A Study of Patterns of Thoracic Injuries in the Victims of Vehicular Incidents Brought to the GMCH Mortuary for Medicolegal Autopsies

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Abstract

The present study aims to highlight the pattern of thoracic injuries sustained by the victims of fatal road traffic accidents (RTA) brought to the GMCH Mortuary for medico legal autopsies. The study is an autopsy based observation during 1st April 2019 to 31st March 2020. In this study, incidence of thoracic injury among all cases of vehicular accident is 23.83%. A male preponderance (89%) was observed with a male-female ratio of 7.7:1. Peak incidence was observed in the age group of 21-30 years (27.24%). In all cases, thoracic injuries are associated with external or internal injuries on other parts of the body. Pleura are the most commonly involved organs in the thoracic regions. Majority of the victims were pedestrians ((36.6 %) followed by two-wheelers (31.06%). The study indicates the pattern of thoracic injuries sustained along with the trend of road traffic accidents in the region.

Keywords: *pattern, injuries, autopsy, incidence, accidents*

Introduction

As per definition, an accident is that "occurrence in a sequence of events which usually produces an unintended injury, death or property damage".[1]

During 2017 there were almost 1.19 million deaths from road accidents in the world. Persons injured in road traffic accidents occupy nearly 10-30% of beds in hospitals.[1] The outcome of a fatal road traffic accident is a severe economic loss to the community as it entails wastage of productive years of life through both disability and death and not merely a tragic loss to the bereaved family. According to study conducted by the National Transportation Planning and Research Centre, in every 4 minutes a person is killed or injured in road accidents in India.[2]

Thoracic injury directly accounts for 20-25% of deaths due to trauma and act as a contributory factor in another 25% of trauma deaths. However approximately 85% of thoracic trauma can be managed without major surgical intervention if diagnosed properly at time. From 1st April 2018 to 31st March 2019 total postmortem examination carried out in our Department was 2476 and out of that road traffic accident was 759. From 1st April 2019 to 31st March 2020 total postmortem examination carried out in our Department is 2625 and out of that road traffic accident is 986. So an increasing trend can be observed.

Materials and Method

Present study has been carried out in the Department of Forensic Medicine, Gauhati Medical College and Hospital. Autopsies that are carried out on the cases brought by the police from within the district administrative area of Kamrup of the state Assam and few referral cases from the neighbouring districts. The study period extended from 1st April 2019 to 31st

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March 2020. During this period a total number of 2625 autopsies were carried out in the department, out of these in 986 numbers of cases the death was associated with road traffic accidents. Out of these roads traffic accident victims a total of 235 cases had some kind of injury on the chest wall or the organs inside the thoracic cage, which were selected for evaluation.

Autopsies where the nature of injury could not be ascertained were excluded.

All decomposed bodies are omitted from the study.

Data were obtained regarding age and gender of the victims, time and place of accident, type of vehicle involved in the accident, the type of injuries sustained, outcome of the accident, etc., in a self-designed proforma (questionnaire). Data derived for each parameter were tabulated using the Microsoft Excel for further analysis.

Results

A total of 2625 medico-legal autopsies were performed during the one year study period of 1st April, 2019 to 31st March 2020. Out of these vehicular accident cases were 986, i.e. 37.56% of total number of cases.

Fraction of Chest injury:

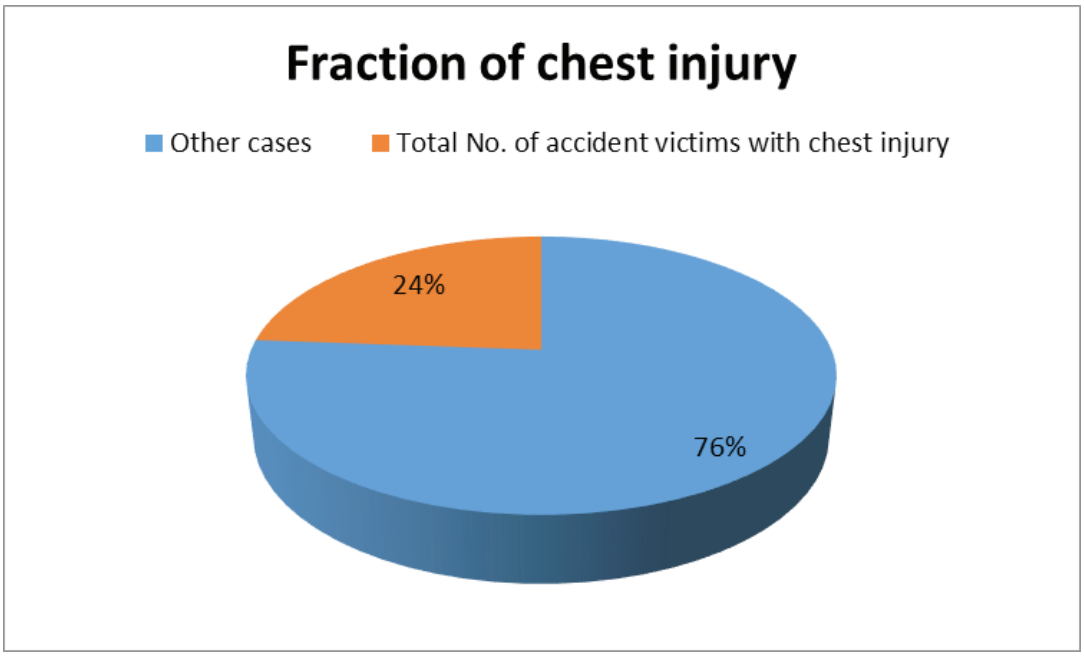

Fig no. 1: Pie-diagram showing the fraction of victims with thoracic injury among all cases of vehicular accident

Age Distribution:

In the present study, the age of the victims ranged from 5 years to 78 years. The victims were divided according to their age into 7 groups.

The peak incidence was observed in the age group of 21-30 years comprising of 64 cases (27.24%) followed by 31-40 years age group with 57 cases (24.26%).

Sex Incidence:

It is observed that among the 235 cases studied, 208 were male comprising 89% and 27 were female comprising 11%. The male to female ratio in the present study is 7.7:1.

Site of injury

In the present study most of the victims (103 or 43.83%) had injury on all regions of the body, followed by Chest+Head+Limbs (81 or 34.47%). None of the victims had injury only on chest. Along with other regions limbs are involved in most of the cases (222 or 94.47%). The incidence of injuries on different sites of

body was also analyzed on the basis of different types of victims. This is shown in the table.

Table no. 1: Distribution of injuries on different categories of victim

Place of injury	Pedestrian	2-wh rider	occupant	Driver	Bicyclist	Pillion rider	Total	Percen-tage
Only chest	0	0	0	0	0	0	0	0
Chest+Head	5	2	3	0	1	0	11	4.68
Chest+Abdomen	0	0	0	0	0	0	0	0
Chest+Limbs	3	1	2	2	2	0	9	4.6
Chest+Head+Abdomen	0	2	0	0	0	0	2	0.85
Chest+Head+Limbs	27	26	12	3	7	6	81	34.47
Chest+Abdomen+Limbs	15	10	3	1	0	0	29	12.34
All regions	36	32	16	9	3	6	102	43.4
Total	86	73	36	15	13	12	235	100

Most of the victims had injuries in all regions of the body. Most common associated injury was limb injury, in 222 cases (94.47%), followed by head injury, in 197 cases (83.83%).

Pleural injury:

In the present study laceration is the most common among the different types of injury.

Lung injury:

Lungs were injured in 122 cases (51.91%) among the total 235 cases in the present study.

Laceration is the most common injury in lung (43.41%). In most of the cases lungs are injured bilaterally.

