Journal of Surgical Radiology

Site: https://journalsurgrad.com/

ISSN Print 2156-213X| ISSN Online: 2156-4566 Volume: 05Issue: 05 Open Access

Research Article

Pattern of Hollow viscus perforation following blunt trauma to abdomen: A Prospective study from a tertiary health care center

Dr Sapna Singh[1],Dr Poonam Gupta[2],Dr Samaksh Giri[3],Dr Satendra Kumar[4],Dr Sunil Kumar[5],Dr Anurag Saraswat[6]

[1]Assistant Professor, Department of General Surgery, Government Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India
[2.] Associate Professor, Department of General Surgery, Government Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India
[3].Assistant Professor, Department of General Surgery, Government Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India
[4.] Professor, Department of General Surgery, Government Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India
[5.] Assistant Professor, Department of General Surgery, Government Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India
[6.]Assistant Professor, Department of General Surgery, Government Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India

*Corresponding Author

Dr Sapna Singh
Sapnasnmc001@gmail.com

Article History
Received: 02.04.2026
Revised: 12.04.2026
Accepted: 02.05.2026
Published: 10.05.2026

Citations:
Singh, S., Gupta, P., Giri, S., Kumar, S., Kumar, S., & Saraswat, A. (n.d.). Pattern of hollow viscus perforation following blunt trauma to abdomen: A prospective study from a tertiary health care center. J Surg Radiol, V5(5) 27-33

Abstract: *Introduction:* Background:Hollow viscus injury following blunt abdominal trauma is relatively uncommon but associated with significant morbidity and mortality due to delayed diagnosis and peritoneal contamination. The aim of present study is to evaluate the clinical profile, diagnostic modalities, management strategies, and outcomes of hollow viscus injuries in blunt abdominal trauma. **Materials and Methods:**This prospective study was conducted over a period of 2 years at a tertiary care centre and included 100 patients with Radiological or intraoperatively confirmed hollow viscus injury. Data regarding demographics, mechanism of injury, clinical presentation, imaging findings, operative management, and outcomes were analyzed using SPSS version 25.0.**Results:**Out of 100 patients, 78 were males and 34 belonged to the 18–30 years age group. Road traffic accidents accounted for 62 cases. Abdominal pain was present in all patients, while guarding was observed in 80 cases. FAST detected free fluid in 82 patients, and CT scan showed bowel injury in 70 cases. Jejunum was the most commonly affected organ (76 cases). Primary repair was performed in 46 patients. Postoperative complications included wound infection in 18 cases and sepsis in 10 cases. Mortality was observed in 4 patients. The mean hospital stay was 12 ± 5 days.**Conclusion:s**Hollow viscus injuries are most commonly seen in young males following road traffic accidents. Early diagnosis using CT scan and prompt surgical intervention significantly improve outcomes and reduces morbidity and mortality.

Keywords: Blunt abdominal trauma; Computed tomography; Hollow viscus injury; Ileal perforation; Peritonitis; Surgical management; Trauma outcomes

INTRODUCTION

Blunt trauma to abdomen is a major cause of morbidity and mortality in young adults worldwide. Despite technological advances and innovations in the diagnostic arsenal, delays in recognition and management contribute significantly to poor outcomes. These injuries are relatively rare, potentially leading to hollow viscus perforation in 3-5% of patients.[1] Complicating matters further, clinical symptoms such as severe head trauma or abdominal wall injuries may mask severe visceral injuries, leading to overlooked symptoms. [2,3]

Blunt trauma to abdomen more commonly affects solid viscera, with Liver and spleen being the most commonly injured organs. But hollow viscus injuries are not less common and are equally or more life threatening than solid visceral injuries accounting to more blood loss and peritoneal contamination. Most of injuries other than abdominal injuries reveal itself earlier but blunt abdominal injury can be silent initially, causing fatal outcome later as time progresses. [4,5]

Multidetector Computed Tomography (MDCT) stands as the most valuable diagnostic tool in assessing these trauma patients.[6] Hemodynamic instability, along with intra-abdominal free fluid (IAFF) on Focused Assessment with Sonography in Trauma (FAST) or signs of peritonitis, prompt emergent surgical exploration. [7,8] The morbidity and mortality eventually rise with any delay in diagnosis. Because road traffic accidents are so common these days, associated bowel injuries should be suspected and managed early. Rapid resuscitation is necessary to save the unstable but salvageable patient with abdominal trauma.[9]

The present study is conducted with an aim to evaluate the clinical profile, diagnostic modalities, management strategies, and outcomes of hollow viscus injuries in blunt abdominal trauma.

