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Original Research Article

Clinical Study of Characteristics of Hollow Viscus Injury Following Blunt Trauma Abdomen with Special Reference to its Management and Outcome in a Tertiary Care Hospital

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Abstract:

Background: Blunt abdominal trauma (BAT) is a major cause of morbidity and mortality in resource-limited areas, often resulting from road accidents, falls, or assaults. Hollow viscus injuries, including intestinal perforations, are rare but challenging due to delayed diagnosis, ambiguous symptoms, and high complication rates. This research examined the traits, treatment methods, and prognosis of such injuries in a tertiary setting.

Aims: This study attempts to evaluate the management difficulties encountered during the management of bowel perforation due to BTA.

Materials and methods: An observational, descriptive, longitudinal study at the General Surgery Department, North Bengal Medical College and Hospital, Darjeeling, India, from March 2024 to January 2025. Seventy patients >12 years with BAT necessitating surgery were selected consecutively. Exclusions: penetrating trauma or severe brain injury. Data covered demographics, causes, clinical features, surgical findings, procedures, and complications, collected via a predefined questionnaire. Follow-up lasted from admission to discharge or death. Analysis used IBM SPSS v22, with percentages for categorical data and chi-square tests for associations ($p<0.05$ significant).

Result: Males predominated (81.4%), mostly aged 21-39 (45.7%). Road accidents caused 57.1% of cases. Ileum was most affected (56.6%), with 60% presenting <1-hour post-injury. Intraoperative issues: hypotension (27.1%), weak pulse (20%). Interventions: ileostomy (45.7%), anastomosis (44.3%), colostomy (10%). Postoperative problems: wound infection (20%), dehiscence (14.3%), anastomotic leak (8.6%). Delayed presentation associated with intraoperative complications ($p=0.038$); ileal injuries linked to both intraoperative ($p=0.033$) and postoperative issues ($p=0.049$).

Conclusion: Prompt identification and surgery are vital for BAT hollow viscus injuries. Ileal damage and late arrivals worsen outcomes. Multidisciplinary strategies enhanced prehospital services, and protocols may boost survival.

Keywords: Blunt Abdominal Trauma; Hollow Viscus Perforation; Surgical Intervention; Patient Outcomes.

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Introduction

Blunt trauma abdomen (BTA) is an important cause of morbidity and mortality, especially in developing countries, where high-speed motor vehicle accidents, falls, and assaults are common causes of blunt abdominal trauma. The spectrum of injuries due to blunt abdominal trauma varies from minor contusions to life-threatening injuries, including bowel perforation. Bowel perforation is one of the most serious complications of blunt abdominal trauma, and thus it requires early diagnosis and prompt surgical intervention to prevent sepsis, multi-organ dysfunction syndrome, and death. Despite advances in trauma care, bowel perforation due to blunt abdominal trauma remains

a challenge because of diagnostic delay, inadequate prehospital care, and variability of presentation. [1] Bowel injuries due to BTA are rare when compared with other injuries such as those of the liver and spleen; they account for only 1% to 5% of blunt abdominal trauma cases.[2] However, the morbidity and mortality rates are high if such injuries occur. The mechanisms of bowel injuries due to BTA include rapid deceleration injuries, which cause compression and bursting of the bowel. These mechanisms cause shearing at fixed points due to the sudden stoppage of movement, such as the junction of the mobile small intestine and the retroperitoneal structures, thereby causing perforations of the bowel. An increase in intra-abdominal pressure can cause an explosion effect, particularly if the bowel was distended at the time of the trauma. The areas of the bowel that are commonly involved in the perforations include the jejunum, the ileum, and the colon; the most commonly affected segment of the bowel is the jejunum.[3]

