



FACTORS AFFECTING OUTCOME AMONG PATIENTS WITH ABDOMINAL TRAUMA: REPORT FROM A TERTIARY CARE CENTRE OF BIHAR

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ABSTRACT **Introduction:** India is the leading country in the number of deaths due to Road Traffic Accidents. Abdomen is the third most common injured region requiring surgery. To combat this problem, it is know contributing risk factors, so that public awareness problems on ways to prevent incidence of such fatality may be implemented with fruitful outcome. With this background, a study was planned to focus on factors influencing outcome among such patients. The study results will help in early identification of negative determinants and reduce the mortality. **Methodology:** An epidemiological study was conducted by Department of General Surgery of Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar. The study included all the patients who were admitted in the surgical wards of the hospital with abdominal trauma during the time period of 1 year, that was from January 2021 to December 2022. Prior ethical clearance was obtained from Institutional Ethical Committee. **Results:** A total of 142 patients were included in the current study. The mean age of the patients was 37.3 years with a SD of 11.4 years. There was a male preponderance. Majority (71.1%) were blunt trauma with RTA being the most common cause of trauma. The spleen (22.5%) followed by liver (11.9%) was the most commonly affected solid organ, and the most commonly affected hallow viscous was the small intestine (32.3%), ileum in blunt injury and jejunum in penetrating injury. Post-operative complications were noted among 69 patients that constitutes to 48.6% of the total study population. 16 out of 142 patients died. Mortality was significantly higher among patients who were brought to the hospital after 12 hrs and those who had severe NISS score while admission. **Conclusion:** Abdominal trauma is a not uncommon in casualty in multiple trauma patients. As most common cause of this trauma is RTA, it is the need of the hour to strengthen traffic rules to minimize such injuries.

KEYWORDS : Abdominal trauma, Road traffic accident, Blunt injury

Introduction:

Use of physical force in any form like Road Traffic Accidents (RTAs) or assault, many a times lead to medical problems for the individual, this aspect of medicine is dealt under the broad heading, trauma. It is the leading cause of death and disability globally especially in developing countries. Moreover, it attributes to majority of the mortality under 45 years of age. [1, 2] As this is the working population, it indirectly hampers the growth and development of nation at large. Incidence of such life-threatening trauma has seen a dramatic increase over the few decades as the world is going through major urbanization, motorization and industrialization. India, being a developing country, is also experiencing such changes and hence trauma has attracted the focus of the medical professionals. In this context, it is noteworthy that RTAs have become the most important public hazard, resulting in one of the largest threats against human lives and safety. [1, 3, 4] India is the leading country in the number of deaths due to RTAs. [2, 5-7]

Abdomen is the third most common injured region with injuries requiring surgery in about 25% of civilian trauma victims, due to minimal bony protection. [8, 9] India is encountering a major increase in cases of trauma, as discussed and hence and hence abdominal trauma in particular has been increasing at an alarming rate. [9] Abdominal trauma has been broadly classified as either blunt or penetrating. [10] It has been experienced that blunt abdominal trauma mostly comes from rural part of the country, while penetrating ones are mostly seen with RTAs coming from urban settings. [11] Blunt trauma are more fatal as their diagnosis are sometimes obscured in the absence of any visible injury. [12] Most common cause of blunt abdominal trauma are RTAs. [13]

To combat this problem, it is inevitable to study in details the risk factors contributing to RTA and specifically abdominal trauma. Then only public awareness problems on ways to prevent and bring down incidence of such fatality may be implemented with fruitful outcome. Researchers across the country have worked in this field and have identified a number of risk factors, including presence of warning signs, the length of the interval between abdominal injury and surgery, shock at the time of admission, presence of chronic disease, and haemoglobin level in addition to age. [10, 14-18] With this background, a study was planned to study the abdominal injury patients attending a tertiary care centre of Bihar. The study focuses on

factors influencing outcome among such patients. The study results will help in early identification of negative determinants and reduce the mortality. To the best of our knowledge, this is the one of the pioneer study in this institute.