MATERIALS AND METHODS

This prospective study was conducted in the General Surgery Department of a tertiary care center of Northern India from June 2023 to June 2025. Ethical clearance for conducting the study was taken from institutional ethics committee before commencement. Consent was taken from the participants and they were informed about the purpose, procedures, confidentiality measures, risks, and benefits of the study.

Through consecutive sampling a total of 100 patients who reported following blunt trauma to abdomen were selected on the basis of inclusion and exclusion criteria.

Inclusion criteria-

- Patients above the age of 18 years with blunt trauma to abdomen
- Hollow Viscus Perforation diagnosed radiologically.
- Intraoperative findings of hollow viscus perforation

Exclusion Criteria

- Patients less than age of 18 years.
- Patients with Head Injury
- Patients with pre-existing bowel pathology (Crohn's disease, diverticulitis, malignancy) that could confound results.
- Those who refused surgical intervention or left against medical advice.
- Patients with penetrating abdominal trauma (stab wounds, gunshot injuries).

All patient data were recorded in a Performa. Patients were evaluated in terms of gender, age, mechanism of injury, clinical presentation, laboratory and imaging findings, site of injuries, injured organs, Injury Severity Score (ISS), calculated Revised Trauma Score (RTSc), amount of transfusion, surgical procedure, length of hospital stay (LOHS), length of intensive care unit stay (LOICUS), and mortality and morbidity.

Data were entered & analyzed using Statistical Package for the Social Sciences (SPSS) software version 25.0. Continuous variables were expressed as mean ± standard deviation (SD) for normally distributed data & median with interquartile range (IQR) for non-normally distributed data. Categorical variables were presented as frequencies & percentages. A two-sided p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 shows demographic characteristics and mechanism of injury. Out of 100 patients, 34 were in the 18–30 years age group, 28 in 31–45 years, 22 in 46–60 years, and 16 were older than 60 years. A total of 78 patients were male and 22 were female. Road traffic accidents accounted for 62 cases, followed by falls from height in 18 cases, assault in 12 cases, and other causes in 8 cases.

Table 1 Demographic Characteristics and Mechanism of Injury

Variable	Category	Number of Patients
Age Group (years)	18–30	34
	31–45	28
	46–60	22
	>60	16
Gender	Male	78
	Female	22
Mechanism of Injury	Road Traffic Accidents	62
	Fall from Height	18
	Assault	12
	Others	8

Table 2 shows clinical presentation and initial hemodynamic status. All 100 patients presented with abdominal pain. Abdominal distension was observed in 72 patients, vomiting in 58 patients, and guarding/rigidity in 80 patients. Hypotension suggestive of shock was present in 26 patients at presentation.

Table 2 Clinical Presentation and Initial Hemodynamic Status

Clinical Feature	Number of Patients
Abdominal Pain	100
Abdominal Distension	72
Vomiting	58
Guarding/Rigidity	80
Hypotension (Shock)	26

Table 3 shows radiological findings. FAST revealed intra-abdominal free fluid in 82 patients. Pneumoperitoneum on abdominal X-ray was detected in 64 patients. CT scan demonstrated bowel wall discontinuity in 70 patients, free air in 68 patients, and mesenteric injury in 30 patients.

Table 3 Radiological findings

Investigation	Findings	Number of Patients
FAST	Free Fluid	82
X-ray Abdomen	Pneumoperitoneum	64
CT Scan (MDCT)	Bowel Wall Discontinuity	70
	Pneumoperitoneum	68
	Mesenteric Injury	30

Table 4 shows site of injury and associated injuries. Jejunal injury was observed in 76 patients, ileal injury in 15 patients, duodenal injury in 3 patients, colonic injury in 4 patients, and gastric injury in 2 patients. Associated mesenteric tears were present in 38 patients, solid organ injuries in 24 patients, rib fractures in 18 patients, and pelvic fractures in 12 patients.

