

**Original Article****Study of Pattern and Management of Abdominal Trauma Patients at a University Hospital of Nepal****Bikesh Shrestha<sup>1</sup>, Rajan Koju<sup>1</sup>, Kritika Shrestha<sup>2</sup>, Yagya Ratna Shakya<sup>1</sup>, Robin Man Karmacharya<sup>1</sup>**<sup>1</sup>Department of Surgery, <sup>2</sup>Research and Development Division, Dhulikhel Hospital, Kathmandu University Hospital, Kathmandu University School of Medical Sciences, Dhulikhel, Kavre, NepalArticle Received: 25<sup>th</sup> March, 2024; Accepted: 15<sup>th</sup> May, 2024; Published: 30<sup>th</sup> June, 2024**DOI: <https://doi.org/10.3126/jonmc.v13i1.68014>****Abstract****Background**

Injury related death is a leading cause of death globally. Abdominal injuries may occur in up to one third of patients with trauma. Road traffic accidents have become the commonest mechanism of trauma.

**Materials and Methods**

This was a hospital based retrospective descriptive study conducted at Dhulikhel Hospital-Kathmandu University Hospital. Patients admitted with abdominal trauma from July 2021 to December 2023 were included in this study.


**Results**

This study included 60 patients with abdominal trauma. Mean age of patients was 35.60 ± 15.81 (10-76) years. Majority of patients belonged to age group 21-40 years (n=32, 53.3%) with male predominance (Male:female ratio=3.6:1). Blunt abdominal trauma (n=58, 96.7%) was more common than penetrating abdominal trauma (n=2, 3.3%). Road traffic accident (n=31, 51.7%), fall from height (n=22, 36.7%) and physical assaults (n=7, 11.7%) were the mechanisms of injury. In our study, commonly injured organs were spleen(n=19, 30.64%), liver(n=15, 24.19%) and small bowel(n=14, 22.58%). Among the patients with penetrating abdominal trauma, one patient had rectal injury and next patient had stab injury with protruding omentum through the wound. Thirty four patients (56.7%) were managed conservatively and 26 patients (43.3%) underwent operative management. The mortality rate was 8.33% (n=5) of which 4 (80%) had undergone operative management and 1 (20%) was being managed conservatively.

**Conclusion**

Majority of patients with solid organ injury can be managed conservatively while hollow viscus injury undergoes operative treatment. Physically active male population is the most affected group. Road traffic accidents are the leading cause of abdominal trauma followed by fall from height and physical assaults.

**Keywords:** *Abdominal injuries, Accidents, Liver, Retrospective study, Spleen*

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## Introduction

Abdomen is the third most common region to be affected in trauma. Abdominal cavity is vulnerable to injury since there is minimal bony protection for underlying organs [1]. Global burden of injury estimate published by the World Health Organization (WHO) ranks injury as one of the top ten leading causes of death with an estimated 5 million deaths annually [2]. Among different causes of injury, road traffic accidents (RTA) is a major cause leading to death of approximately 1.19 million people every year. RTA is a major cause of death for children and youths aged 5-29 years [3]. In Nepal, injuries related death is the third most common cause of death accounting to 7.8% of total deaths [4].

The etiological spectrum and mechanism of injury of abdominal trauma including penetrating and blunt abdominal trauma vary from one part of world to another [5]. Common mechanisms for blunt abdominal trauma are road traffic accidents, fall from height, physical assault etc [6]. As compared to penetrating abdominal trauma diagnosis of blunt trauma is more difficult as clinical findings are usually not reliable. Ultrasonography and CT scan are vital imaging techniques to diagnose the organ injury in any abdominal trauma [7, 8]. The spleen, liver and kidney are the most commonly injured organs as a result of blunt trauma [10]. Treatment strategy either operative or conservative, mainly depends on clinical evaluation and grade of injury, hemodynamic states of patient and presence or absence of pneumoperitoneum.

This retrospective study was carried out to find out different causes of abdominal trauma, major organs involved, their management and outcome of the patients.

