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Research Article

Diagnostic Significance of Laboratory Tests in Correlating with Findings of Exploratory Abdominal Surgery Following Trauma

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Abstract

Background: Blunt abdominal trauma (BAT) is a common cause of intra-abdominal injuries and poses significant diagnostic challenges. Laboratory and imaging investigations are essential in guiding the management of these patients. *Objective:* This study aimed to evaluate the diagnostic significance of laboratory tests in correlation with findings from exploratory abdominal surgery following trauma. *Methods:* This descriptive cross-sectional study was conducted in the Department of Surgery, Rangpur Medical College and Hospital, Rangpur, Bangladesh, from July 2020 to December 2020. A total of 50 patients diagnosed with blunt abdominal trauma and requiring exploratory laparotomy were included in the study. *Results:* The majority of patients were aged 31–40 years (42%) with a male predominance (70%). Abdominal pain was the most common presenting symptom (100%), followed by abdominal distension (76%) and vomiting (24%). Clinical examination revealed tenderness in 90%, guarding/rigidity in 78%, and rebound tenderness and absent bowel sounds in 70% of patients. Laboratory abnormalities included deranged INR in 74%, prolonged APTT in 70%, elevated AST in 34%, ALT in 30%, and raised amylase and lipase in 48% of patients. Imaging detected free fluid on USG in 80% and haemoperitoneum on CT in 94% of cases. Small bowel was the most commonly injured organ (54%), followed by liver (20%), spleen (16%), mesentery (12%), duodenum (10%), colon (6%), and stomach (4%). Most injuries were isolated (76%), with grade II small bowel and duodenal injuries predominating. Patients aged 18–40 years exhibited the highest frequency of biochemical and imaging abnormalities, correlating with small bowel injuries ($P < 0.00001$). *Conclusion:* Laboratory and imaging investigations provide valuable diagnostic support in BAT but should complement clinical evaluation. Younger patients are at higher risk for small bowel injuries and exhibit more pronounced biochemical derangements. Early recognition and correlation with surgical findings are crucial to improve outcomes.

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Keywords

Blunt Abdominal Trauma, Intra-abdominal Injury (Iai), Laparotomy, Organ Injury Scaling

1. Introduction

Trauma is a significant public health problem worldwide, affecting countries regardless of their socioeconomic status [1]. In civilian populations, the majority of abdominal injuries result from blunt trauma [2]. The abdomen ranks as the third most commonly injured region, with approximately 25% of cases requiring surgical intervention [3]. The principal causes of blunt abdominal trauma (BAT) include road traffic accidents, followed by falls from height, objects falling on the body, and assaults [4]. The mechanisms underlying abdominal organ injury are generally classified into three types: deceleration, external compression, and crushing injuries [5].

The prevalence of intra-abdominal injuries (IAI) following BAT has been reported to range from 12% to 15% [6]. Identifying serious intra-abdominal pathology can be challenging [7]. Various diagnostic tools assist clinicians in the optimal management of blunt abdominal trauma, including physical examination, focused assessment with sonography for trauma (FAST), computed tomography (CT) scan, abdominal paracentesis, X-ray abdomen, and chest X-ray [8]. Despite adherence to strict evaluation protocols, missed abdominal injuries can still occur, often in the absence of abdominal pain or abnormal findings on physical examination [9]. Studies indicate that physical examination alone is an insensitive predictor of IAI in blunt trauma [10]. Similarly, laboratory tests have a limited role [11]. While elevated serum lipase and amylase may suggest injury, they are not definitive and require further assessment [12]. Liver function tests also fail to reliably distinguish between minor and serious injuries [12].

Ultrasound and diagnostic peritoneal lavage (DPL) are highly sensitive for detecting hemoperitoneum but are less effective in identifying IAI when free fluid is absent [6]. FAST is operator-dependent and mainly identifies peritoneal free fluid, without differentiating between conservatively managed solid organ injuries and injuries requiring surgical intervention [13]. Subtle injuries to the bowel and mesentery are particularly difficult to detect with FAST [14]. CT scans, although excellent for detecting and grading solid organ injuries, are less sensitive for injuries to the mesentery, bowel, pancreas, and diaphragm [15]. DPL maintains the highest sensitivity but has relatively low specificity [16]. Its invasiveness, masking of physical signs, inability to repeat easily, and contraindications—such as prior laparotomy, coagulopathy, or late pregnancy—limit its utility [16].