Table 4 Site of Injury and Associated Injuries

Parameter	Category	Number of Patients
Site of Injury	Jejunum	76
	Ileum	15
	Duodenum	3
	Colon	4
	Stomach	2
Associated Injuries	Mesenteric Tear	38
	Solid Organ Injury	24
	Rib Fractures	18
	Pelvic Fractures	12

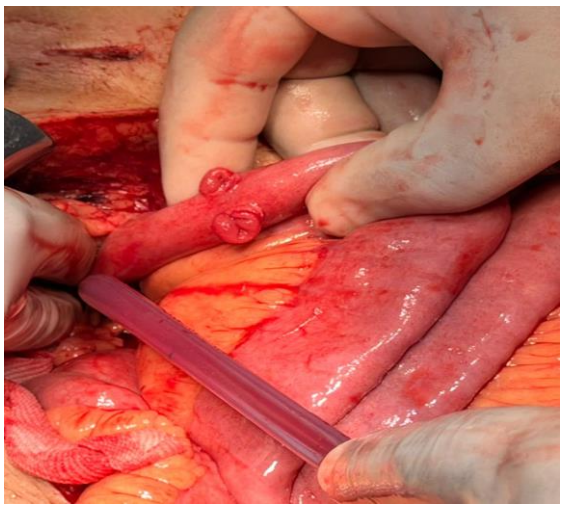

FIGURE 1: Image showing Jejunal Perforation on antimesenteric border

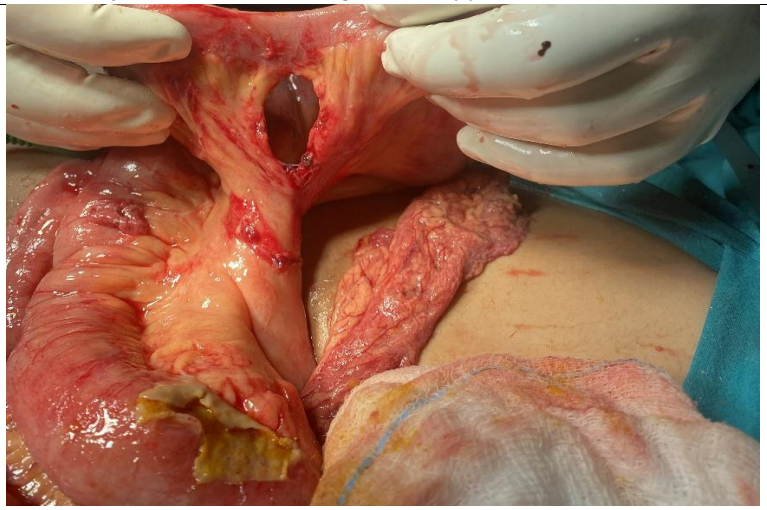

FIGURE 2: Image showing Mesenteric Injury

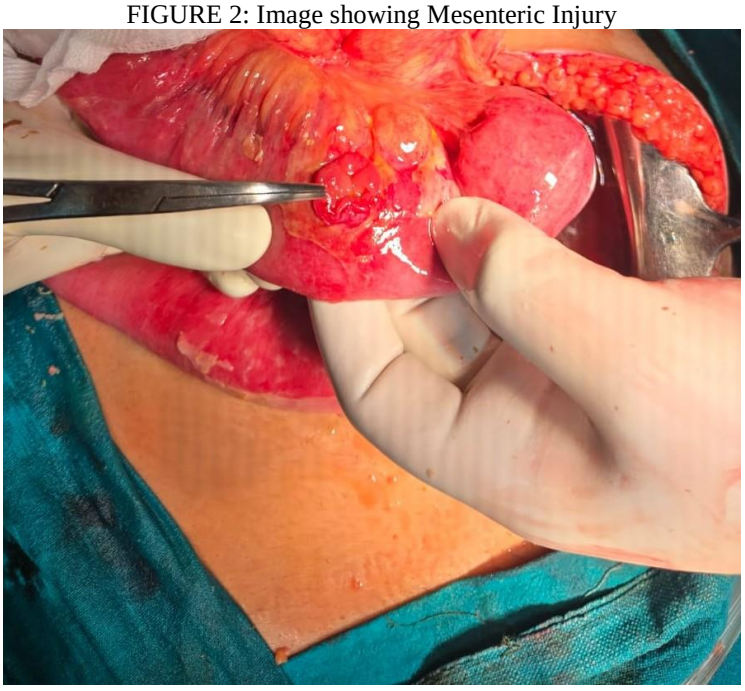

FIGURE 3: Image showing Ileal perforation at mesenteric border

Table 5 shows surgical management and postoperative complications. Primary repair was performed in 46 patients, Bowel resection and anastomosis in 32 patients, stoma formation in 14 patients, and damage control surgery in 8 patients. Postoperative wound infection occurred in 18 patients, anastomotic leak in 3 patients, and sepsis in 10 patients. A total of 4 patients died, while 65 patients had an uneventful recovery.

Table 5: Surgical Management and Postoperative Complications

Parameter	Category	Number of Patients
Surgical Procedure	Primary Repair	46
	Resection & Anastomosis	32
	Creation of Stoma	14
	Damage Control Surgery	8
Complications	Surgical Site Infection	18
	Anastomotic Leak	3
	Sepsis	10
	Mortality	4
	Uneventful Recovery	65

Table 6 shows hospital stay, ICU stay, and trauma scores. The mean length of hospital stay was 12 ± 5 days, while the mean ICU stay was 4 ± 2 days. The mean Injury Severity Score was 18 ± 6, and the mean Revised Trauma Score was 6.5 ± 1.2.

Table 6 Hospital Stay, ICU Stay, and Trauma Scores

Parameter	Mean ± SD
Length of Hospital Stay (days)	12 ± 5
ICU Stay (days)	4 ± 2
Injury Severity Score (ISS)	18 ± 6
Revised Trauma Score (RTSc)	6.5 ± 1.2

DISCUSSION