Methodology

An epidemiological study was conducted by Department of General Surgery of Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar. The study included all the patients who were admitted in the surgical wards of the hospital with abdominal trauma during the time period of 1 year, that was from January 2021 to December 2022. Prior ethical clearance was obtained from Institutional Ethical Committee. Patients with other injuries were excluded from this study. Duly signed informed consent forms were obtained from the patients or their next of kin. Patients who refused to consent for participation were also excluded from the study. In this way, a total of 142 cases were included in the study.

An analysis of all emergency procedures with special attention to their morbidity rates on an average was undertaken. Particulars of the patient with regard to age, sex, clinical features, operative details and postoperative outcome were noted down. Severity was assessed using National Injury Severity Score (NISS) into mild, moderate and severe. From these data critical evaluation was made regarding diagnosis, choice of operative procedure and prognostic indices. Clinical examination, X- ray findings, CT findings and lab investigations were emphasized with regard to diagnosis and prognosis.

Analysis was done using SPSS v20 and analysed for frequencies, mean, SD, chi square test and multiple logistic regression. Significance was considered at p value <0.05.

Results

A total of 142 patients were included in the current study. The mean age of the patients who participated in the study was 37.3 years with a SD of 11.4 years (range 11-69 years). There was a male preponderance noted with a male to female ratio of 3.89. The most common age group was 31-45 years.

Out of total 142 injuries, majority (71.1%) were blunt trauma. Table 1 showing age wise distribution of both blunt and penetrating trauma. It can be inferred from the table that penetrating injury had maximum proportion among injuries sustained by patients in the age group of 15-

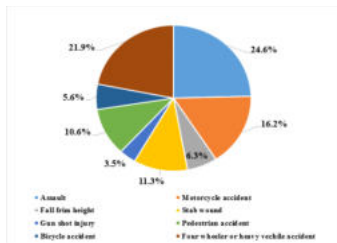
30 years. This was age group were most of the injuries were inflicted by some form of assault. The pediatric patients in this study had blunt trauma, none of the patient had penetrating injury.

Table 1: Age distribution of participants based on their mode of injury

Age (Years)	Mode of injury		Total number (%)
	Blunt trauma	Penetrating trauma	
<15 yrs	4 (100%)	0	4 (2.8%)
15-30	16 (59.3%)	11 (40.7%)	27 (19.1%)
31-45	43 (69.4%)	19 (30.6%)	62 (43.7%)
46-60	29 (76.3%)	9 (23.7%)	38 (26.8%)
> 60	8 (72.7%)	3 (27.3%)	11 (7.6%)
Total	101 (71.1%)	41 (28.9%)	142 (100%)

The history of the patients noted down in their bed head tickets were scrutinized for their causes pertaining to injury sustained. It was noted that overall the most common cause of injury was RTAs. This category included four wheeler, two wheeler accidents along with accidents on roads involving pedestrians. Single most common cause of injury was assault and least common cause being gun shot injury. (Figure 1)

Figure 1: Pie diagram showing distribution of cases based on cause of injury



The spleen (22.5%) followed by liver (11.9%) was the most commonly affected solid organ, and the most commonly affected hollow viscous was the small intestine (32.3%), ileum in blunt injury and jejunum in penetrating injury. Other injured organs included mesentery, parts of large intestine etc.

Various procedures had been performed on the patients based on the requirement of the patients and judgement of the treating surgeon. As most of the patients presented with peritonitis following gut perforation, closure of the perforation was the most commonly performed surgery for such patients. In cases where closure of perforation was not possible, resection anastomosis was done. Splenectomy had to be performed on almost all cases who sustained spleen injury.