Diagnostic laparoscopy is commonly used for penetrating trauma [17]. In blunt trauma, even experienced surgeons may find it difficult to visualize all parts of the intraperitoneal gastrointestinal tract [17]. Visualization can be further compromised by blood staining and adherence to the serosal surface [17]. While minor liver or spleen injuries can sometimes be diagnosed and treated laparoscopically, determining the injury grade—which is crucial for treatment planning—remains challenging [17]. Additionally, the pneumoperitoneum required for optimal visualization carries a theoretical risk of air embolism through injured vessels [17]. These challenges, along with cost considerations, limit the use of laparoscopy in blunt trauma [17].

Currently, conservative management is considered the gold standard for solid organ injuries in hemodynamically stable patients [18]. Suspected or confirmed hollow organ injuries, however, require surgical intervention [18]. Patients with BAT who are unstable and demonstrate intra-abdominal fluid on FAST require emergency laparotomy [19]. The spleen is the most commonly injured organ, followed by the liver and small bowel [20]. The small bowel is reported to be the most commonly injured hollow viscus and the third most frequently injured organ in BAT [21]. According to Munns et al., blowout perforation on the antimesenteric border is the most common small bowel injury, whereas colonic injuries typically present as serosal tears or bruises [22]. Importantly, intraperitoneal organs may be ruptured without any superficial evidence of trauma [23]. Unrecognized intra-abdominal injuries remain a distressingly frequent cause of preventable death in patients with blunt abdominal trauma [24]. Ultimately, diagnostic modalities can supplement but not replace careful clinical evaluation [25]. In some cases, the exact nature of the injury is only revealed when the abdomen is surgically opened or during autopsy [26].

In this study, we aimed to evaluate the diagnostic significance of laboratory tests in correlation with findings from exploratory abdominal surgery following trauma.

2. Methodology & Materials

This descriptive cross-sectional study was conducted in the Department of Surgery, Rangpur Medical College and Hospital, Rangpur, Bangladesh. The study was carried out over a period of six months, from July 2020 to December 2020. A total of 50 patients diagnosed with blunt abdominal trauma and requiring exploratory laparotomy were included in the study.

These were the following criteria for eligibility as study

participants:

Inclusion Criteria

1). Patients aged 18 years and above.
2). Both male and female patients were included.
3). Patients diagnosed with blunt abdominal trauma who required exploratory laparotomy.

Exclusion Criteria

1). Patients with penetrating abdominal trauma.
2). Patients who were managed conservatively without surgery.
3). Patients who were unwilling to participate in the study.

Data Collection Procedure: Data were collected using a standard pre-designed data collection form, with each participant assigned a unique identification number. Verbal informed consent was obtained from the patient's guardian prior to inclusion. Upon admission, all patients were assessed according to the Advanced Trauma Life Support (ATLS) protocol. Socio-demographic data such as age and sex were recorded. Hemodynamic status was determined using the Revised Trauma Score (RTS), classifying patients into stable and unstable groups.

The following investigations were performed in all cases:

1). Complete blood count (CBC)
2). Serological tests
3). Ultrasonography (USG) of the whole abdomen
4). Plain X-ray abdomen (erect posture, A/P view including both domes of the diaphragm)
5). Chest X-ray (P/A view)

CT scan of the abdomen was performed in selected hemodynamically stable patients. Clinical presentations and laboratory findings were documented in detail. Clinically stable patients were managed conservatively, while patients meeting any of the following criteria were selected for exploratory laparotomy:

a) Signs of peritonitis
b) Uncontrolled shock or hemorrhage
c) Clinical deterioration during observation
d) Presence of free fluid on ultrasonography
e) Haemoperitoneum on CT scan
f) Pneumoperitoneum on radiography

Informed consent was obtained from all patients undergoing exploratory laparotomy. All per operative findings were recorded and graded according to the American Association for the Surgery of Trauma (AAST) Grading Scale.