The presentation of bowel perforation due to BTA varies greatly and can often be subtle in the initial stages of the disease process. The patient may present with a variety of nonspecific symptoms such as abdominal pain, nausea, vomiting, and bloating. The patient might not present with the initial symptoms of peritonitis due to the containment of the bowel content within the peritoneal cavity. The patient might present with other injuries such as head or spinal injuries that might mask the symptoms of the disease process, thereby making the assessment of the patient difficult. The patient might present with abdominal tenderness, rigidity, and absent bowel sounds; however, these symptoms might not always be present due to the aforementioned reasons.[4] Laboratory tests such as leukocytosis and increased lactate levels might not always point towards a specific disease process; hence, imaging studies are useful in the diagnosis of the condition. The timely and precise diagnosis of bowel perforation after BTA is of utmost importance. Various imaging techniques have been employed in the diagnosis of suspected bowel perforation. Plain films of the abdomen may show free intraperitoneal air or pneumoperitoneum, which is considered pathognomonic of bowel perforation. However, it is not seen in up to 30% of the cases. [5] Hence, it is not considered an important diagnostic aid. FAST is also employed in the diagnosis of bowel perforation. It is useful in the diagnosis of hemoperitoneum and solid organ injury. However, it has low sensitivity for the diagnosis of bowel perforation. The presence of free fluid without solid organ injury is considered suggestive of bowel perforation. CT scans with contrast media are considered the gold standard imaging techniques. The presence of free air, thickening of the bowel wall, mesenteric strandings, and leakage of contrast media from the bowel lumen strongly suggest the diagnosis of bowel perforation. CT scans, however, have the disadvantage of failing to diagnose early-stage injuries. DPL has also been employed in the diagnosis of bowel perforation. [6] This method has largely been replaced by CT scans. This method is considered useful in the diagnosis of unstable patients in whom imaging facilities are not available. The presence of feculent material, bile, and bacteria in the DPL fluid strongly suggests the diagnosis of bowel injury.

The timing of surgical intervention for patients with bowel perforation due to BTA is critical in determining patient outcomes. Delayed diagnosis and treatment may result in fecal peritonitis, SIRS, and eventually MODS. Early surgical intervention within six hours of injury is associated with improved patient outcomes.[7] However, there are various reasons that may result in delays in making surgical decisions. Patients with BTA may take longer to access healthcare facilities due to lack of transport, lack of finances, and misdiagnosis of their condition by healthcare staff in remote facilities. Indeterminate diagnosis of the patient's condition may also result in a "wait and watch" policy, leading to delays in making surgical decisions. Patients with polytrauma may require stabilization of other injuries before undergoing surgery for bowel perforation. [8] Moreover, lack of a qualified surgeon may be another reason for delays in making surgical decisions for patients with BTA in some healthcare facilities, especially those located in rural areas. The type of surgical procedure that can be applied to treat bowel perforation due to BTA includes exploratory laparotomy with primary closure of the perforated viscus and segmental resection with anastomosis.

The type of surgical procedure that can be applied depends on the size of the perforation and the overall condition of the patient. Small and well-perfused perforations can be treated with simple closure of the affected viscus. However, extensive injuries with devitalized tissues require segmental resection with anastomosis. [9] Anastomotic leakage is a significant problem that may be encountered during the management of BTA.

Anastomotic leakage is particularly common when there is contamination of the peritoneum. Temporary stoma formation may be necessary in cases of gross contamination of the peritoneum, delayed presentation of the patient, and instability of the patient's hemodynamics. Temporary stoma formation is associated with some challenges, such as increased patient stay in the hospital and the need for a second operation to reverse the stoma. Contaminated peritoneum, multiple perforations of the viscus, and mesenteric injury may make the surgical procedure complicated. Peritoneal lavage

and drainage are critical during surgery to prevent postoperative sepsis.[10]