Post-operative complications were reported by patients either during the post-operative stay or follow up visits. It was noted among 69 patients that constitutes to 48.6% of the total study population. Multiple complications were reported by 25 patients. Most common single complication complained was surgical site infections, that treated with oral or parental antibiotics, followed by hypovolumic shock. These infections lead to wound dehiscence among 7 out of 44 cases with infections at the site of incision. (Table 2)

Table 2: Post-operative complications reported by patients[#]

Post op complications	Number of patients
Surgical site infection	44 (30.9%)
Hypovolemic shock	35 (24.6%)
Urinary tract infection	31 (21.8%)
Paralytic ileus	25 (17.6%)
Enterocutaneous fistula	13 (9.2%)
Intra abdominal abscess	9 (6.3%)
Wound dehiscence	7 (4.9%)

multiple response table

Outcome was assessed in form of death or survival. Out of 142 patients reporting with abdominal injury in any form, 16 patients could not survive. Hence, a mortality rate was calculated to be 11.3%. It is noteworthy that 11 out of 16 deceased patients passed away on day 0 of admission. The cause of death was ascertained to be hypovolumic

shock. Among rest 5 patients, 3 expired due to ARDS (Acute Respiratory Distress Syndrome) within 3 days of admission and remaining 2 patients died after 3 days pertaining to MI (Myocardial infarction).

Mean hospital stay was 6.3 ± 3.1 days. It ranged from 1 to 17 days. Majority (57.8%) were discharged from the hospital within a week. Time of admission signifies the time interval between injury and point of time when the patient report the injury to the hospital either in the casualty or the Out Patient Department. It is an important factor that can alter the individual's prognosis. Logistic regression was done to find association of various studied factors with the outcome. Result has been depicted in form of Odds ratio and p value in table 3. It is evident that mortality was significantly higher among patients who were brought to the hospital after 12 hrs and those who had severe NISS score while admission.

Table 3: Univariate logistic regression to find out association of outcome of abdominal trauma patients with the various factors that were envisaged in the current study

Variable	Death	Total	Odds Ratio (95% CI)	P value
Age				
≤ 37.3 years	4	68	1	
> 37.3 years	12	74	2.5 (0.6-11.40)	> 0.05
Sex				
Males	13	113	1	
Females	3	29	0.9 (0.3-7.8)	> 0.05
Type of injury				
Blunt	10	101	1	
Penetrating	6	41	0.8 (0.2-8.0)	> 0.05
Time to admission				
Within 12 hours of injury	2	83	1	
After 12 hours of injury	14	59	3.4 (1.2-7.3)	0.03
NISS score				
Mild	0	27	1	
Moderate	3	31	2.8 (0.3-9.8)	
Severe	13	84	17.3 (3.7-21.3)	0.004
Duration of stay in hospital				
≤ 7 days	8	82	1	
> 7 days	2	60	2.5 (0.2-5.5)	> 0.05

Discussion

In the surgical wards, trauma constitutes a major share of cases globally. Moreover, this still contributes to significant amount of morbidity and mortality among the study population. [19] Trauma most commonly affects head followed by extremities. The abdomen is the third most frequent injured region especially, when the mode of injury is blunt trauma. [20, 21]. In this context, the foremost concern is early and rapid diagnosis to facilitate treatment so as to reduce mortality. Hence, intra-abdominal organ injury must and always be considered as top priority in health set ups as these are usually associated with such injuries. Many a times, blunt abdominal trauma later gets complicated as multisystem trauma. Among various other contributing factors, hypovolemic shock and septic shock or peritonitis developed due to hollow organ injury are the major causes of morbidity and mortality among such patients. [20, 22, 23] This study also tried to generate evidence for factors affecting the mortality among patients reporting with intra-abdominal injury and underwent some sort of surgical intervention in the concerned hospital.

