

Original Research Article

Early Post-Operative Complications Following Exploratory Laparotomy in Patients with Abdominal Trauma

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Abstract: **Objective:** To determine the frequency of early post-operative complications following exploratory laparotomy in patients with abdominal trauma. **Study Design:** Descriptive study. **Place and Duration of Study:** Conducted from 20th July 2025 to 20th November 2025 at General Surgery Department of MTI LRH. **Methodology:** A total of 76 patients aged 25–70 years with abdominal trauma were included. Demographic and clinical data were recorded. Patients underwent exploratory laparotomy and were followed for 30 days for early post-operative complications. Data was analysed using Statistical Package for Social Sciences version 25. Numerical variables were presented as mean $\pm$ standard deviation and categorical variables as frequency n(%). Stratification was done and Chi-square test or Fisher exact test was applied with p-value ≤ 0.05 taken as significant. **Results:** Mean age was 50.07 ± 12.59 years and mean body mass index was 26.81 ± 3.53 kg/m². Majority were males 57 (75.0%) and rural residents 46 (60.5%). Abdominal pain was most common presentation 45 (59.2%). Wound infection was most frequent complication 29 (38.2%), followed by septicemia 11 (14.5%), wound dehiscence 8 (10.5%) and paralytic ileus 6 (7.9%), while bile leak was least common 3 (3.9%). Significant association was found for wound infection with rural residence ($p=0.032$), and for bile leak and paralytic ileus with abdominal pain ($p \leq 0.05$). **Conclusion:** Early post-operative complications are common after exploratory laparotomy in abdominal trauma, with wound infection being most frequent.

Keywords: Abdominal injuries, Laparotomy, Postoperative complications, Surgical wound infection, Trauma

INTRODUCTION

Laparotomy in patients who have sustained abdominal trauma is a common surgery performed in order to evaluate and treat any intra-abdominal damage [1]. Reasons for performing this procedure usually include either blunt or penetrating trauma if the clinician suspects damage to an organ or presence of intraperitoneal bleeding or peritonitis [2]. This surgery requires the clinician to make an incision in the abdomen to examine internal organs, which may

be the liver, spleen, bowel, and blood vessels [3]. While the choice to conduct a laparotomy is made based on clinical presentation, hemodynamic instability, and diagnostic tools like FAST and CT scans, the need for this procedure can sometimes be urgent [4].

Early complications after surgery are very common in exploratory laparotomy and significantly impact the patient's recovery process. Wound infection is one of

the most common complications, developing due to trauma or during the procedure, manifesting itself through signs such as redness, discharge, and poor healing [5]. Bile leakage is another major complication, especially if there is damage to the liver and biliary system, when bile leaks into the abdominal cavity and causes inflammation and infection [6]. Another severe complication associated with this procedure is wound dehiscence, also known as "burst abdomen," when the surgical wound splits open partly or entirely because of poor wound healing, infection, or increased pressure in the abdomen [7].

Septicemia is a critical and potentially lethal complication which may develop secondary to poorly controlled infection, especially if the source of infection is intra-abdominal or associated with wounds [8]. Should it progress untreated, it could lead to systemic inflammatory reaction syndrome, organ dysfunction, and increased risk of mortality [9]. The following predisposing factors increase the possibility of developing such complications: delayed presentation, severity of the injury, malnutrition, and postoperative care deficiency [10].

The justification behind carrying out this research in Khyber Pakhtunkhwa is the high prevalence rate of abdominal injuries, mainly attributed to road traffic injuries, interpersonal assaults, and lack of safety precautions in the region.

Objective

This research will be undertaken with the aim of determining the causes of postoperative complications and reducing the mortality and morbidity rate associated with exploratory laparotomy for abdominal injuries. The purpose of this study is to find out the incidence rate of early postoperative complications associated with exploratory laparotomy.

METHODOLOGY

This descriptive study was carried out in the General Surgery Department of MTI LRH over a duration from 20th July 2025 to 20th November 2025. The ethical approval certificate number was Ref No. 229/LRH/MTI dated 02/06/2025. The sample size was calculated as 76 by using WHO sample size calculator, taking expected frequency of bile leak as 5.2%, 11 margin of error 5% and confidence level 95%.