The postoperative period is also an important factor in determining the outcome of patients with bowel perforation due to BTA. Various complications may occur during the postoperative period. Vigilant monitoring is essential in these cases. Sepsis and peritonitis are some of the most feared complications that may occur during the postoperative period. Septic shock and failure of other vital organs are the consequences of sepsis. Antibiotics, fluid balance, and other supportive measures are essential in treating septic shock. Anastomotic leakage is one of the most feared complications that may occur in the postoperative period after bowel resection and anastomosis. Infection in the peritoneum, or peritonitis, is the consequence of anastomotic leakage. Tachycardia, fever, abdominal distension, and an increase in inflammatory markers are the early signs of anastomotic leakage. Malnutrition, diabetes, and an increase in the duration of surgery are some of the factors that increase the risk of wound infection and dehiscence. Proper wound care and antibiotic prophylaxis are essential in these cases. [11] Adhesions in the abdominal cavity are responsible for bowel obstruction in the postoperative period. Bowel obstruction may require surgical intervention. Despite advances in surgical techniques and critical care, mortality rates are high in cases of bowel perforation due to BTA. Malabsorption, fistula formation, adhesive obstruction, and other complications are the consequences of bowel perforation. Various measures are to be taken to improve the outcome in cases of bowel perforation due to BTA. Trauma surgeons, intensivists, radiologists, and critical care experts should work in coordination to improve the outcome in these cases. Trauma care at the prehospital stage, standardization of management protocols, and awareness among the public about the importance of early medical care in cases of blunt abdominal trauma are some of the measures that are to be taken to improve the outcome in cases of bowel perforation due to BTA. [12]

Bowel perforation due to blunt trauma abdomen poses considerable management difficulties, which range from diagnostic delays to postoperative complications. Even though there have been considerable improvements in diagnostic modalities and surgical interventions, the mortality and morbidity rates are high, which can be attributed to delayed presentation, insufficient healthcare facilities, and associated polytrauma. Early diagnosis, prompt surgical intervention, and a multidisciplinary approach are essential in managing bowel perforation due to BTA.[13] This study attempts to evaluate the management difficulties encountered during the management of bowel perforation due to BTA.

Materials and Methods

Study design: The current study was an institution-based observational descriptive study with a longitudinal design.

Place of study: The study was conducted at the Department of General Surgery of the North Bengal Medical College and Hospital, a tertiary care teaching institute of Darjeeling, India.

Period of study: The study was conducted for 12 months from March of 2024 to January of 2025.

Study Population: The study population consisted of all patients admitted under the Department of General Surgery of the study institution with a diagnosis of blunt trauma of abdomen.

Sample Size: 70 trauma patients.

Inclusion Criteria

1. Patients with a diagnosis of blunt trauma abdomen admitted to the Department of General Surgery of the study institution during the study period
2. Patients of both sexes
3. Patients aged >12 years

Exclusion Criteria

1. Patients with penetrating trauma to abdomen.
2. Children with age less than 12 years.
3. Patients with positive findings in CT scan brain.

Methodology

A consecutive enumeration sampling technique was adopted. All patients who were admitted to the department of general surgery of the study institution and fulfilled the inclusion and exclusion criteria were included in the resulting sample for analysis. After doing a thorough review of the existing records of patients in the department, it was seen that on an average, 7 patients were admitted with blunt trauma abdomen in the hospital per month. Considering the data collection timeframe to be of 10 months, the final expected sample size for the present study was considered to be comprised of 70 patients.

The study was conducted using a predesigned questionnaire to obtain the socio-demographic and clinical data of the patients. Following the collection of the data, operative and post-operative complication related data were obtained for each patient. Each of the patients was followed up from their admission into the study institution till their death or discharge from the institution.

The present study was conducted to evaluate the management of bowel perforation following blunt

abdominal trauma. All trauma patients included in the study underwent a comprehensive evaluation. A detailed history regarding the mode of trauma was obtained, and a complete physical examination was performed. Routine blood investigations, including blood grouping and Rh typing, were conducted. Radiological investigations such as chest X-ray in posteroanterior (PA) view and erect X-ray of the abdomen were performed. In cases where further assessment was necessary, ultrasonography (USG) of the abdomen and pelvis was carried out. When findings remained inconclusive, a computed tomography (CT) scan of the abdomen and pelvis was performed.