Data Analysis: All data were recorded systematically in a pre-formatted data collection form. Quantitative data for continuous variables such as age, hemoglobin level, white blood cell count, serum amylase, serum lipase, AST, and ALT were expressed as mean ± standard deviation (SD). Qualitative data, including categorical variables such as sex, causes of blunt abdominal trauma, clinical symptoms and signs, and radiological findings (ultrasonography, abdominal X-ray, chest X-ray, and CT scan of the whole abdomen), were expressed as frequency and percentage. The study results were presented in the form of tables, charts, and graphs for clear interpretation and comparison. The data were analyzed using the Z-test and chi-square test. A p-value <0.05 was considered significant. Statistical analysis was performed by using SPSS 24.0 (Statistical Package for Social Sciences). This study was ethically approved by the Institutional Review Committee of Rangpur Medical College and Hospital.

3. Results

Table 1. *Distribution of study patients by demographic and clinical characteristics (n = 50).*

Variables	Number	Percentage (%)
Age (years)		
18–30	15	30
31–40	21	42
41–50	7	14
51–60	4	8
>60	3	6
Mean ± SD	39.74 ± 13.9	
Sex		
Male	35	70
Female	15	30
Symptoms		
Abdominal pain	50	100
Abdominal distension	38	76
Vomiting (non-bloody)	12	24
Vomiting (Blood mixed)	2	4
Urinary retention	9	18
Hematuria	10	20
Signs		
Abdominal distension	28	56
Abdominal bruise (London's sign)	7	14
Abdominal tenderness	45	90
Rebound tenderness	35	70
Muscle guard/rigidity	39	78
Obliteration of liver dullness	29	58
Absence of bowel sound	35	70
Tachycardia	29	58

Table 1 shows that the majority of the study subjects belonged to the age group of 31–40 years (42%), followed by

18–30 years (30%). The mean age of the patients was 39.74 ± 13.9 years. Among the participants, 70% were male and 30% were female. The male-to-female ratio was 7:3 in the study. All patients (100%) presented with abdominal pain, making it the most common symptom, followed by abdominal distension in 38 (76%) patients and vomiting (non-bloody) in 12 (24%) patients. Regarding clinical signs, abdominal tenderness was the most frequent, observed in 45 (90%) patients, followed by muscle guard/rigidity in 39 (78%), and rebound tenderness and absence of bowel sound each in 35 (70%) patients.

Table 2. *Distribution of study patients according to laboratory findings (n = 50).*

Parameters	Number	Percentage (%)
Hemoglobin level (gm/dl)		
>10	5	10
9–9.99	25	50
8–8.99	10	20
7–7.99	8	16
≤6.00	2	4
Mean ± SD (gm/dl)	9.22 ± 1.01	
Coagulation profile (INR)		
<1.5	13	26
>1.5	37	74
Coagulation profile (APTT)		
Normal (≤36 sec)	15	30
Prolonged (>36 sec)	35	70
AST level		
Normal	33	66
Abnormal	17	34
ALT level		
Normal	35	70
Abnormal	15	30
Serum amylase level		
Normal	26	52
Raised	24	48
Serum lipase level		
Normal	26	52
Raised	24	48

Table 2 presents the distribution of study patients according to their laboratory findings. The mean hemoglobin level of the patients was 9.22 ± 1.01 gm/dl. Half of the patients (50%) had hemoglobin levels between 9–9.99 gm/dl, while 10 (20%) had levels between 8–8.99 gm/dl. A small proportion (2; 4%) had severe anemia with hemoglobin ≤ 6.0 gm/dl. Regarding the coagulation profile, an elevated INR (>1.5) was observed in 37 (74%) patients, and the APTT was prolonged (≥ 36 seconds) in 35 (70%) patients. AST was abnormal in 17 (34%) and normal in 33 (66%) patients, whereas ALT was abnormal in 15 (30%) and normal in 35 (70%). Both serum amylase and serum lipase were raised in 24 (48%) of the patients, while 26 (52%) had normal levels.

Table 3. *Distribution of study patients according to radiological findings.*

Investigation	Number	Percentage (%)
Plain X-ray (n = 50)		
Gas under right dome of diaphragm	30	60
Dilated bowel loops	6	12
Air-fluid level	2	4
Ultrasonography (USG) (n = 50)		
Pleural effusion	3	6
Free fluid	40	80
Hemothorax	1	2
Intra-abdominal injury detected	13	26
Hollow organ injury	3	14
Liver injury	6	28
Spleen injury	4	18
CT scan (n = 36)		
Haemoperitoneum	34	94.44
Hemopneumoperitoneum	25	69.44
Intra-abdominal injury detected	21	58.33
Hollow organ injury	3	14.21
Liver injury	10	47.61
Spleen injury	8	38.09

Table 3 presents the distribution of study patients according to their radiological findings. On plain X-ray, the most common finding was gas under the right dome of the diaphragm observed in 30 (60%) patients, followed by dilated bowel loops in 6 (12%) and air-fluid levels in 2 (4%) patients.