Bowel perforation after blunt trauma is rare but potentially fatal. The nonspecific nature of symptoms—such as vague abdominal pain, distension, or absent bowel sounds—often leads to underdiagnosis. The proposed mechanisms of intestinal injury in BAT include compression forces and deceleration forces which results in a spectrum of injury from intramural hematoma to perforation. [10]

The management of hollow viscus injuries depends on the severity of the injury and associated complications. Surgical intervention is often required to repair the perforation or for resection of devitalised segment. Non-operative management may be considered for certain stable injuries.[11]

In the present study 100 patients with hollow viscus injury following blunt trauma to abdomen were included. Out of 100, 34 were in the 18–30 years age group, 28 in 31–45 years, 22 in 46–60 years, and 16 were older than 60 years. Blunt and penetrating trauma to abdomen was more commonly seen in young individuals [9]. A total of 78 patients were male and 22 were females which is comparable with study by Khadilkar, which also showed abdominal trauma was more common in males.[1] In our study cause of blunt trauma was road traffic accidents in 62 cases, followed by fall from height in 18 cases, assault in 12 cases, and miscellaneous causes in 8 cases. Other studies also reported that 62% to 70% cases of blunt injury to abdomen was due to RTA [1,2]

In present study Abdominal pain was present in all patients. 72 patients had abdominal distension, 58 had vomiting, and 80 had guarding/rigidity. At presentation, 26 patients had hypotension suggestive of shock. According to other studies, RTA was to blame for 62% to 70% of cases of blunt traumatic abdominal injuries [1]. Abdominal pain was the most prevalent symptom in the current study (61%). The results are close to those of studies by Akhgar A et al., and Shrihari V et al., which found that abdominal pain affected 85% and 96% of patients, respectively[9,12].