The cases were followed from the time of admission until discharge or death. Upon admission, history was recorded, and clinical examination was carried out. Patients were resuscitated and stabilized as per standard trauma management protocols. Routine blood investigations were conducted, and electrolyte imbalances and renal function were assessed, with corrective measures undertaken when required. In cases where peritonitis was suspected following trauma, an erect abdominal X-ray was obtained. For patients in whom X-ray findings were inconclusive, further imaging with abdominal and pelvic USG or CT scan was performed for definitive diagnosis.

Patients requiring surgical intervention were adequately prepared for emergency laparotomy. All surgical procedures were performed under general anesthesia. The primary surgical techniques included primary closure of perforations, segmental resection with end-to-end anastomosis, closure of mesenteric rents, and colostomy or ileostomy, with or without resection of pathological bowel segments. The intraoperative findings, surgical procedures performed, and final operative diagnosis were meticulously documented.

Postoperatively, patients were closely monitored for any complications. Standard postoperative care was provided, including fluid management, pain control, antibiotic therapy, and nutritional support. Patients were observed for signs of infection, anastomotic leakage, wound dehiscence, and other postoperative complications. The follow-up period extended until the patient was discharged or succumbed to the illness, with all complications systematically recorded and analyzed.

The Institutional Ethics Committee of North Bengal Medical College & hospital, Darjeeling, reviewed and approved the project before it was carried out.

All of the participants were informed in their own language about the study and their rights for participation before providing data for the researcher-administered questionnaire. They were informed about the participant's role and rights, to clarify that their participation was voluntary, the information was treated confidentially, and they could withdraw from the study at any time. After the collection of data, the data was cleaned, anonymised and stored in a password protected spreadsheet for data analysis.

Statistical Analysis: The collected data were checked for consistency, completeness and entered into Microsoft Excel (MS-EXCEL, Microsoft Corp.) data sheet. Analyzed with the statistical program Statistical Package for the Social Sciences (IBM SPSS, version 22).

Data were organized and presented using the principles of descriptive and inferential statistics. The data were categorized and expressed in proportions. The continuous data were expressed as mean±SD. The data were graphically presented in the form of tables, vertical bars, horizontal bar, pie diagram.

Acknowledgement if any

Conflict If Any: None declared.

Declaration If Any: While undertaking the study voluntary informed consent was taken from the patients according to the consent form in writing, and full confidentiality of the patients have been retained.

I further declare that this is an original study and no part of the study has been previously published or submitted to any university.

Result

Table 1: Distribution according to age (n=70)

Age group	Frequency	Percentage
<20	8	11.4
21-39	32	45.7
40-59	22	31.4
60 and above	8	11.4
Total	70	100

Table 2: Distribution according to sex (n=70)

Sex	Frequency	Percentage
Male	57	81.4
Female	13	18.6
Total	70	100

Table 3: Distribution according to time interval between injury and presentation (n=70)

Time to presentation (hours)	Frequency	Percentage
<1 hour	42	60
1-6 hours	23	32.9
7-12 hours	5	7.1
Total	70	100

Table 4: Distribution according to site of injury (n=70)

Site of injury	Frequency	Percentage
Jejunum	25	38.4
Ileum	38	56.6
Colon	7	10.4

Table 5: Distribution according to cause of injury (n=70)

Cause of injury	Frequency	Percentage
RTA	40	57.1
Fall	21	30
Assault	9	12.9
Total	70	100

Table 6: Distribution according to presenting symptoms (n=70)

Presenting symptoms	Frequency	Percentage
Abdominal pain	70	100
Abdominal distention	16	22.9

Table 7: Distribution according to surgery (n=70)

Surgery	Frequency	Percentage
Ileostomy	32	45.71
Anastomosis	31	44.28
Colostomy	7	10
Total	70	100

Table 8: Association of predictive factors with incidence of intraoperative complications (n=70)

