraco-Abdominal Injuries in various accidents including fatal road traffic accidents

Material and Method: The Department of Forensic Medicine and Toxicology conducted a hospital-based descriptive observational study. Among the remains brought to the mortuary for postmortem assessment, at least 80 cases of traumatic deaths met the inclusion and exclusion criteria. The current autopsy-based study sought to understand the pattern of thoracoabdominal injuries in fatal traffic accidents, the relationship between the type of vehicle and the pattern of thoracoabdominal injuries, and the examination of age- and sex-related mortality.

Results: In the 80 cases, 68 of the participants were men and 12 were women, which is a clear statistic given the preponderance of men's active participation in socioeconomic activities. 65 fatalities, or a maximum of 75 percent, were the consequence of traffic accidents, followed by 11 victims of incidents involving falls from great heights, then 2 victims of train accidents, and just 2 victims of assaults or machine injuries.

Conclusion: This epidemic is getting worse every day despite the implementation of numerous strict rules pertaining to reckless and negligent driving, intoxicated driving, and the non-use of helmets and seatbelts. The worst case scenario on the roadways is the absence of first help for the injured and the indifference of bystanders toward the victims as a result of lingering issues with the police and justice.

Keywords: Road Traffic Accidents, Thoraco-Abdominal Injuries, Trauma, Morbidity and Mortality.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

In the twenty-first century, accidents are one of the main epidemics of non-communicable diseases. An "unplanned, unexpected, occurrence which may involve injury" is what is meant by the definition of an accident. These are a portion of the costs associated with technical advancement. Mechanical trauma from road collisions causes morbidity, disability, and even mortality. One of the highest in the world, and 20 times higher than that reported in industrialized nations, is India's death rate in traffic accidents.[1] According to the 2015 Global Status Report on Road Safety, which included data from 180 nations, the number of fatalities on the world's roads has stabilized at 1.25 million annually, with low-income nations having the two highest rates.[2]

Accidents are a by-product of industrialization and a fast lifestyle and are seen as a contemporary pandemic when it comes to abdominal injuries. One of the top five causes of illness and mortality in South-East Asian nations is road traffic accidents (RTA).[3] Morbidity, disability, and even death are all consequences of mechanical damage caused by RTA. One of the highest in the world, and 20 times higher than that reported in industrialized nations, is India's death rate in traffic accidents.[4,5] Trauma to the critical organs of circulation and breathing located in the bony thoracic cage compromises the integrity and viability of the entire human body, making thoraco-abdominal injuries a significant contributor to death.

Similar to the chest, the abdomen is the third most often wounded area of the body in civilian trauma because it is generally unprotected by bony structures.[6] The abdomen houses many vital organs, including the liver, spleen, kidney, and pancreas, as well as hollow, viscous organs like the stomach, intestines, and urinary bladder. As a result of injuries to these

organs, there can be significant morbidity and mortality.[7] For a number of reasons, thoraco-abdominal injuries are of particular relevance in medico-legal proceedings. In order to recreate the events, it may be helpful to determine the actual or likely anatomical site of primary impact by analyzing the pattern of exterior and interior injuries. Therefore, it is crucial in every case to carefully examine entire injury patterns.[8] A thorough autopsy, along with a trip to the place of the incident and the presence of any intervening objects, is of great assistance in the challenging situation of determining the method of death.[9] In India, there were 4.97 million registered traffic accidents in 2011, 142485 documented fatalities, or one accident and one death every three minutes.[10] A research by the National Transportation Planning and Research Centre in Delhi found that there are road accidents in India that result in one person being killed or injured every four minutes.[11]

Most car crashes are unintentional, very few are suicide-related, and even fewer are homicidal in nature. The manner is frequently shown by injury patterns and dying circumstances.[12] Researchers have found that the majority of people hurt in traffic accidents are two-wheeler drivers and passengers. Accident etiological factors can be divided into two categories: human and environmental. Human error is the main connection between the two.[13]

Since economic liberalization and the ensuing globalization, the health issues that Indian society is currently dealing with have undergone tremendous change. Over the past two decades, there has been a rise in motorization as a result of epidemiological change, demographic shifts, and socioeconomic change.[14]

Material and Methods

The Department of Forensic Medicine and Toxicology conducted a hospital-based descriptive observational study. Among the remains brought to the mortuary for post-mortem assessment, at least 80 cases of traumatic deaths met the inclusion and exclusion criteria. The current autopsy-based study sought to understand the pattern of thoracoabdominal injuries in fatal traffic accidents, the relationship between the type of vehicle and the pattern of thoracoabdominal injuries, and the examination of age- and sex-related mortality.