## Materials and Methods

This was a Hospital based retrospective descriptive study conducted at Department of Surgery, Dhulikhel Hospital-Kathmandu University Hospital. Ethical approval to carry out the study was obtained from the Institutional Review Committee of Kathmandu University School of Medical Sciences. The data of the patients were retrieved from hospital discharge summary and patient records maintained at medical record section of our hospital. All patients who were managed with the diagnosis of abdominal trauma from July 2021 to December 2023 were included in the study. Patients who left against medical advice and those patients who were referred to other centers were excluded from the study. The diagnosis of abdominal trauma was based on

history, clinical examination findings supported with radiological findings. All the patients were managed by the same team of surgeons following standard protocol. Patients with solid organ injury who were hemodynamically stable were subjected to non operative management with close observation while patients with hollow viscus injury and solid organ injury with hemodynamic instability were subjected to operative management. Patients were admitted to postoperative ward, high dependency unit or intensive care unit as per the severity of injury and need of level of care. Necessary data including patient demography, mechanism of injury, organs injured, management including operative and non-operative approach and final outcome of patients were collected by filling up the questionnaire. SPSS 20.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Frequency analysis was performed for scalar and ordinal variables. For nominal variables, descriptive analysis was performed with calculation of mean, range, standard deviation.

## Results

This study included 60 patients admitted with the diagnosis of abdominal trauma during the study period. In this study, 47 patients were male and 13 patients were female with male: female ratio 3.6:1. Mean age of the patients was  $35.60 \pm 15.81$  years (Range 10-76 years). The average age of male patients was  $34.32 \pm 14.88$  years (Range 10-68 years) and female patients were  $40.23 \pm 18.75$  years (Range 14-76 years). Difference between the mean age among male and female patients was not statistically significant ( $p$  value  $> 0.05$ ). Figure 1 shows the distribution of patients according to different age groups. The most vulnerable age group in this study was 21-40 years (53.3%) followed by 41-60 years (26.7%).

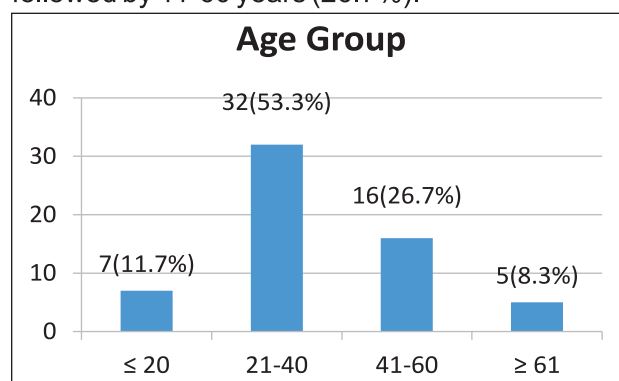


Figure 1: Distribution of Patients according to Age Group (n=60).

Among 60 patients, 58 (96.7%) had blunt abdominal trauma whereas 2 patients (3.3%) had



penetrating abdominal injury. Regarding the patients with penetrating trauma, one patient had rectal injury and next patient had stab injury with protrusion of omentum through the wound. Both patients underwent operative management.

**Table 1: Distribution of patients according to mechanism of injury (n=60).**

Mechanism of Injury	No. of patients	Percentage
Road Traffic Accidents(RTA)	31	51.7
Fall from height	22	36.7
Physical assault	7	11.7
Total	60	100

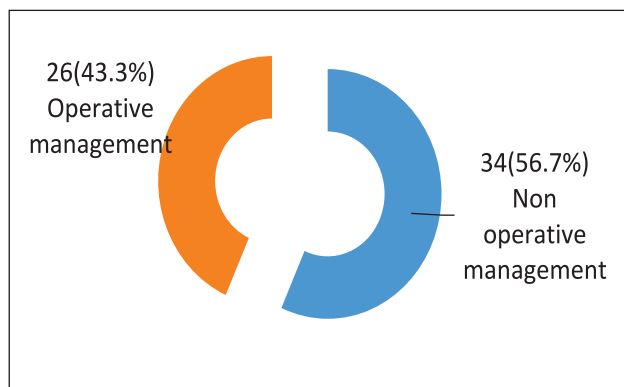
Road Traffic Accidents (RTA) was the most common mechanism of abdominal injury contributing to 51.7% of the cases in our study followed by fall from height (36.7%) and physical assaults (11.7%). (Table 1)

**Table 2: Abdominal Organs Injured**

Hollow viscus injured	No. of patients (%)	Solid Organs Injured	No. of patients (%)	Soft tissue injured	No. of patients (%)
Small Bowel	14(22.58)	Spleen	19(30.64)	Mesentery	1(1.6)
Large Bowel	1(1.6)	Liver	15(24.19)	Diaphragm	1(1.6)
Urinary Bladder	2(3.2)	Kidney	7(11.3)	Omentum	1(1.6)
		Pancreas	1(1.6)		

Spleen(30.64 %) was the most commonly injured solid organ followed by liver(24.19%), whereas small bowel(22.58%) was the most commonly injured hollow viscus. (Table 2)