On ultrasonography (USG), free fluid in the abdomen was detected in 40 (80%) patients. Among the detected intra-abdominal injuries, liver injury was found in 6 (28%), spleen injury in 4 (18%), and hollow organ injury in 3 (14%) patients. In CT scan findings, haemoperitoneum was the most common feature, observed in 34 (94.44%) cases. Intra-abdominal injuries were detected in 21 (58.33%) patients, with liver injury in 10 (47.61%), spleen injury in 8 (38.09%), and hollow organ injury in 3 (14.21%) patients.

Table 4. *Distribution of per-operative findings of study patients.*

Organ	Number	Percentage (%)
Stomach	2	4
Duodenum	5	10
Pancreas	1	2
Small intestine	27	54
Spleen	8	16
Liver	10	20
Colon	3	6
Mesenteric injury	6	12

Table 4 shows that the small bowel was the most commonly involved organ in blunt abdominal trauma, observed in 27 (54%) patients. This was followed by injuries to the liver in 10 (20%), spleen in 8 (16%), mesentery in 6 (12%), duodenum in 5 (10%), colon in 3 (6%), and stomach in 2 (4%) patients.

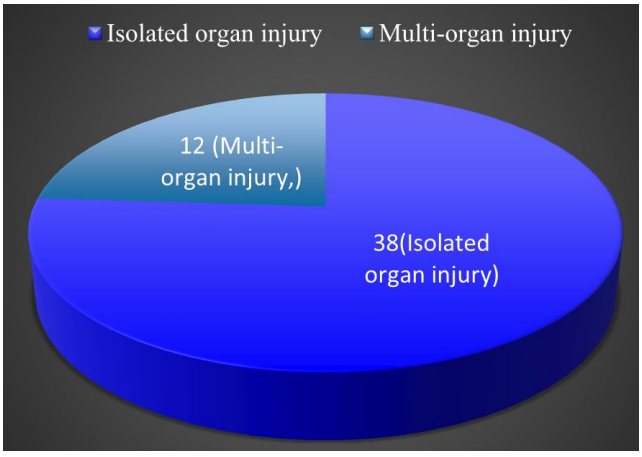

Figure 1. *Pattern of organ injury in study patients.*

Figure 1 shows the distribution of study patients according to the pattern of organ injury. The majority 38 (76%) of patients had isolated organ injuries, while 12 (24%) patients had multi-organ injuries.

Table 5. *Distribution of grade-specific organ injuries among study patients.*

Organ	Number	Percentage (%)
Small bowel (n = 27)		
Grade I	0	0
Grade II	20	74.07
Grade III	3	11.11
Grade IV	2	7.44
Grade V	2	7.44
Liver (n = 10)		
Grade I	0	0
Grade II	2	20
Grade III	5	50
Grade IV	3	30
Grade V	0	0
Spleen (n = 8)		
Grade I	2	25
Grade II	2	25
Grade III	1	12.5
Grade IV	3	37.5
Grade V	0	0
Duodenum (n = 5)		
Grade I	0	0
Grade II	4	80
Grade III	1	20
Grade IV	0	0
Grade V	0	0
Colon (n = 3)		
Grade I	0	0
Grade II	3	100
Grade III	0	0
Grade IV	0	0
Grade V	0	0
Stomach (n = 2)		
Grade I	0	0
Grade II	2	100
Grade III	0	0
Grade IV	0	0
Grade V	0	0

Table 5 presents the distribution of grade-specific organ injuries among the study patients. For small bowel injuries (n = 27), the majority were grade II (20; 74.07%), followed by grade III (3; 11.11%), and grades IV and V each in 2 (7.44%) patients. Liver injuries (n = 10) were most commonly grade III (5; 50%), followed by grade IV (3; 30%) and grade II (2; 20%). Among spleen injuries (n = 8), grade IV was most frequent in 3 (37.5%), followed by grades I and II each in 2 (25%) patients, and grade III in 1 (12.5%). Duodenal injuries (n = 5) were predominantly grade II (4; 80%) with one patient having grade III injury. Both colon (n = 3) and stomach injuries (n = 2) were exclusively grade II.