Inclusion criteria: Patients of age 25–70 years of either gender and presenting with abdominal trauma as defined above were included in the study.

Exclusion criteria: Patients having pre-existing chronic abdominal conditions, pregnancy, or immunocompromised status were excluded from the study.

Before starting data collection, informed written consent was taken from all patients after explaining purpose, benefits and possible risks of study. Demographic variables including age and gender were recorded for each patient. Patients having abdominal trauma were identified on clinical evaluation, where blunt trauma was considered when abdominal tenderness, pain (VAS>3), and hematuria were present, while penetrating trauma was considered when entry or exit wound, pain (VAS>3), and tenderness were present. Exploratory laparotomy was carried out as opening of abdominal cavity through midline incision for direct visualisation and management of intra-abdominal organs.

Patients were then followed up for 30 days after procedure for occurrence of early post-operative complications. Early post-operative complications were assessed during follow-up period. Wound infection was taken when there was redness, pain (VAS>3), warmth and purulent discharge at wound site on clinical examination. Bile leak was considered when ultrasound showed anechoic or hypoechoic fluid collection in subhepatic or perihepatic region in patients having abdominal pain (VAS>3), fever and jaundice. Dehiscence of wound was described as partial or complete tearing apart of the surgical wound. Paralytic ileus was described as showing uniform dilatation of both small and large bowel loops on radiology in patients who presented with distended abdomen and nausea/vomiting. Sepsis was described as finding of growth of either bacterium or fungus in one or more blood cultures from patients who had at least two of the following: respiratory rate >22/min, altered sensorium, or blood pressure <100 mm Hg.

Data was analysed using SPSS version 25. Numerical variable like age was presented as mean $\pm$ standard deviation or median with interquartile range. Categorical variables including gender, early post-operative complications, clinical presentations and residence area were presented as frequencies and percentages. Stratification of early post-operative complications was done with respect to age, gender, clinical presentations and residence area to assess effect modifiers. Post-stratification Chi-square test or Fisher's exact test was applied and p-value <0.05 was considered statistically significant.



RESULTS

The mean age of patients was 50.07 ± 12.59 years and mean BMI was 26.81 ± 3.53 kg/m². Majority of patients were male 57 (75.0%) while females were 19 (25.0%). Most patients belonged to rural area 46 (60.5%) as compared to urban 30 (39.5%). Regarding clinical presentation, abdominal pain was most common seen in 45 (59.2%) patients, followed by abdominal distention 16 (21.1%) and hematuria 15 (19.7%) (Table-I).

Table 1. Patient Demographics

Demographics	Mean $\pm$ SD / n (%)
Age (years)	50.07 $\pm$ 12.59
BMI (kg/m ²)	26.81 $\pm$ 3.53
Gender	
Male n (%)	57 (75.0%)
Female n (%)	19 (25.0%)
Residence	
Rural n (%)	46 (60.5%)
Urban n (%)	30 (39.5%)
Clinical Presentation	
Abdominal Pain n (%)	45 (59.2%)
Abdominal Distention n (%)	16 (21.1%)
Hematuria n (%)	15 (19.7%)

Thrombus grade III was observed in 41.5% of patients in the DAPT group and 44.4% in the triple therapy group (p=0.73). Thrombus grade IV occurred in 34.8% versus 32.6%, while grade V was seen in 23.7% versus 23.0%, respectively. All patients in both groups had TIMI flow <3 prior to PCI (Table 2). Frequency of early post-operative complications showed that wound infection was present in 29 (38.20%) patients, bile leak in 3 (3.90%), wound dehiscence in 8 (10.50%), paralytic ileus in 6 (7.90%), and septicemia in 11 (14.50%) patients (Table-II).