	Factors	Intraoperative complications absent		Intraoperative complications present		p-value
		Frequency	Percentage	Frequency	Percentage	
Age	<20	3	12	5	11.1	0.224
	21-39	8	32	24	53.3	
	40-59	9	36	13	28.9	
	60 and above	5	20	3	6.7	
Sex	Female	4	16	9	20	0.68
	Male	21	84	36	80	
Time to presenta-tion	<1 hour	15	60	27	60	0.038*
	1-6 hours	10	40	13	28.9	
	7-12 hours	0	0	5	11.1	
	Jejunum injury	11	44	16	35.6	0.487
	Ileum injury	12	48	28	62.2	0.033*
	Colon injury	3	12	4	8.9	0.678
Cause	Assault	2	8	7	15.6	0.371
	Fall	6	24	15	33.3	
	RTA	17	68	32	51.1	

*Statistically significant

Table 9: Association of predictive factors with incidence of postoperative complications (n=70)

	Factors	Postoperative complications absent		Postoperative complications present		p-value
		Frequency	Percentage	Frequency	Percentage	
Age	<20	5	11.9	3	10.7	0.437
	21-39	16	38.1	16	57.1	
	40-59	15	35.7	7	25	
	60 and above	6	14.3	2	7.1	
Sex	Female	9	21.4	4	14.3	0.452
	Male	33	78.6	24	85.7	
Time to presentation	<1 hour	23	54.8	19	67.9	0.507
	1-6 hours	16	38.1	7	25	
	7-12 hours	3	7.1	2	7.1	
	Jejunum injury	21	50	6	21.4	0.016*
	Ileum injury	20	47.6	20	71.4	0.049*
	Colon injury	4	9.5	3	10.7	0.871
Cause	Assault	5	11.9	4	14.3	0.753
	Fall	14	33.3	7	25	
	RTA	23	54.8	17	60.7	

*Statistically significant

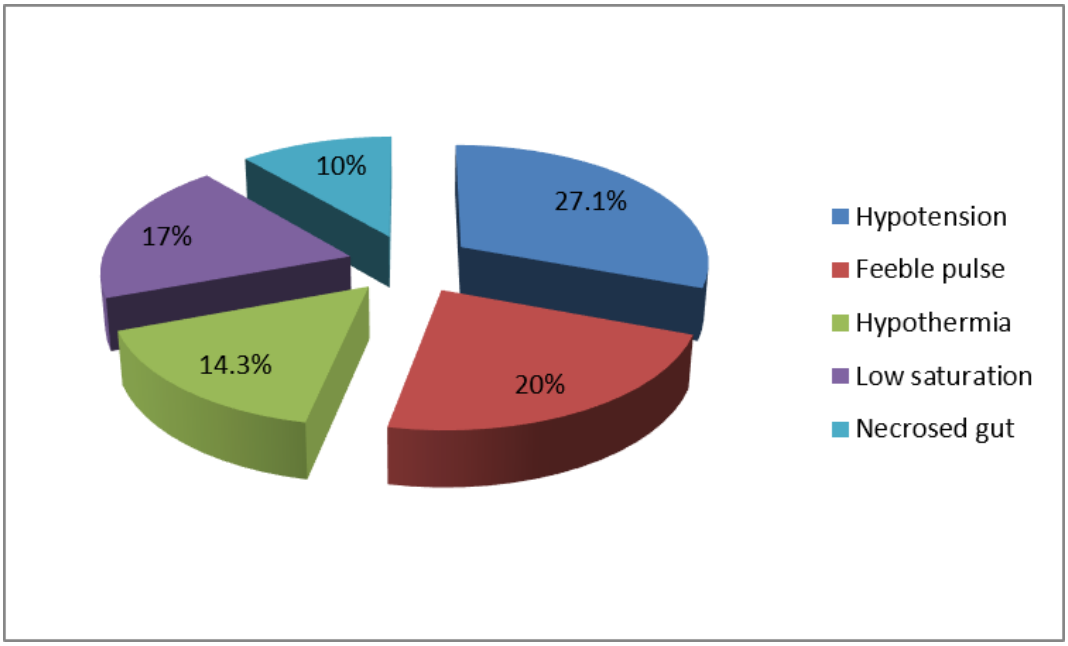


Figure 1: Distribution according to difficulties encountered during surgery (n=70)