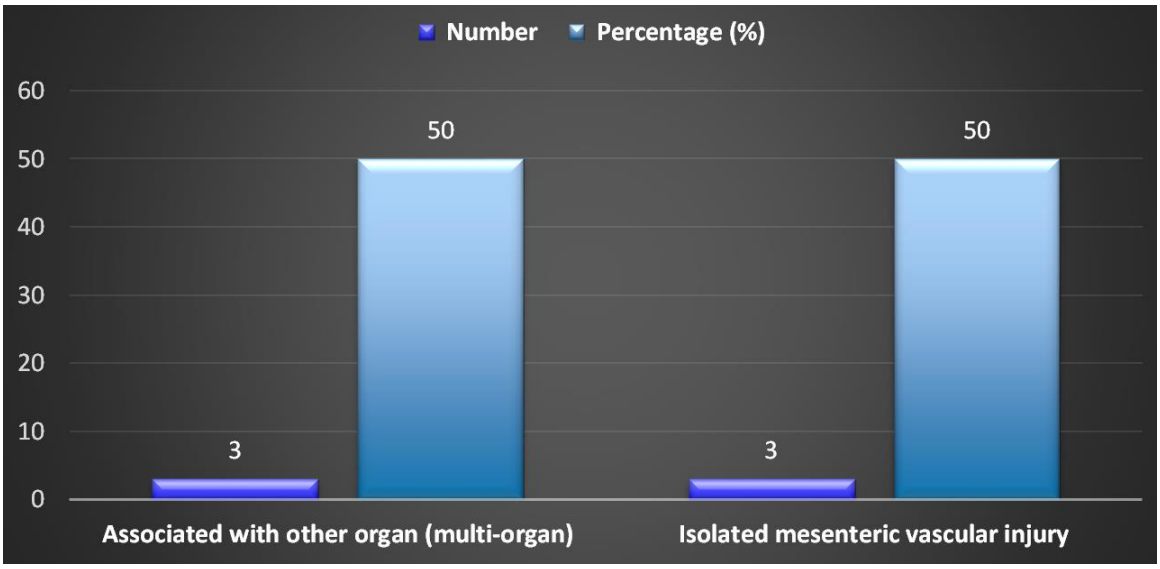

Figure 2. *Mesenteric injury in study patients (n=6).*

Figure 2 shows that among the mesenteric injuries (n = 6), half (50%) were isolated mesenteric vascular injuries, while the remaining half (50%) were associated with injuries to other organs.

Table 6. *Correlation of clinical presentation, laboratory findings and per-operative findings of study patients.*

Age (years)	AST n=17	ALT n=15	Serum amylase n=26	Serum lipase n=26	INR n=37	APTT n=35	USG	CT scan
18–30 (n=15)	2	2	7	7	11	10	13	11
31–40 (n=21)	10	9	13	13	17	16	19	16
41–50 (n=7)	2	2	2	2	5	5	5	5
51–60 (n=4)	2	1	3	3	3	3	2	3
>60 (n=3)	1	1	1	1	1	1	1	1

Age (years)	Stomach n=2	Duodenum n=5	Small bowel n=27	Pancreas n=1	Liver n=10	Spleen n=8	Colon n=3	P-value
18–30 (n=15)	1	1	9	0	2	1	1	<0.00001
31–40 (n=21)	1	2	12	1	6	3	2	<0.00001
41–50 (n=7)	0	1	3	0	1	2	0	0.02981
51–60 (n=4)	0	0	2	0	0	2	0	<0.00001
>60 (n=3)	0	1	1	0	1	0	0	<0.00001

Table 6 shows that patients aged 18–40 years (n = 36) showed the highest frequency of abnormalities, with elevated AST and ALT in 21 patients, raised serum amylase and lipase in 20 patients, and deranged INR and APTT in 45 patients. Imaging findings were abnormal on USG in 32 patients and on CT scan in 27 patients. Small bowel injuries were most common in this age group (21 patients), followed by liver (8 patients), spleen (4 patients), duodenum (3 patients), stomach (2 patients), colon (3 patients), and pancreas (1 patient) injuries. Patients aged 41–50 years (n = 7) and 51–60 years (n = 4) had fewer biochemical and imaging abnormalities, with small bowel injuries present in 5 and 2 patients, respectively. Organ involvement in older patients (>60 years, n = 3) was limited, including duodenum, small bowel, and liver injuries. Overall, younger patients demonstrated a higher prevalence of biochemical derangements, imaging abnormalities, and small bowel injuries compared to older patients. The associations across age groups were statistically significant ($P < 0.00001$ for most comparisons, except 41–50 years, $P = 0.02981$).