The mean age of the patients in this study was 37.3 with a SD of 11.4 years. Th age of the sample population ranged from 11-69 years. Majority of the patients were in the age group of 31-45 years. There was a male preponderance. The gender distribution of the study population was in agreement with many other previous researchers. [24-27] But the age distribution vary slightly as many reported 2nd and 3rd decades of life to be the most common affected age. [24-28] The reason for this group being most affected is that this is the economically most active age of the society and hence are more involved in outdoor activities as well as many high risk activities.

Majority of the patients in our study sustained blunt abdominal trauma.

While many researchers support this finding with more than three-quarter of patients having blunt trauma [29, 30], many have reported more incidence of penetrating abdominal injury. [24, 31, 32] This finding may be as blunt trauma mostly involves cases involved in road traffic accidents; that goes hand in hand with the increased motorization of our India and state as well. Hence, RTA was the most common cause of abdominal trauma overall. RTA have been held responsible for most cases by many previous studies. [25-27]

The spleen was the most commonly injured organ, followed by bowels, in blunt abdominal injury. Repair of the bowels was the most common means of treatment, followed by the Splenectomy. The gastrointestinal tract is commonly injured in penetrating abdominal injuries. These findings are similar to those of other studies. [33, 34] Same researchers have reported a lesser incidence of post-operative complications in their studies as compared to that we have come across. [33-37] But at the same time most common complication reported by these studies was invariably same as our study. This finding has an effect on the final outcomes of these patients in our study.

The main objective of the study to find factors affecting the outcome of patients coming with abdominal trauma. Outcome was reported in form of mortality. The current study reports a mortality rate of 11.3%. There are studies where mortality rate is even higher than this [38, 39] and at the same time, there are studies with better outcome too. [40, 41] We found that factors that significantly affect the outcome were the delayed arrival to the health center as it highly contributes to the morbidity and mortality of trauma patients. [42, 43] This may cause a delay in the initiation of definitive care and thus lead to complications for patients. Also the patients with higher NISS had worse outcome. This finding is supported by the study done by Shilanaiman et al. [43]

Limitations

The exclusion of patients not consented to participate, patients who were managed conservatively, and the patients who left against medical advice along with those who referred to other health facilities or other departments for treatment may have led to selective bias in this study. Further study to overcome these shortcomings and with larger population size is needed to generate stronger evidence that will help policy makers to combat ways to spread awareness among the general population on ways to prevent such injuries.

Conclusion

Abdominal trauma is a not uncommon in casualty in multiple trauma patients. As most common cause of this trauma is RTA, it is the need of the hour to strengthen traffic rules to minimize such injuries. Relevant injury prevention programs and stringent road traffic regulations would likely to minimize the occurrence and outcomes of abdominal trauma. Furthermore, larger multicentre studies are needed to evaluate the trauma care capability of health care facilities in our region and the impact of trauma to our population. We recommend early and easy availability of ambulance and bedside imaging for trauma patients to avoid longer waiting times for operations.