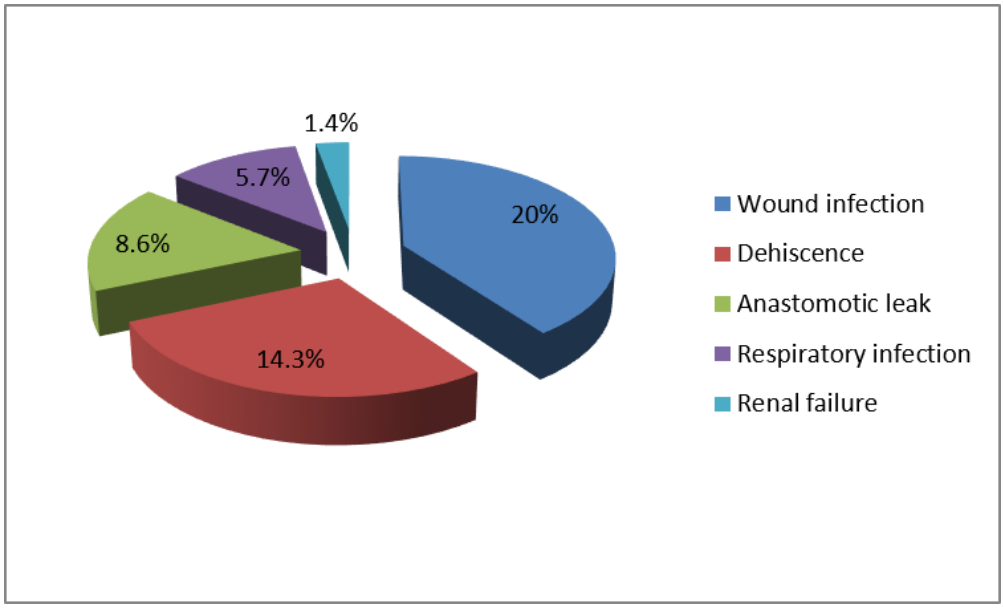


Figure 2: Distribution according to postoperative complications (n=70)

The study included 70 patients with bowel perforation following blunt trauma abdomen. The highest proportion of patients (45.7%) belonged to the 21-39 years age group, followed by 31.4% in the 40-59 years category. Equal proportions (11.4%) of patients were found in the under-20 and 60-and-above age groups (Table 1).

A significant male predominance was observed in the study, with 81.4% (n=57) of patients being male, while females accounted for only 18.6% (n=13) (Table 2).

The majority of patients (60%) presented to the hospital within one hour of injury, while 32.9% arrived between 1-6 hours post-injury. A small proportion (7.1%) presented between 7-12 hours after trauma (Table 3).

The most commonly injured bowel segment was the ileum, accounting for 56.6% of cases, followed by the jejunum in 38.4% of cases. The colon was affected in only 10.4% of patients (Table 4).

The leading cause of blunt trauma leading to bowel perforation was RTAs, responsible for 57.1% (n=40) of cases. Falls accounted for 30% (n=21) of cases, while assault-related injuries were observed in 12.9% (n=9) (Table 5).

All patients (100%) presented with abdominal pain, making it the most consistent symptom in bowel perforation cases. Additionally, 22.9% of patients exhibited abdominal distension (Table 6).

Out of the 70 operated patients 45.71% undergo ileostomy followed by anastomosis which accounts for 44.28% and only 7 patients (10%) undergone colostomy (Table 7). Several factors were analyzed for their association with intraoperative complications. The time to presentation was significantly associated with intraoperative complications (p=0.038), with delayed presentation leading to a higher incidence. Ileal injuries were significantly more likely to result in intraoperative complications (p=0.033). However, age (p=0.224), sex (p=0.680), site of jejunal (p=0.487) or colonic (p=0.678) injury, and cause of injury (p=0.371) were not significantly associated with intraoperative complications (Table 8).