4. Discussion

In the present study, the majority of patients belonged to the age group of 31–40 years (42%), followed by the 18–30 years group (30%), with a mean age of 39.74 ± 13.9 years. This finding is consistent with that of Mukhopadhyay M, who reported that the 31–40 years age group was most commonly affected (53.19%), with a mean age of 34.98 years [27]. Similarly, Umare GM et al also observed that the 31–40 years group accounted for the highest proportion of patients (26%) in their study [28]. In contrast, Vashistha R et al found that most patients (33.96%) were between 21–30 years of age [29].

In the current study, males constituted 70% of patients, while females accounted for 30%, giving a male-to-female ratio of 7:3. This male predominance aligns with findings from Vashistha R et al., who reported that 81.13% of victims were male [29]. Similarly, Abri B et al found that among 332 patients, 63.9% were male and 36.1% were female [30]. Sisodiya S and Malpani P also observed male predominance (82.2%) with a male-to-female ratio of 4.6:1 [31]. The higher male involvement can be attributed to their greater exposure to outdoor activities, occupational risks, and road traffic accidents.

All patients in this study presented with abdominal pain, making it the most common symptom. Other frequent complaints included abdominal distension (76%), vomiting (28%), haematuria (20%), and urinary retention (18%). Sisodiya and Malpani similarly reported that 94.4% of patients experienced abdominal pain, and 69% had pain associated with vomiting [31]. Rajan and Chhabra also documented abdominal pain in 90% of cases, [32] while Siddique MAB et al. found that 88.88% had abdominal pain, 33.33% abdominal distension, 16.66% vomiting, and 11.11% haematuria [33].

The major clinical signs observed in this study were abdominal tenderness (90%), guarding or rigidity (78%), and absent bowel sounds (70%). Obliteration of liver dullness was noted in 58% of patients. Rajan and Chhabra reported tenderness in 85.3% and guarding/rigidity in 54% of patients [32]. Similarly, Davis JJ et al observed generalized tenderness and guarding in over 75% of cases, with rebound tenderness and rigidity present in 28% [34]. These findings reinforce the importance of careful abdominal examination in detecting intra-abdominal injuries following trauma.

According to the Revised Trauma Score (RTS), 72% of patients were stable, 10% required urgent, and 18% required immediate management, with a mean RTS of 11.26 ± 1.52. Mansour DA et al. found a comparable mean RTS of 11.41 among blunt abdominal trauma patients, with 71% being stable [35].

Most patients (90%) in this study had hemoglobin levels ≤ 9.99 g/dl, with a mean of 9.22 ± 1.01 g/dl. Zaki YK et al. reported a similar mean hemoglobin level of 9.35 ± 2.25 g/dl in patients with intra-abdominal injuries [36]. Musalar E et al. also found that 94% of patients with blunt abdominal trauma had hemoglobin ≤ 9.99 g/dl, consistent with our findings [37].

Regarding biochemical markers, raised AST levels were found in 34% and raised ALT in 30% of patients. Elbaih AH et al. reported elevated AST in 58.06% and ALT in 51.61% of their cases, mainly associated with hepatic injuries [38]. In this study, serum amylase and lipase were raised in 48% of patients each. Singh RP et al. found raised amylase in 52% and raised lipase in 54% of cases, closely matching the current results [39]. Conversely, Farkouth E et al. detected elevated amylase in only 25% of their patients.

Radiological findings also supported the diagnosis of intra-abdominal injuries [40]. Plain X-ray abdomen (erect) showed gas under the right dome of the diaphragm in 60% of patients, dilated bowel loops in 12%, and air-fluid levels in 4%. Davis JJ et al. reported abnormal abdominal X-rays in 21% of cases, with pneumoperitoneum in 6% [34]. On ultrasonography, free fluid was the most common finding (80%), while organ injury was identified in 26% of patients. Among the detected organ injuries, liver was most frequent (46%), followed by spleen (30%) and hollow organ injury (23%). Srivastava S reported haemoperitoneum in 62% of patients, with liver and spleen injuries being the most common [41]. Makama JG et al. found that ultrasonography detected free fluid in 28.9% and directly delineated organ injury in 24.1% of patients [42].