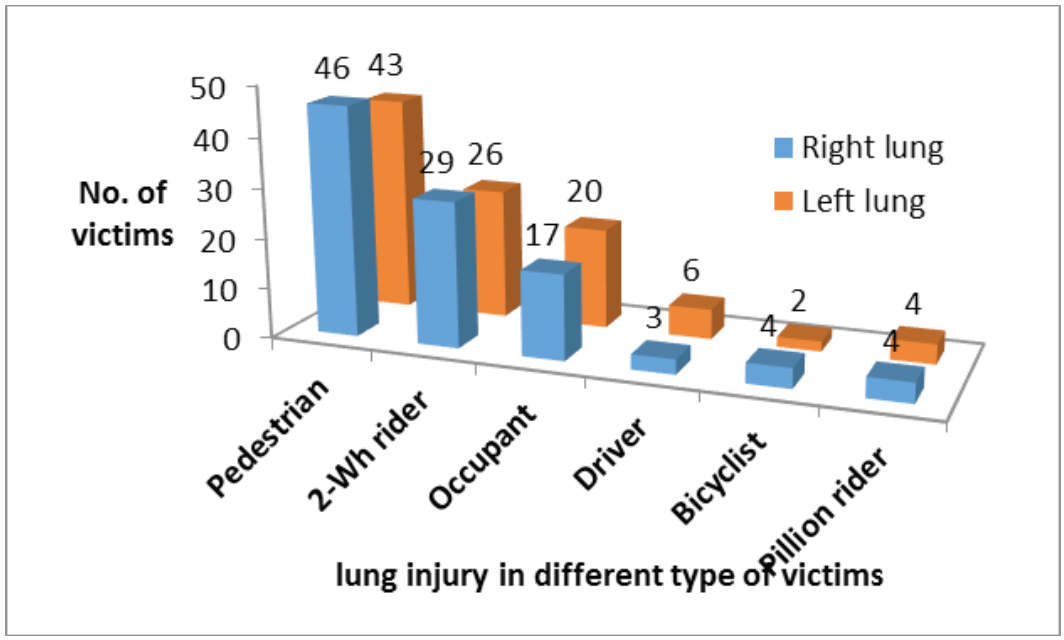

Fig no. 2: Lung injury in various categories of victims

Blood in pleural cavity:

A total of 107 cases (45.53%) had liquid and clotted blood in the pleural cavity. In four cases, cavity is empty even after presence of injury on the organs because of draining of blood in presence of laceration or crush injury.

Pericardial injury:

A total of 29 cases (12.34%) had some kind of pericardial injury. Laceration is the most common injury.

Heart:

It is observed that heart was injured in a total number of 14 cases (5.96%), on the basis of naked eye examination and histopathological examination.

From the below figure it is seen that right atrium is injured in 5.96%, right ventricle in 4.68%, Left atrium in 5.53% and left ventricle in 6.38% of all cases of thoracic injuries.

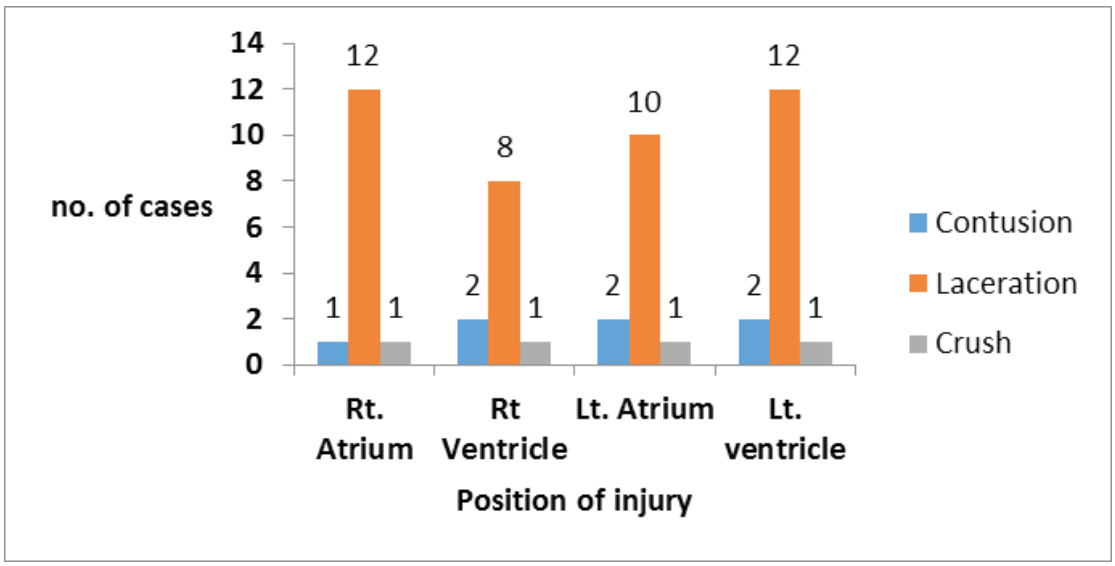

Fig no. 3: Position of cardiac injuries

Injury on ribs:

Rib fracture was present in total 139 cases (2 were crushed) comprising 59.15% of all 235 cases or 14.1% of all fatal vehicular accident cases.

Injury on vertebrae:

Fracture of vertebrae was found in five cases and crush injury was found in four cases. All of these were found to be associated with some sort of spinal cord injury as well as other visceral injury in chest.

Cause of death:

The incidence of different causes of death among the victims is given in the following table.

Table no. 2: Causes of death among the victims

Cause of death	No. of victims	Percentage
Coma	97	41.28%
Haemorrhage and shock	78	33.19%
Coma+haemorrhage and shock	22	9.36%
Instantaneous	33	14.04%
Exhaustion	2	0.85%
Spinal shock	2	0.85%
Syncope	1	0.43%
Total	235	100.00%

Coma without haemorrhage and shock is the most common cause of death (41.28%) followed by haemorrhage and shock without coma (33.19%). Death was instantaneous in 14.04% cases.