A significant association was found between postoperative complications and the site of bowel injury. Ileal injuries were associated with a higher incidence of postoperative complications (p=0.049), while jejunal injuries had a protective effect (p=0.016). However, age (p=0.437), sex (p=0.452), time to presentation (p=0.507), and cause of injury (p=0.753) were not significantly associated with postoperative complications (Table 9). The most common intraoperative difficulty was hypotension, observed in 27.1% (n=19) of cases, followed by feeble pulse (20%, n=14) and low oxygen saturation (17%, n=12). Hypothermia was noted in 14.3% (n=10), while necrosed gut requiring resection was encountered in 10% (n=7) of patients (Figure 1).

The most frequently observed postoperative complication was wound infection, occurring in 20% (n=14) of cases. Dehiscence was observed in 14.3% (n=10) of cases, while anastomotic leaks occurred in 8.6% (n=6). Respiratory infections were noted in 5.7% (n=4), and renal failure developed in 1.4% (n=1) of cases (Figure 2).

Discussion

Bowel perforation due to blunt trauma abdomen (BTA) posed various challenges in the diagnosis and management of the condition. The study revealed various trends, including those related to the epidemiology of the condition, associated complications, and the factors that influenced the outcome of the condition.

From the study, it was evident that the majority of the cases of bowel perforation due to BTA were from the age group of 21 to 39 years (45.7%), and the majority of the cases were male (81.4%). These trends were similar to those revealed by Mehta et al. (2014), which also indicated that the majority of the cases of BTA were male, as revealed by the study carried out by the same authors regarding the management of BTA in India.[9] The study revealed that the majority of the cases of BTA were from the third and fourth decades of life, and the male-to-female ratio was 3.7:1. It can be deduced that the high number of male cases of bowel perforation due to BTA could be attributed to the high number of male exposures to high-risk activities, including accidents while driving.

The study revealed that the majority of the cases of bowel perforation due to BTA were due to road traffic accidents (57.1%), followed by falls (30%) and assaults (12.9%). These trends were similar to those revealed by Ciftci et al. (1998), which indicated that the majority of the cases of bowel perforation in the pediatric population were due to motor vehicle accidents, which accounted for 60% of the cases.[4] The high number of road traffic accidents as a cause of BTA was also revealed by De Castro et al. (2015), which indicated that the majority of the cases of blunt trauma were due to road traffic accidents, as revealed by the study carried out by the same authors regarding the management of trauma cases in adults.[10] It can be deduced that the high number of cases of blunt trauma due to road traffic accidents highlights the need to enforce traffic laws to avoid accidents.

The study revealed that the majority of patients (60%) presented to the hospital within one hour of injury, while 32.9% presented in 1–6 hours. A small percentage (7.1%) presented to the hospital after six hours or longer. The time interval between injury and presentation to hospital was significantly associated with intraoperative complications ($p=0.038$). These findings were in agreement with Sule et al. (2007), who found that delayed presentation to hospital resulted in an increased incidence of peritonitis and mortality rate. [7] The delayed presentation to hospital could be due to lack of awareness or misdiagnosis. The importance of early intervention in trauma care cannot be overemphasized.

The ileum was found to be the most commonly injured part of the bowel (56.6%), followed by the jejunum (38.4%), and then the colon (10.4%). Ileal injuries were significantly associated with intraoperative complications ($p=0.033$). These findings were in agreement with Ciftci et al. (1998), who found that in cases of BTA in children, the ileum was the most commonly injured part. [4] Similarly, Albanese et al. (1996) found that jejunal and ileal perforations were the predominant types of injuries in children who underwent surgery for cases of traumatic intestinal perforations. [6] The ileum is very susceptible to blunt trauma due to its anatomical position. The ileum is relatively fixed in position in the abdomen. The anatomical position of the ileum could be one of the reasons that make it very susceptible to blunt trauma.

The intraoperative difficulties observed included hypotension, which was the most common intraoperative difficulty, accounting for 27.1%, followed by feeble pulse, which accounted for 20%, and low oxygen saturation, which accounted for 17%. Hypothermia was observed in 14.3%, while necrosed gut requiring resection was observed in 10%. These intraoperative difficulties observed in the study are similar to those observed by Jahromi et al. (2016) in their study, which highlighted the intraoperative difficulties observed in managing delayed bowel perforation. These difficulties included compromised viability of the gut and hemodynamic instability. [15] The study reinforced the importance of early surgical intervention in managing bowel perforation.