Thirty four patients (56.7%) were managed conservatively while 26 patients (43.3%) had to undergo surgical interventions. (Figure 2)



**Figure 2: Distribution of Patients according to Mode of management.**

**Table 3: Type of Surgery (n=26).**

Operative procedure	No. of cases	Percentage
Repair of bowel injury	9	34.6
Resection of bowel	4	15.4
Repair of bowel injury with diverting loop ileostomy	2	7.7
Splenectomy	5	19.2
Repair of Urinary bladder	2	7.7
Peritoneal lavage	2	7.7
Suturing of liver laceration	1	3.84
Repair of Diaphragmatic tear	1	3.84
Total	26	100

Repair of bowel injury and splenectomy were the most commonly performed surgeries for the management of patients with abdominal trauma requiring surgical intervention. (Table 3)

Among the 60 patients, 45 patients (75%) were admitted to Intensive care unit (ICU), 11 patients (18.3%) to high dependency unit (HDU) and 4 patients (6.7%) in general ward. The average hospital stay was  $8.38 \pm 6.64$  days (Range 1-44 days). The mean ICU stay was  $5.47 \pm 6.46$  days (Range 1-35 days). Thirteen patients (21.67%) required ventilator support and fourteen patients (23.33 %) required blood transfusion during the treatment. Most of patients with solid organ injury with hemoperitoneum were admitted in ICU for intensive care and monitoring. Postoperative ventilator support, ARDS, associated lung injury were the common causes for need of mechanical ventilation. Patients with drop in hemoglobin below 8 mg/dl in serial monitoring required blood transfusion. Among the associated extra-abdominal injuries, chest injuries were present in 9 patients followed by Spine injury in 4 patients and upper limbs injury and lower limb injuries in 3 each group. Three patients developed surgical site infection, 5 patients developed postoperative ileus and 3 patients developed hospital acquired pneumonia. In our study we had 5 mortalities (8.33%) among which 4 patients were in operative management group while 1 in non operative management group. Multi Organ Dysfunction Syndrome (MODS), septic shock were the cause of death in two patients each and Hospital acquired pneumonia was the cause of death in one patient.

## Discussion

Abdominal trauma is a major cause of trauma related admissions to health care facilities globally with significant morbidity and mortality [4]. The economically active population are mostly involved in injuries [10]. In this study, 32 (53.3%) patients belonged to age group 21-40 years which is in line with another Nepalese study by Ghimire P et al in which study most of the patients belonged to age group 21-40 [11]. In a study from India by Reddy NB et al showed 50% of patients with abdominal trauma belonged to age group 21-40 [12]. Another study by Chalya et al from Tanzania found 46.5% patients were of age 21-30 years [13]. This age group is active economically throughout the world and are involved in various outdoor activities leading to more incidents of road traffic accidents and fall injuries leading to increased incidence of abdominal trauma. In this study, male are more prone to abdominal injuries than female with male:female ratio of 3.6:1. Our finding is consistent with similar studies [14, 15]. The reason for increased male predominance is due to engagement of male in activities like construction, farming, driving etc. In this study, Road traffic accident (RTA) was the most common mechanism for abdominal trauma accounting to 51.7% of cases followed by Fall from height (36.7%) and Physical assault (11.7%). Road traffic accident (RTA) has been the leading cause of abdominal trauma globally consistent with findings by Chalya et al (69.5%), Kundlas et al (68%) and Kulkarni et al (75%) [13, 16, 17]. Fall from height and physical assaults are the other common causes for abdominal trauma which is similar to study by Kulkarni et al who has 26% abdominal injuries are due to fall injury followed by assault in 9% patients [17]. Another study by Ghimire R et al from Nepal published in 2023 has shown RTA as most common mechanism of injury in 56.43 % followed by fall from heights in 36.43% [14]. However, study by Thapa BB from Nepal in 2012 has shown fall injury (40%) and road traffic accident (14%) and stab injury (14%) as the three frequent causes of abdominal injury [18]. This showed that number of Road traffic accidents have increased in our country. With growing economy, the number of vehicles is increasing and due to hilly terrain, narrow roads and poor road safety in our nation, road traffic accidents have become the most common cause of abdominal trauma in Nepal over the past decade. In this study blunt abdominal trauma (BAT) was present in 58 (96.7 %) and penetrating abdominal trauma (PAT) in 2 (3.3%) patients. Similar

finding is shown by study in similar circumstances, 87% BAT and 13% PAT [16]. A study by Saleem et al who has shown BAT and PAT in 77.5% and 22.5% respectively [19]. Another study from Ethiopia has shown 48.5 % BAT and 51.5% PAT, stab injury and gunshot injuries being the most common cause for PAT [15]. This shows that mechanism of injury vary in different parts of the world.