Among 36 patients who underwent CT scan, haemoperitoneum was the most frequent finding (94.44%), followed by hemopneumoperitoneum (69.44%). Organ injuries were identified in 21 patients, with liver (47.61%) and spleen (38.09%) being the most common, which corresponds with the results of Srivastava S [41].

Intraoperative findings revealed that the small bowel was the most commonly injured organ (54%), followed by the liver (20%), spleen (16%), mesentery (12%), duodenum (10%), colon (6%), and stomach (4%). These results are

consistent with Siddique MAB et al., who reported small bowel injury in 61.11% of cases [33]. Khanna R et al. also found small bowel injury to be the most frequent (57%), followed by mesenteric (47%) and liver (37%) injuries [43]. Similarly, Sarma KO and Mottaquin MM. observed small bowel (40.35%) and splenic (36.84%) injuries as the most common [44].

In this study, isolated organ injury was found in 76% of cases, while multiple organ injuries were seen in 24%. Ayoade BA et al. reported similar findings, with isolated organ injury in 71.4% and multiple injuries in 23.3% [45].

Regarding injury grading, most small bowel injuries were grade II (74.07%), consistent with Mukhopadhyay M (72.72%) and Ahmad R et al. (55.55%) [27, 46]. Among liver injuries, grade III (50%) was most common, followed by grade IV (30%) and grade II (20%), aligning with Hussain Ml et al. who reported grade III injuries in 32.81% of patients [47]. AST and ALT levels were more accurate in detecting major liver injuries, consistent with Koca B et al., who found that their diagnostic accuracy increases with higher injury grade [48].

For splenic injuries, grade IV was most frequent (37.5%), followed by grade II and I (25% each). Ahmad R et al. similarly reported that 50% of splenic injuries were grade IV [45]. Among mesenteric injuries, 50% were isolated vascular injuries and 50% were associated with small bowel injuries, comparable to the findings of Sarma KO and Mottaquin MM [44]. All colon and stomach injuries were of grade II, matching the observations of Ahmad R et al. and Sarma KO and Mottaquin MM [44, 45].

Age-specific analysis showed that the 31–40 years group was most affected ($P < 0.00001$), with 21 patients in this range. These patients exhibited higher biochemical abnormalities (AST, ALT, amylase, lipase, INR, APTT) and radiological positivity, correlating with the highest frequency of small bowel and liver injuries. The 18–30 years group was the second most affected ($P < 0.00001$), also demonstrating a strong association with biochemical derangements and positive imaging findings.

5. Limitations of the Study

The present study had several limitations. Firstly, the study was conducted in a single tertiary care hospital in Rangpur, which may limit the generalizability of the results to the broader population of Bangladesh. Secondly, the study was carried out over a short duration. Finally, the relatively small sample size may not fully capture the variability of blunt abdominal trauma cases in different settings.

6. Conclusion and Recommendations

The study findings show that males were predominantly affected, with young adults being the most vulnerable group to blunt abdominal trauma. Among the injured organs, the small bowel was most commonly involved, followed by the liver, spleen, and mesentery. Ultrasonography of the whole abdomen proved to be a valuable initial diagnostic tool for detecting intra-abdominal injuries, while computed tomography (CT) remained the gold standard for accurate diagnosis and grading of such injuries. However, clinical presentation and routine laboratory tests alone were insufficient to predict specific intra-abdominal injuries, highlighting the need to combine clinical evaluation with imaging for accurate diagnosis and effective management.

Further study with a prospective and longitudinal study design, including a larger sample size, needs to be done to validate the findings of this study.

Abbreviations

BAT	Blunt Abdominal Trauma
IAI	Intra-abdominal Injuries
CT	Computed Tomography
USG	Ultrasonography

Author Contributions

Md. Toufiqul Islam: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

Atiqul Maula Omar Ibrahim Shamsi: Conceptualization, Validation

Mohammad Sharif Hossain: Investigation

Md. Ziaur Rahman: Software, Supervision

Syeda Tashfia Jahan: Formal Analysis

Md. Insanul Alam: Resources

Mahmudul Hasan Chowdhury: Writing – review & editing

Ahsan Ahmed: Methodology

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Conflicts of Interest

The authors declare no conflicts of interest.

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