The study also highlighted the importance of early diagnosis in managing bowel perforation. Although plain radiographs and ultrasound scans gave an indication of the condition, computed tomography scans were the gold standard in confirming bowel perforation. These results are similar to those observed by Rizzo et al. (1989), which showed that computed tomography scans have a high sensitivity in differentiating between operable and non-operable bowel and mesenteric injuries. [13] However, false negatives remained an intraoperative difficulty, as observed in the study by Albanese et al. (1996), which showed a 26% false-negative rate of computed tomography scans in the diagnosis of gastrointestinal perforations in children.[6]

The primary methods used for the surgical management included primary repair, segmental resection with end-to-end anastomosis, and stoma formation. These findings were also supported by Paterson et al. (1990), who emphasized that extensive contusions beyond the circumference of the bowel wall often demanded resection to avoid delayed perforation and stricture formation.[12] The need for individualized surgical management was also emphasized in the present study, as some cases with severe contamination or necrotic bowel had to undergo stoma formation despite the associated morbidity.

The most common postoperative complication observed was wound infection, which accounted for 20% of the cases. Dehiscence accounted for 14.3%, anastomotic leakage for 8.6%, respiratory infection for 5.7%, and renal failure for 1.4%. Ileal injuries had a significant association with an

increased incidence of postoperative complications compared to other injuries (p = 0.049). Jejunal injuries had a protective role for postoperative complications compared to other injuries (p = 0.016). These findings were similar to those of Meissnitzer et al. (2014), who emphasized the role of small mesenteric hematomas observed on CT scans as a prelude to bowel perforations and postoperative complications if not managed appropriately.[14] Williams et al. (2003) also emphasized the role of colonic injuries in causing increased hospital stay due to associated postoperative complications like sepsis and anastomotic failure.[3]

The incidence of anastomotic leakage was found to be 8.6%, which is a serious concern as it may lead to peritonitis and sepsis. These findings were also supported by Hughes et al. (2002), who emphasized the role of gastrointestinal injuries following blunt trauma and the associated high morbidity risks, especially with delayed perforations.[2]

The importance of a multidisciplinary approach to the management of Bowel Perforation due to BTA was also emphasized by this study. The role of trauma surgeons, radiologists, and critical care specialists was crucial. In addition, this study reinforced the significance of public health interventions that are directed at reducing RTAs, improving prehospital trauma care, and establishing standards for managing blunt abdominal trauma. Advancements in diagnostic imaging techniques such as multi-detector CT scans could help in the early detection of mesenteric injuries, thus reducing diagnostic uncertainties, as also stated in the paper by Iaselli et al. (2015).[5] Further studies on the use of biomarkers for the early detection of bowel perforation could also help in the betterment of patient care.

Conclusion

Bowel perforation following blunt trauma abdomen (BTA) is an important surgical emergency that carries considerable morbidity and mortality. The study emphasizes that early detection, timely treatment, and effective surgical care are essential for improving patient outcomes. The majority of patients were identified among young male patients, with road traffic accidents being the primary cause of injury. Ileal perforation is the most common injury seen, followed by jejunal and colonic perforations. Despite advancements in diagnostic techniques, delays in hospital presentation and surgical treatment contributed to a poor prognosis for patients.

Hypotension, low oxygen saturation, and necrosed bowel segments were some of the intraoperative complications that posed a considerable challenge for surgical decision-making. Postoperative complications like wound infection, anastomotic leakage, and respiratory infection also contributed to patient outcome and hospital stay. The study emphasizes that a multidisciplinary approach is essential for patient care, with effective resuscitation, diagnostic techniques, and postoperative care for minimizing untoward outcomes.

Delayed presentation and intraoperative complications were significantly associated with patient outcome, emphasizing that effective prehospital trauma care is essential for patient outcome.

Despite the difficulties encountered, timely surgical treatment and postoperative care were associated with good patient outcomes.

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