This study includes all cases of fatal thoracoabdominal injuries caused by vehicle/road accidents that were reported during this time. Family members, friends, police officers, and police inquest papers were used to acquire information about the circumstances surrounding thoracoabdominal injury in fatal road traffic accidents.

The information was recorded on the proforma created for the study after a careful analysis of the relatives' and friends' comments, the inquest report, and the demographic profile of the victims.

Inclusion Criteria:

- Thoracoabdominal trauma is suggested by treatment records.
- Thoracoabdominal trauma is suggested by a police investigation.
- The results of the post-mortem investigation point to thoracoabdominal trauma.

- The study included all medico legal autopsies of people with a known history of traffic accidents and thoracic and abdominal injuries.
- The study also included autopsies from traffic incidents that revealed numerous injuries, as well as thoracic and abdominal injuries.

Exclusion Criteria:

- Cases of thoracic-abdominal blunt injuries that penetrate deeply.
- Any instance of a person dying from an asphyxiation, burn, or other non-thoracic abdominal trauma.
- Road traffic accidents when homicidal thoracoabdominal injuries and head injuries were the cause of death.
- The investigation did not include decomposed remains.

Statistical Analysis

Data was entered in MS Excel and analysed with SPSS version 20. P-values were calculated to determine the significance of the data. These were carefully compiled, tabulated, and analysed using Microsoft Excel.

Result

Out of the 80 fatal cases, 30 victims were in the age range of 20-29 years, 20 in 30-39, followed by 17 cases in the age range of 40-49 years, and 13 between 50-59 years of age. Out of the 80 cases, 68 subjects were male and 12 were female, which is an obvious figure given the preponderant active participation of males in socio-economic activities.

Table 1: Showing distribution of 80 cases according to the mode of injury and cause of death

Mode of injury	Cause of death					Total
	Shock and Haemorrhage	Coma	Septic shock	Traumatic asphyxia	Decapitation	
Road accidents	42	20	2	1	0	65
Fall from height	9	02	00	00	00	11
Train accident	2	00	00	00	00	02

Assault	1	00	00	00	00	01
Machine injury	1	00	00	00	00	01
Total	55	22	02	01	00	80

Sixty-five deaths of all deaths were the consequence of traffic accidents, followed by 11 deaths from falls from higher places, two deaths from train accidents, and only two deaths from assault or machine injuries.

Table 2: Showing distribution of 80 cases according to body region involved in trauma

Body region	Number of cases	%
Thoracic injuries	11	13.75
Abdominal injuries	18	23.75
Thoraco-abdominal injuries	50	62.5
Others	01	1.25
Total	80	100

Eighty instances in all, with thoracic injuries occurring in 11, abdominal injuries in 18, and thoraco-abdominal injuries in 50. Based on the information in the police requisition and treatment records, 01 instances were included in the study; however, post-mortem investigation revealed no thoracoabdominal damage in these cases. These 1% of cases involved injuries to other body parts, but they were nevertheless considered for the study since they met the inclusion and exclusion requirements.

Table 3: Showing distribution of 80 cases of external thoracic injury according to type of injuries

Type of injury	Chest	
	No. of cases	%
Abrasion	52	65
Bruise	11	27.5
Laceration	08	10
Swelling / Deformity	09	11.25
Total	80	100

Out of the 80 instances involving external thoracic injuries, 52 involved abrasions, 11 bruises, 8 lacerations, and 9 involved edema and/or deformity of the thoracic wall.

Discussion

Most of the critical organs are located in the thoracic and abdominal chambers, thus harm to these organs can be fatal. There are several ways to cause trauma to these cavities, including car accidents, train accidents, height falls, and blunt force trauma. The majority of these are caused by automobile accidents on the roads. Penetrating or open injuries and

nonpenetrating or closed injuries are the two categories used to describe thoracic-abdominal injuries.