Discussion

A total of 2625 medico legal autopsies were performed during my study period of 1st April 2019 to 31st March 2020. Out of these 986 (37.56%) cases died in vehicular accidents.

This finding is almost consistent with NCRB report of 2018.[3]

Out of total 986 cases of vehicular accidents, percentage of cases having thoracic injury is 23.83%.

Epidemiological Factors

Age:

In the present study, peak incidence was observed in the age group of 21-30 years comprising of 64 (27.24%) cases. This is closely followed by age group 31-40 years witsh 57 (24.26%) cases and 41-50 years with 43 (18.31%) cases. This means that 164 (69.77 % of total) people lost their in prime of their life. Age groups 0-10 years (9 cases), 51-60 years (23 cases) and >61 years (13 cases) have less number of cases.

These findings are consistent with Bairagi K. (2005)[4], Das T.K. (2007)[5], Husain M. et al (2009)[6], Malik Y. (2010)[7], Goyal A. et al. (2014)[8], Reddy N. B. (2014)[9], Shrivastava S. R. (2014)[10], Seid M. et al. (2015)[11], Sharma S. M. (2016)[12], Singh S.K. (2017)[13],

Smith et al. (2017)[14].

The reason for the above is that young adults are the prime bread earners of the family and remain outdoors during most of the day, while persons in extremes of the age usually remain indoors whereas children are confined to the outskirts of the residential premises only.

Sex:

In the present study males comprises a majority (89%) compared to female who were only 11%. Male to female ratio is 7.7:1.

This finding is consistent with Sinha YN, Bairagi K.K. and Das K.C. (2005)[4], Das T.K. (2007)[5], Goyal A. et al. (2014)[8], Reddy N. B. (2014)[9], Shrivastava S. R. (2014)[10], Seid M. et al. (2015)[11], Sharma S. M. (2016)[12], Singh S.K. (2017)[13], Smith et al. (2017)[14].

The reason for the male majority is that men everywhere are more up and about and exposed to outdoor activities, traveling between the home and place of work, while women remain mainly indoors at the home involved in household work.

Injury

Site of injury:

In this study, incidence of chest injury among all cases of vehicular accident is 23.83%. In all the cases chest injury is associated with one or more other region injury. In majority of cases (43.83%) all regions of the body are involved. Head injury is associated with total 83.83% cases.

The incidence of chest injury is highest among the pedestrians, (in 86 cases, 36.6%). This fact tallies with the observation made by Reddy et al. (2014).[9]

Pleural injury:

In this study it is seen that laceration of pleura is more common than contusion and bilateral involvement is more common than unilateral injury. Left side involvement is more common than right side.

Lung injury:

Laceration of lung is more common than contusion and bilateral involvement is more common than unilateral injury. Right side involvement is more common than left side. In two case lungs are crushed.

Again lung involvement is most common in pillion riders.

Heart injury:

Heart was injured in a total number of 14 cases (5.96%), on the basis of naked eye examination and histopathological examination. Laceration is more common than contusion. In one case heart is lacerated. Among the chambers right atrium is most commonly involved (5.96%).

Among the different types of victims, heart is most commonly involved in pillion rider (16.67%).

These finding are almost consistent with Reddy et al. (2014)[9] and El-Menyar (2016)[15].

In all case of laceration of heart death was instantaneous.

Trachea was involved in 7 (2.98%) cases. It is one of the organ which are less likely to be injured in vehicular accident cases.

Ribs:

Rib fracture was present in total 139 cases (2 were crushed) comprising 59.15% of all 235 cases or 14.1% of all fatal vehicular accident cases.

In majority of cases (48.2%) ribs are fractured bilaterally.

This finding is almost consistent with Reddy et al. (2014)[9].

Vertebrae:

Fracture of vertebrae was found in five cases and crush injury was found in four cases. All of these were found to be associated with some sort of spinal cord injury as well as other visceral injury in chest.

Crush injury:

Crush injury is found to be most common on head (15.74%).

Cause of death:

In this study coma without haemorrhage and shock is the most common cause of death (41.28%) followed by haemorrhage and shock without coma (33.19%). Death was instantaneous in 14.04% cases.

Fatal chest injury leads to haemorrhage and shock and thereby death in majority of cases which are consistent with finding of Gushinge and Kadu (2017)[16].