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REFERENCES

- Aubakirova A, Kossumov A, Iggisinov N. Road traffic accidents in Kazakhstan [J]. Iran J Public Health 2013; 42:231-9.
- Ameratunga S, Hajar M, Norton R. Road-traffic injuries: Confronting disparities to address a global-health problem. *Lancet*. 2006; 367:1533-40.
- Nantulya VM, Reich MR. The neglected epidemic: Road traffic injuries in developing countries. *BMJ*. 2002; 324:1139-41.
- Museru LM, Leshabari MT, Grob U, Lisokotola LNM. The pattern of injuries seen in patients in the orthopedic/trauma wards of Muhimbili Medical Centre. *East and Central African Journal of Surgery*, 1998; 4:15-21.
- Killer Roads. *The Hindu*. May 23, 2011. Available from: <http://www.thehindu.com/opinion/editorial/article2042983.ece> Last assessed in March 2022.
- Accidental Deaths and Suicides in India – 2010. National Crime Records Bureau. Ministry of Home Affairs. Government of India. Available from: <http://www.ncrb.nic.in/ADSI2010/ADSI2010-full-report.pdf> . Last assessed in December 2020.
- Road accidents in India 2016. Transport research wing Government of India ministry of road transport & highways <http://www.indiaenvironmentportal.org.in/> Last assessed in December 2020.
- Peden M, Scurfield R, Sleet D, et al. World report on road traffic injury prevention [R]. Geneva: World Health Organization, 2004:1-280.
- Adesanya AA, Afolabi JR, da Rocha – Afodu JT. Civilian Abdominal Gunshot Wounds in Lagos. *J R Coll Surg Edinb*. 1998; 43(4): 230-234.
- Aldemir M., Taçyıldız I., Girgin S. Predicting factors for mortality in the penetrating abdominal trauma. *Acta Chirurgica Belgica*. 2004; 104:429-34.
- Hemmila MR, Wahl WL. Management of the injured patients In: Doherty G Meditor Current surgical diagnosis and treatment. New York: Mc Graw-Hill Medical, 2008: 227-228.
- Jansen JO, Yule SR, Loudon MA. Investigation of blunt abdominal trauma. *BMJ* 2008; 336:938-942.
- Al-Qahtani, M.S. The pattern and management outcomes of splenic injuries in the Assir region of Saudi Arabia. *West African Journal of Medicine*. 2004; 23:1-6.
- Mehta R K, Rai S, Mehta R. Epidemiological study on road traffic accident cases reporting to a tertiary care government hospital. *Int J Multidiscip Res Develop*. 2015;2: 539-543.
- Urfi M H, Khan S, et al. Epidemiology of road traffic accidents in Western Uttar Pradesh, India. *Ann Res Rev Biol*. 2014; 4:412-422.
- Kahn P S, Hussain R.A. An epidemiological study of road traffic accident cases attending a tertiary care hospital, Tirupati. *Int Org Sci Res- J Dent Med Sci (IOSR-JDMS)*. 2015; 13:38-43.
- Roy R, Chaturvedi M, Katiyar K, et al. Epidemiological study of road traffic accident cases in greater Noida: hospital based study. *Indian J Community Health*. 2014; 26:249-253.
- Aldemir M, Taçyıldız I, Girgin S. Predicting factors for mortality in the penetrating abdominal trauma. *Acta Chir Belg* 2004; 104 (4):429-434.
- Abbas, S.M., Upadhyay, V. Hollow viscus injury in children: Starship Hospital experience. *World Journal of Emergency Surgery*, 2007; 1186:1749-7922.
- Ertekin C, Taviloğlu K, Güloğlu R, Kurtuluş M. Solid organ yaralanmalarında konservatif tedavi,” in *Travma*. pp. 886-894, İstanbul Medikal Yayıncılık. 2005.
- Mattox K L, Feliciano D V, Moore Davis E E. History in Trauma. 4th Eds. Pp 319. McGraw Hill, New York, NY, USA, 2000.
- Baş K K, Künt Batın Travması Sonucu Gelişen Solid Organ Yaralanmalarına Güncel Yaklaşım, *Uzmanlık Tezi*, İstanbul, Turkey, 2005.
- Trunkey D D, Lewis L R. Injury prevention in Current Therapy of Trauma. 4th Eds. vol. 144, pp. 667-683. Mosby, St. Louis, Mo, USA. 1990.