Pneumothorax, hemothorax, interstitial emphysema, arterial air embolism, and cardiac tamponade are complications of thoracic trauma. Internal hemorrhage, shock, peritonitis, and paralytic ileus are the main complications associated with abdominal injuries.[15]

Jha et al.2003[16] also observed the dominance of males in road traffic accidents and also the age group involvement of 21-30 years. Singh et al.2004[17] observed that the most

common age group involved in road traffic accidents was 21-30 years, followed by 31-40 years and then 11-20 years, and observed that the male-to-female ratio was 9:1 in his study. The highest number of instances occurred in the winter and was attributed to the region's frequent fog, which reduced vision. Additionally, the cold climate and increasing alcohol consumption both slow down reaction time. A similar trend was also observed by Harruff 1998[18] who stated that most of the accidents occurred in winter. Jha et al.2003[16] observed that the highest number of road traffic accidents took place in January (12.9%). Singh et al.2004[17] also observed that the maximum number of accidents occurred in winter.

According to Bowley D and Boffard K.2002[19], thoracic injury directly accounts for 20-25% of deaths due to trauma; thoracic injury or its complications are a contributing factor in a further 25% of trauma deaths. 15% of RTA fatalities are caused by aortic damage. In individuals hospitalized to hospitals with blunt trauma, diaphragmatic rupture is reported to occur between 0.8% and 1.6% of the time.

Wong et al.2002[20] in their study observed that 42% of the victims died on the spot. Singh et al.2004[17] observed that the longest survival period was 30 days and 15 hours at their study center. Due to the abundance of hospitals and tertiary care facilities in this region as well as their accessibility from the highways, the findings from this study about survival in hours could not be compared to those of any other study.

Most young people utilize two-wheeled cars, which are more frequently engaged in deadly traffic accidents due to irresponsible driving, overtaking, and the less stable nature of the vehicles. Young, successful men were frequently hurt in RTA. It was discovered that weekends

accounted for more than half of the accidents. Following a head injury as the leading cause of death in RTAs is persistent irreversible shock. A direct transfer of trauma victims to a trauma center can significantly improve the result of the trauma case. Hospitals with designated trauma centers perform better than hospitals without them in terms of patient outcomes.

According to a study done in Imphal, vehicle accidents account for the majority of blunt thoracoabdominal injuries (86.40%), followed by blunt-force assault (8%). In 12.80% of patients, there were no accompanying exterior injuries to the thoracoabdominal region. The majority of fatalities (47.2%) passed away immediately, 12.0% died within an hour, 10.4% survived for less than two hours, and only 1.6% made it for more than a week. In (48.8% of instances), hemorrhagic shock and a head injury were the most frequent causes of death, followed by hemorrhagic shock alone in (44%) of the cases. 87.20% of the cases had thoracoabdominal external injuries that were connected with them, while 12.80% of the cases had no external injuries at all.[21]

In Maharashtra, a cross-sectional hospital-based study found that vehicle-to-vehicle collisions were the cause of 61.3% of cases. More accidents occur involving two-wheelers (25.87%) than four-wheelers or trucks. Fractures made up 23.4% of all injuries, whereas 12.8% of all injuries were multiple. 9.2% of patients were sent to higher centers. Of all RTA instances, 61.7% were treated, cured, and released. When patients were discharged, 23.5% had a handicap, and there was 5.60% mortality.[22]

According to a research done in Allahabad, the majority of fatalities—83.05%—occurred on highways, with only 6 incidents occurring in lanes. Two-

wheelers were involved in 30.53% of fatalities, followed by pedestrians with 35.79% of the total. Most fatal RTA incidents were caused by large trucks. 58.52 % of instances involved light vehicles, and 21.5 % did not. The majority of the numerous visceral injuries were caused by the huge automobiles. The majority of the time, there was damage to the liver and lungs, then the brain. The most common cause of death for the victims was head trauma, followed by thoraco-abdominal trauma and head trauma. Most cases (40.21%) of deaths occurred within 24 hours, followed by spot deaths (32.42%).[23] According to the study that was conducted, young, successful men were the most frequently killed and injured in traffic accidents. The study found that the majority of RTA fatalities occurred right after or within 24 hours of the injury, which is extremely worrying. It conveys the necessity of establishing quality pre-hospital care. the creation of an advanced trauma center on a national scale. This research could assist national policymakers and planners in making decisions about health management and safety measures. Increasing public knowledge of road safety is also crucial.