This study has shown that Solid organ injury (67.73%) is more common than hollow viscus injury (27.38%) and soft tissue injury (4.8%) following abdominal trauma. Spleen is the most common solid organ injury followed by liver in this study constituting 30.64 % and 24.19% cases respectively. Among the hollow viscus injury, small bowel injury is the commonest one constituting 22.58 % cases. Our findings are supported by Kundlas et al which study has shown splenic injury in 30.1% and small bowel injury in 18.3% cases respectively [16]. However there are studies which report liver to be the most common injured solid organ followed by spleen and kidney [20-22].

In this study, among 58 BAT patients, 34 patients (58.62%) were managed conservatively and 24 patients (41.38%) had to undergo operative management. Two patients with PAT were both managed surgically. Majority of patients with solid organ injury (85.71%) were commonly managed conservatively with close hemodynamic monitoring in ICU/HDU setup. Five patients with splenic injury and one patient with liver injury underwent surgical management. All patients with hollow viscus organ injury underwent surgical management. Studies have shown nearly 2/3rd cases of abdominal trauma are managed conservatively and nearly 1/3rd cases require surgical management [23, 24]. In our study, proportion of hollow viscus organ injury is slightly higher, which is the cause of more patients undergoing operative management.

In this study, the average length of stay in intensive care unit and total hospital stay was 5.47 days and 8.38 days respectively. A study by Ghimire R et al has shown mean intensive care and hospital stay as 2.6 days and 7.8 days respectively [14]. In the present study, there were 5 mortalities (8.33%), among whom two patients had undergone splenectomy, two patients had undergone repair of traumatic bowel injury and one patient was being managed conservatively for splenic injury with left pneumothorax. MODS, septic shock and hospital acquired pneumonia were the cause of mortality in these patients in our study. The mortality rate in our



study is comparable to study by Thapa BB et al which have shown 9.3% mortality [18].

### Conclusion

Road traffic accidents have become the leading mechanism of abdominal trauma followed by fall from heights and physical assaults. Blunt abdominal trauma is more common in our region. Spleen and liver are the commonly injured solid organ while small bowel is the commonly injured hollow viscus organ following abdominal trauma. Majority of patients with solid organ injury can be managed conservatively while patients with hollow viscus injury undergo operative treatment.

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**Conflict of interest:** None