Radiological findings of our study showed 82 individuals had intra-abdominal free fluid, according to eFAST. 64 patients had pneumoperitoneum in Erect X Ray abdomen. CECT scan of abdomen revealed mesenteric injury in 30 patients, pneumoperitoneum in 68 patients, and discontinuity of the gut wall in 70 individuals. Study by Mohapatra S et al., reported accuracy of x-ray erect abdomen to be 100% in detecting Hollow viscous injuries.[13] Davis JJ et al., reported that in their series, abdominal x ray was abnormal in 21% of cases; pneumoperitoneum was detected in 6% of cases and dilated bowel loops in 6% of cases.[14]

In our study seventy-six patients had Jejunal perforation, fifteen had ileal perforation, three had perforated second part of duodenum, four had perforation in transverse colon, and two had gastric perforation. 38 patients had associated mesenteric tears, 24 had solid organ injuries, 18 had rib fractures, and 12 had pelvic fractures. This result is compared to a study done by Allen RB et al., which showed small bowel was involved in 35.3% of cases. [15]. Naqvi R H et al., reported jejunum as the most common hollow viscous injured in blunt abdominal trauma.[16]

In present study 46 patients underwent primary repair, 32 underwent resection and anastomosis, 14 underwent stoma creation, and 8 underwent damage control surgery.10 patients had sepsis, 3 had anastomotic leaks, and 18 had postoperative wound infections. 40 patients recovered without incident, while 4 individuals died. Khanna R et al., in their study found that closure of bowel perforation was done in 13 patients (64%), colostomy in 2 patients, repair of mesentery in 9 patients.[17] Sreenidhi G. reported closure of bowel perforation was done in 54% patients.[18] Davis JJ et al., reported wound infection as a complication in 15% of the cases.[14] Khadilkar R et al., showed respiratory complication as the most common complication.[1] Similar results was shown by Sreenidhi GM also[18]. Shrihari V et al., where mortality was 13%.[12] Decreased mortality is explained by better health care facilities and availability of broad-spectrum antibiotics in present scenario.

In present study the average ICU stay was 4 ± 2 days, while the average hospital stay was 12 ± 5 days. The average Revised Trauma Score was 6.5 ± 1.2, and the average Injury Severity Score was 18 ± 6. The duration of stay for most of the patients in the study by Jain S et al., was between 11-20 days with mean of 15 days for those who underwent operative management and a mean of 8.5 days for conservative management.[2] Khadilkar

R et al., showed the duration of stay 8.78 days for patients managed conservatively and 16.62 days for patients managed operatively.[1]

When assessing the outcomes, it is crucial to consider the several limitations of this study. The investigation was conducted at a singular tertiary care institution, which may limit the generalisability of the findings to other settings, particularly rural or primary healthcare facilities. Secondly, although a sample size of 100 patients is enough for descriptive analysis, it may be insufficient for subgroup comparisons or robust statistical correlations. Thirdly, selection bias may have been introduced, as milder cases treated conservatively may have been excluded due to the inclusion criteria, which only considered patients with intraoperatively confirmed hollow viscus injuries. The absence of long-term follow-up in the study constrained the assessment of late sequelae such as incisional hernia or adhesive intestinal obstruction. While this was not rigorously analysed, changes across patients in the timing of presentation and intervention may have influenced the results. Additionally, pre-hospital treatment, comorbidities, and nutritional condition were not thoroughly assessed, which could have had an impact on morbidity and mortality. Ultimately, the absence of comparative groups complicates the identification of the underlying causes of managerial strategies.

CONCLUSION

Injury to a hollow viscus following blunt abdominal trauma is a critical surgical condition that can result in significant morbidity and potentially fatal outcomes. The present study reveals a high incidence of these injuries in young males, with road traffic accidents recognised as the principal cause. The Jejunum was the organ most frequently implicated.[16] Clinical signs, such as abdominal pain and guarding, supported by radiological methods—particularly computed tomography—facilitated swift diagnosis. Timely surgical intervention, primarily via primary repair, was associated with favourable results in most patients. Nevertheless, the tardy presentation resulted in increased problems post-surgery, including sepsis and anastomotic leak, and was associated with mortality. Therefore, increased clinical vigilance, prompt imaging, and timely surgical intervention are essential to improve patient outcomes and reduce morbidity and death in cases of blunt abdominal trauma with hollow viscus injury.