Among pedestrian Haemorrhage and shock without coma is the most common cause of death and in 2 wheeler rider coma without haemorrhage and shock is the most common cause of death

Conclusion

Vehicular accidents continue to be a growing menace, incurring heavy loss of valuable life and man-power along with a corresponding drain of precious resources.

Primarily three factors comprise road safety - infrastructure (roadways), vehicle design and human behaviour. So it is necessary to improve the condition of traffic by improving road and by proper implementation of traffic laws. To reduce the harm done when crashes occur, seat belt for all vehicular occupants and use of helmet for both riders of two wheeler should be enforced. Children should sit in rear seats only. Air bag should be mandatory in all vehicles.

To prevent the loss of life due to injuries to the vital organs (to reduce post crash harm) it is necessary to have good emergency communication and transportation.

Stress and strains of busy life of modern days has a deleterious effect on the power of mental concentration which is very much essential in driving. Banning of mobile phone while driving should be strictly implemented. Since the heavy moving vehicles are responsible for majority of deaths, it is of immense value to periodically screen the drivers to check their physical and psychological efficiency.

The use of alcohol measuring gadgets may decrease the use of alcohol during driving.

So, it is clear that multidisciplinary approach is required to prevent deaths and disabilities resulting from road traffic accidents.

Funding: None

Conflict of Interest: There are no conflicts of interest

Ethical Clearance: Obtained

References

1. Park K. Accidents and injuries. 21st ed. Jabalpur. Banarsidas Bhanot. 2011. p. 374-9.
2. Subrahmanyam B.V. Modi's Medical Jurisprudence & Toxicology. 22nd ed. New Delhi. Butterworths. 1999. p. 393-402.
3. Accidental deaths and suicides in India [Internet]. Ncrb.gov.in. 2018 [cited April 4 2020]. Available from: http://www.ncrb.gov.in/StatPublications/ADSI/PrevPublications.htm
4. Singh YN., Bairagi KK. and Das KC. An epidemiological study of road traffic accident victims in medicolegal autopsies. Journal of Indian Academy of Forensic Medicine. 2005;27(3). p.166-169
5. Das T.K. A study of pattern of pelvic injuries in road traffic accidents in medicolegal autopsy (Thesis submitted to Gauhati Universityfor Degree of Doctor of Medicine of Forensic Medicine). 2007
6. Husain M., Haroon A. and Abbas M. A Study in minutiae of Road Traffic Accidents and associated mortality within 72 hours of hospitalization. Journal of Indian Academy of Forensic Medicine. 2009/July-September;31(3). 189-195
7. Malik Y. A study of head injury in medicolegal autopsy (Thesis submitted to Gauhati University for Degree of Doctor of Medicine of Forensic Medicine). 2010.
8. Goyal A, Oberoi SS, Agarwal KK, Aggarwal AD. Pattern of Injuries Cases in the mortuary in the year 2011-2014 in Rajindra Hospital Patiala. J Punjab Acad Forensic Med Toxicol. 2014;14(2):105-7.
9. Reddy NB, Hanumantha null, Madithati P, Reddy NN, Reddy CS. An epidemiological study on pattern of thoraco-abdominal injuries sustained in fatal road traffic accidents of Bangalore: Autopsy-based study. J Emerg Trauma Shock. 2014 Apr;7(2):116–20.
10. Shrivastava SR, Pandian P, Shrivastava PS. J

Neurosci Rural Pract. 2014 Nov;5(Suppl 1):S33-8. doi: 10.4103/0976-3147.145198.

11. Seid M, Azazh A, Enquselassie F, Yisma E. BMC Emerg Med. 2015 May 20;15:10. doi: 10.1186/s12873-015-0035-4.
12. Sharma SM. Road Traffic Accidents in India. Int J Adv Med Sci.2016;1(2):57-64
13. Singh SK. Road Traffic Accidents in India: Issues and Challenges. Transportation Research Procedia. 2017;25:4708–19.
14. Smith A, Smith H. Perceptions of risk factors for road traffic accidents. Advances in Social Sciences Research Journal [Internet]. 2017 Jan 25 [cited 2018 Jun 21];4(1). Available from: http://www.scholarpublishing.org/index.php/ASSRJ/article/view/2616
15. El-Menyar A, Abdelrahman H, Al-Hassani A, Ellabib M, Asim M, Zarour A, et al. Clinical Presentation and Time-Based Mortality in Patients With Chest Injuries Associated With Road Traffic Accidents. Arch Trauma Res. 2016 Mar;5(1):e31888.
16. Gushinge M, Kadu S. International Journal of Education and Research in Health Sciences, April-June 2017;3(2):90-92