### References

1. C. J. Alastair and J. G. Pierre, "Abdominal trauma," in *Surgical Emergencies*, M. John, D. Graeme, and O. M. Kevin, Eds., Blackwell Science Ltd, Hoboken, NY, USA, 1st edition. (1999, 224-236).
2. WHO, "The top 10 causes of death," 2020. [Internet]. <https://www.who.int/mediacentre/factsheets/fs310/en/>.
3. Global status report on road safety 2023. Geneva: World Health Organization; 2023. (2023,5-7).
4. Nepal Burden of Disease 2019: A Country Report based on the 2019 Global Burden of Disease Study. Kathmandu, Nepal: ,NHRC, MoHP, IHME, and MEOR. (2021,8-10).
5. AdesanyaR, Afolabi and Darocha-Aodu JT, Civilian abdominal gunshot wounds in Lagos, J.R.Coll.Surg. Edinb. 43:4 (1998) 230-234. PMID: 9735644.
6. Bekker W, Kong VY, Laing GL, et al, The spectrum and outcome of blunt trauma related enteric hollow visceral injury, Ann R Coll Surg Engl. 100:4 (2018) 290-4. DOI: 10.1308/rcsann.2018.0013/ PMID: 29484938.
7. Stengel D, Leisterer J, Ferrada P, et al, Point-of-care ultrasonography for diagnosing thoracoabdominal injuries in patients with blunt trauma, Cochrane Database Syst Rev. 12:1(2018) CD012669. DOI: 10.1002/14651858.CD012669.pub2/ PMID: 30548249.
8. O'Neill SB, Hamid S, Nicolaou S, et al, Changes in approach to solid organ injury: what the radiologist needs to know, Can Assoc Radiol J. 71:3 (2020) 352-36. DOI: 10.1177/0846537120908069/ PMID: 32166970.
9. Verma S, Noori MT, Garg P, et al, Study of pattern and management strategies of solid visceral injuries in blunt trauma abdomen in tertiary care centre, Int Surg J. 7(2020)1808-12. DOI: <http://dx.doi.org/10.18203/2349-2902.isj20202386>
10. Joshi SK SS, A Study of Injuries and Violence Related Articles in Nepal , J Nepal Med Assoc. 48,175 (2009) 209-16. PMID: 20795459.
11. Ghimire P, Yogi N, Ghimire P, Non-operative Management of Blunt abdominal trauma in a Tertiary Care Hospital of a Developing Nation, Nepal Journal of Medical Sciences. 2,1(2013)38-41. DOI: <https://doi.org/10.3126/njms.v2i1.7650>
12. Reddy NB, Reddy NN, Reddy CS, et al, An epidemiological study on pattern of thoraco-abdominal injuries sustained in fatal road traffic accidents of Bangalore: Autopsy-based study, J Emerg Trauma Shock.7:2 (2014) 116-20. DOI: 10.4103/0974-2700.130882. PMID: 24812457.
13. Chalya PL, Mabula JB, Abdominal trauma experience over a two-year period at a tertiary hospital in north-western Tanzania: a prospective review of 396 cases, Tanzan J Health Res.15:4 (2014) 230-9. PMID: 26591698.
14. Ghimire R, Acharya BP, Pudasaini P, et al, Blunt abdominal trauma among patients admitted to the Department of Surgery at a tertiary care centre: A descriptive cross-sectional study, JNMA J Nepal Med Assoc. 61:261(2023) 404-408. DOI: 10.31729/jnma.8154. PMID: 37203899.
15. DemekeAltaye K, ZewdieTadesse A, BekeleMuleta M, et al, Assessment of Pattern of Abdominal Injury over a Two-Year Period at St Paul's Hospital Millenium Medical College and AaBET Hospital, Addis Ababa, Ethiopia: A Retrospective Study. Emerg Med Int, 27(2022) 3036876. DOI: 10.1155/2022/3036876. PMID: 36204336.
16. Rajiv Kundlas, Rajagopalan G, Joseph Alexis, et al, Clinico - epidemiological profile, pattern and outcome of abdominal trauma in a level 1 trauma centre in South India, International Journal of Contemporary Medical Research.7:5 (2020) E1-E5. DOI: <http://dx.doi.org/10.21276/ijcmr.2020.7.5.29>
17. Kulkarni S, Kanase V, Kanase N, et al, Blunt Trauma to abdomen in rural setup: a multiple case study, Intern J Sci Study. 3(2015)16-9. DOI: 10.17354/ijss/2015/297
18. Thapa BB, Gurung R, Basnet R, et al, Predictors of Surgical Outcome of Abdominal Trauma in Tertiary Care Centers of Nepal,MJSHB.15:2(2016) 54-61.DOI:10.3126/mjsbh.v15i2.17204
19. SaleemAEA, Abdul Raheem O, Abdallah H, et al, Epidemiological evaluation and outcome of pure abdominal trauma victims who underwent surgical exploratory laparotomy, Al-Azhar Assiut Med J. 14 (2016) 24-8. DOI: 10.4103/1687-1693.180458
20. Arumugam S, Al-Hassani A, El-Menyar A, et al, Frequency, causes and pattern of abdominal trauma: A 4-year descriptive analysis, J Emerg Trauma Shock. 8:4 (2015) 193-8. DOI: 10.4103/0974-2700.166590. PMID: 26604524.
21. Smith J, Caldwell E, D'Amours S, et al, Abdominal trauma: A disease in evolution, ANZ J Surg.75 (2005) 790-4. DOI: 10.1111/j.1445-2197.2005.03524.x. PMID: 16173994.
22. Clancy TV, Gary Maxwell J, Covington DL, et al, A statewide analysis of level I and II trauma centers for patients with major injuries, J Trauma. 51 (2001) 346-51. DOI: 10.1097/00005373-200108000-00021. PMID: 11493798.
23. Reddy TRP, Reddy LD, AngothSN, et al, Clinical Study of Blunt Injury Abdomen and Its Management at MNR Hospital Sangareddy, Telangana, J Med SciClin Res. 6:2 (2018) 1006-13. DOI: <https://dx.doi.org/10.18535/jmscr/v6i2.157>
24. Malhotra P, Sharma D, Gupta S, et al, Clinico epidemiological study of blunt abdominal trauma in a tertiary care hospital in north western Himalayas, IntSurg J.4:3 (2017) 874-82. DOI:10.18203/2349-2902.isj20170426