REFERENCES

1. Khadilkar R, Yadav AS, D'silva A. A clinical study to evaluate and manage solid organ injuries in blunt abdominal trauma. CIBT J Surg. 2015;4(1):5-9.
2. Jain S, Maske D, Songra MC. Clinical study of hollow viscus injury in abdominal trauma. Int Surg J 2018;5:39-44.
3. Bège T, Brunet C, Berdah SV. Hollow viscus injury due to blunt trauma: A review. J Visc Surg 2016;153:61–8.
4. Wadhwa M, Kumar R, Trehan M, Singla S, Sharma R, Ahmed A, Sharma R. Blunt abdominal trauma with hollow viscus and mesenteric injury: a prospective study of 50 cases. Cureus. 2021 Feb 12;13(2).
5. Nance ML, Peden GW, Shapiro MB, Kauder DR, Rotondo MF, Schwab CW. Solid viscus injury predicts major hollow viscus injury in blunt abdominal trauma. Journal of Trauma and Acute Care Surgery. 1997 Oct 1;43(4):618-23.
6. Bhagvan S, Turai M, Holden A, Ng A, Civil I. Predicting hollow viscus injury in blunt abdominal trauma with computed tomography. World J Surg 2013;37:123–6.
7. Wani I, Bhat RA, Wani S, Khan N, Wani RA, Parray FQ. Isolated small bowel mesentery injury after steering wheel trauma. Trauma Mon 2012;17:279–81.
8. Coccolini F, Catena F, Moore EE, Ivatury R, Biffl W, Peitzman A, et al. WSES classification and guidelines for liver trauma. World J Emerg Surg 2016;11:50.
9. Akhgar A, Talebian MT, Ashouri M, Ghorbani S, Mirfazaelian H. Jejunal Perforation Following Blunt Abdominal Trauma; a Case Report. Adv J Emerg Med. 2017 Oct 29;1(1):e9. doi: 10.22114/AJEM.v1i1.22. PMID: 31172061; PMCID: PMC6548091.
10. Jha NK, Yadav SK, Sharma R, Sinha DK, Kumar S, Kerketta MD, Sinha M, Anand A, Gandhi A, Ranjan SK, Yadav J. Characteristics of hollow viscus injury following blunt abdominal trauma; a single centre experience from Eastern India. Bulletin of Emergency & Trauma. 2014 Oct;2(4):156.
11. Özpek A, Yıldırak MK, Ezberci F. Hollow viscus injury due to blunt abdominal trauma: a tertiary trauma center experience. Turkish Journal of Trauma & Emergency Surgery. 2024 Feb 2;30(2):123.
12. Shrihari V, Jayran J, Sabira S. Clinical study of blunt trauma abdomen. Ind J Res. 2015; 4(1):123-6.
13. Mohapatra S, Prahad S, Rao KRRM, Bastia B. Options in the management of solid visceral injuries from blunt abdominal trauma. Indian J surg. 2003;65(3):263-8.
14. Davis JJ, Cohn Jr IS, Nance FC. Diagnosis and management of blunt abdominal trauma. Ann Surg. 1976 Jun;183(6):672.
15. Allen RB, Curry GJ. Abdominal trauma: a study of 297 consecutive cases. Am J Surg. 1957;93(3):398 404.
16. Naqvi R H, Singh G, Saroch T, Trakroo S. Traumatic gastrointestinal perforation following abdominal trauma: a study in tertiary care centre, international Surgery Journal. 2022Aug;9(8):1446-1449.

17. Khanna R, Khanna S, Singh P, Khanna P, Khanna AK. Spectrum of blunt abdominal trauma in Varanasi. Quarterly J Surg Sci. 1999;35(1):25-8.
18. Sreenidhi GM, Venugopal K, Nandeeshkumar GN. A clinical study and management of abdominal injuries. Journal of Evolution of Medical and Dental Sciences. 2014 Sep 11;3(43):10756-72.