Conclusion

The human species is paying a price for technical advancement, an unbalanced rise in population, and other related factors. One such cost is the increase in traffic accidents. This epidemic is getting worse every day despite the implementation of numerous strict rules pertaining to reckless and negligent driving, intoxicated driving, and the non-use of helmets and seatbelts. The worst-case scenario on the roadways is the absence of first help for the injured and the indifference of bystanders toward the victims as a result of lingering issues with the police and justice. In-built safety features in car construction, improved first aid stations along highways, and most

importantly—and something that is still lacking in our society—public awareness—all contribute to preventing such occurrences. Road accident prevention and management require immediate attention. Up until recently, it was widely accepted that human error accounts for the vast majority of accidents. However, experts now believe that it is difficult to link these faults to a specific person or entity.

References

1. Park K. Park's textbook of Preventive Medicine. Jabalpur: Banarsidas Bhanot; 2017;24: 423-30.
2. World Health Organisation. Global status report on road safety 2015.
3. Modi J. P. medical jurisprudence & toxicology. New Delhi: Lexis Nexis Butterworth; 2004; 22:424-35.
4. World Health Organization. Regional Office for South-East Asia, New Delhi. Strategic plan for injury prevention and control in South-East Asia. New Delhi. 2002.
5. Park K. Accidents and Injuries. In: Park K, editor. Park's Textbook of Preventive and Social Medicine. Jabalpur, India: M/S Banarasidas Bhanot Publishers; 2011;21:374–79.
6. Viano DC, Culver CC, Evans L, Frick M, Scott R. Involvement of older drivers in multivehicle side impact crashes. *Accid Anal Prev.*1990; 22(2): 177- 88.
7. Epstein LI, Lempke RE. Diaphragmatic injuries. *J Trauma.* 1965; 5: 19.
8. Barashkov GA, Gubar LN. Characteristics and structure of automobile injuries. *Vestn Khir.* 1978; 120(5):73-8.
9. Sharma AK. Postmortem evaluation of abdominal and pelvic trauma in Delhi. Thesis for the Degree of Doctor of Medicine (Forensic Medicine). 1986.

10. Sharma SM. Road traffic accidents in India. *Int J Adv Integrated Med Sci* 2016;1(2):57-64.
11. Tirpude BH, Naik RS, Anjankar AJ, Khajuria BK. A study of the pattern of craniocerebral injuries in road traffic accidents. *J Indian Forensic Sci* 1998;20(1):9-12.
12. Singh SK. Road traffic accidents in India: Issues & Challenges. *Transp Res Proc* 2017;25(3):4712-23.
13. Norton R, Matlin SA. The role of health research in the prevention and control of road traffic injuries in South Asia. *J Coll Physicians Surg Pak* 2004;14(12):705-6.
14. Shruthi P, Venkatesh VT, Viswakanth B, Ramesh C, Sujatha PL, Dominic IR. Analysis of fatal road traffic accidents in a metropolitan city of South India. *J Indian Acad Forensic Med* 2013;35(4):317-20.
15. Gordon and Shapiro. *Medicolegal importance of regional injuries. forensic medicine*. 2nd ed. London: Churchill Livingstone; 1975; 2:301-20.
16. Jha N, Srinivasa DK, Roy G, Jagdish S. Injury pattern among road traffic accident cases: a study from South India. *Indian J Community Med* 2003;28(2):85-90.
17. Singh H, Dhatarwal SK. Pattern and distribution of injuries in fatal road traffic accidents in Rohtak (Haryana). *J Indian Acad Forensic Med* 2004;26(1):20-3.
18. Harruff RC, Avery A, Pandya AS. Analysis of circumstances and injuries in 217 pedestrian traffic fatalities. *Accid Anal Prev* 1998;30(1):11-20.
19. Bowley D, Boffard K. Pattern of injury in motor vehicle accidents. *World Wide Wounds*. 2002.
20. Wong E, Leong MK, Anantharaman V, Raman L, Wee KP, Chao TC. Road traffic accident mortality in Singapore. *J Emerg Med* 2002;22(2):139-146
21. Meera T, Nabachandra H. A study of pattern and injury severity score in blunt thoracoabdominal trauma cases in Manipal. *Medico-Legal Update*. 2005;5(2):47-52.
22. Mudey AB, Shetty P, Dawale AK, Mudey G, Wagh V V, Goyal RC. An epidemiological study on road traffic accidents reporting in the casualty of rural teaching institute of a district in Maharashtra state of India. *International Journal of Current Research and Review*. 2010;02(6):13-20.
23. Kaul A, Sinha U S, Kapoor AK, Pathak YK, Sharma S, Singh A, Singh S. An epidemiological study of fatal road traffic accidents in Allahabad region. *Indian Internet J Forensic Med Toxicol [Internet]*. 2005;3(1).