- Edino, S.T. (2003) Pattern of abdominal injuries in Aminu Kano Teaching Hospital, Kano. *Nigerian Postgraduate Medical Journal*, 2003; 10:56-59.
- Chalya, P.L., Mabula, J.B., Giiti, G., Chandika, B.A., Dass, R.M., Mchembe, M.D., Gilyoma, J.M. Splenic injury at Bugando Medical Center in northwestern Tanzania: A tertiary hospital experience. *BMC Research notes*, 2012; 5:59.
- Chalya, P.L., Mabula, J.B., Dass, R.M., Mbelenge, N., Ngayomela, I.H., Chandika, A.B., Gilyoma, J.M. Injury characteristics and outcome of road traffic crash victims at Bugando Medical Centre in North western Tanzania. *Journal of Trauma Management & Outcomes*, 2012; 6:1.
- Chalya, P.L., Mabula, J.B., Ngayomela, I.H., Kanumba, E.S., Chandika, A.B., Giiti, G., Mawala, B., Balumuka, D.D. Motorcycle injuries as an emerging public health problem in Mwanza City, north-western Tanzania. *Tanzania Journal of Health Research*, 2010; 12:214-221.
- Pandey VK, Shahi HP, Singh R, Pratap P. A prospective study of injury pattern and outcome of blunt trauma abdomen patients in a tertiary care hospital in eastern part of India. *Int Surg J* 2020; 7:2557-62.
- Haan, J., Kole, K. & Brunetti, A. Nontherapeutic laparotomies revisited. *American Journal of Surgery*, 2003;69:562-565
- Udojop, U.W. & Iwatt, A.R. Abdominal trauma in South-Eastern Nigeria. *Central African Journal of Medicine*, 1991; 37:409-415.
- Ismail, A.E., Suleiman, H.S. & Ahmed, M.E. Abdominal trauma in Khartoum. *Sudan Medical Journal*, 1991; 9:75-77.
- Musau, P., Jani, P.G. & Owillah, F.A. Pattern and outcome of abdominal injuries at Kenyatta National Hospital, Nairobi. *East African Medical Journal*, 2006; 83:37-43.
- Salami BA, Tade AO. Abdominal injuries in Olabisi Onabanjo University teaching hospital Sagamu, Nigeria: pattern and outcome. *Niger J Orthop Trauma*. 2006; 5(2):45-9.
- Suthar KD, Mewada BN. Abdominal injuries: an experience of 87 cases. *J Int Med Res*. 2012; 1:1-8.
- Jolly S, Upadhyay M, Jam BL. Blunt abdominal trauma. A clinical study of 100 cases. *Indian J Surg*. 1993;55:290-3.
- Davis JJ, Cohn J Jr, Nance FC. Diagnosis and management of blunt abdominal trauma. *Ann Surg*. 1976;183:672-8.
- Maske AN, Deshmukh SN. Traumatic abdominal injuries: our experience at rural tertiary care center. *Int Surg J*. 2016;3:543-8.
- Howes N, Walker T, Allorto NL, Oosthuizen GV, Clarke DL. Laparotomy for blunt abdominal trauma in a civilian trauma service. *S Afr J Surg*. 2012;50:30-2.
- Musau P, Jani PG, Owillah FA. Pattern and outcome of abdominal injuries at Kenyatta National Hospital, Nairobi. *East Afr Med J*. 2006;83:37-43.
- Arumugam S, Al-Hassani A, El-Meyner A, Abdelrahman H, Parchani A, Peralta R, Zarour A, Al-Thani H. Frequency, causes and pattern of abdominal trauma: A 4-year descriptive analysis. *J Emerg Trauma Shock*. 2015; 8(4):193-198.
- Kumar A, Kumar S, Kumar B. A study of patients with abdominal trauma in a tertiary care centre with special emphasis on factors influencing outcomes. *Int J Health Clinical research*. 2021; 22(4).
- Hardcastle TC, Oosthuizen G, Clarke D, Lutge E. Trauma, a preventable burden of disease in South Africa: review of the evidence, with a focus on KwaZulu-Natal. *S Afr Health Rev*. 2016; 1:179-89.
- Shilanaiman Hilary Ntundu, Ayesiga M, Herman, Alfred Kishe, Heri Babu, Ola F. Jahanpour, David Msuya, et al. Patterns and outcomes of patients with abdominal trauma on operative management from northern Tanzania: a prospective single centre observational study. *BMC Surgery*, 2019; 19:69.