Table 2. Frequency of Early Post-Operative Complications Following Exploratory Laparotomy n=76

Table 3. Association of Early Post-Operative Complications with Demographic and Clinical Factors

Demographic and Clinical Factors	Wound Infection Yes n (%)	No n (%)	p-value	Bile Leak Yes n (%)	No n (%)	p-value	Wound Dehiscence Yes n (%)	No n (%)	p-value	Paralytic Ileus Yes n (%)	No n (%)	p-value	Septicemia Yes n (%)	No n (%)	p-value
Age (years)															
≤50	17 (41.5%)	24 (58.5%)	0.521	1 (2.4%)	40 (97.6%)	0.592	7 (17.1%)	34 (82.9%)	0.063	4 (9.8%)	37 (90.2%)	0.681	6 (14.6%)	35 (85.4%)	1.000
>50	12 (34.3%)	23 (65.7%)		2 (5.7%)	33 (94.3%)		1 (2.9%)	34 (97.1%)		2 (5.7%)	33 (94.3%)		5 (14.3%)	30 (85.7%)	

Gender															
Male	20 (35.1)	37 (64 .9)	0.3 40	2 (3. 5)	55 (96. 5)	1.0 00	5 (8.8)	52 (91. .2)	0.6 71	5 (8.8)	52 (91. 2)	0.40 3	10 (17.5)	47 (82. .5)	0.2 73
Female	9 (47.4)	10 (52 .6)		1 (5. 3)	18 (94. 7)		3 (15.8)	16 (84. .2)		1 (5.3)	18 (94. 7)		1 (5.3)	18 (94 .7)	
Residen ce															
Rural	22 (47.8)	24 (52 .2)	0.0 32*	3 (6. 5)	43 (93. 5)	0.2 74	6 (13.0)	40 (87 .0)	0.4 62	4 (8.7)	42 (91. 3)	1.00 0	8 (17.4)	38 (82 .6)	0.5 11
Urban	7 (23.3)	23 (76 .7)		0 (0. 0)	30 (10 0.0)		2 (6.7)	28 (93 .3)		2 (6.7)	28 (93. 3)		3 (10.0)	27 (90 .0)	
Presenti ng Compla int															
Abdom inal Pain	18 (40.0)	27 (60 .0)	0.8 05	0 (0. 0)	45 (10 0.0)	0.0 06*	3 (6.7)	42 (93 .3)	0.4 03	0 (0.0)	45 (10 0.0)	<0.0 01*	6 (13.3)	39 (86 .7)	0.3 89
Abdom inal Distenti on	5 (31.3)	11 (68 .8)		0 (0. 0)	16 (10 0.0)		2 (12.5)	14 (87 .5)		6 (37.5)	10 (62. 5)		4 (25.0)	12 (75 .0)	
Hemat uria	6 (40.0)	9 (60 .0)		3 (20 .0)	12 (80. 0)		3 (20.0)	12 (80 .0)		0 (0.0)	15 (10 0.0)		1 (6.7)	14 (93 .3)	

Values are presented as n (%). Chi-square test/Fisher's exact test was used to assess associations. $p < 0.05$ was considered statistically significant and is indicated by an asterisk (*).

On stratified analysis, wound infection was significantly higher among rural patients 22 (47.8%) as compared to urban 7 (23.3%) with $p=0.032$, while no significant association was seen with age ($p=0.521$) and gender ($p=0.340$). Bile leak showed significant association with abdominal pain where no cases were observed in patients with abdominal pain versus presence in those without pain ($p=0.006$). Paralytic ileus also showed significant association with abdominal pain, with no cases in patients having abdominal pain compared to occurrence in those without it ($p<0.001$). No other variables including age, gender, residence, abdominal distention and hematuria showed statistically significant association with any of the complications (Table-III).

Table 3. Association of Early Post-Operative Complications with Demographic and Clinical Factors

Demogr aphic Factors	Wou nd Infec tion Yes n (%)	No n (%)	p- val ue	Bile Lea k Yes n (%)	No n (%)	p- val ue	Woun d Dehisc ence Yes n (%)	No n (%)	p- val ue	Paral ytic Ileus Yes n (%)	No n (%)	p- valu e	Septic emia Yes n (%)	No n (%)	p- val ue
Age ≤50	17 (41.5 %)	24 (58. 5%)	0.5 21	1 (2.4 %)	40 (97.6 %)	0.5 92	7 (17.1 %)	34 (82. 9%)	0.0 63	4 (9.8 %)	37 (90.2 %)	0.68 1	6 (14.6 %)	35 (85. 4%)	1.0 00
Age >50	12 (34.3 %)	23 (65. 7%)		2 (5.7 %)	33 (94.3 %)		1 (2.9%)	34 (97. 1%)		2 (5.7 %)	33 (94.3 %)		5 (14.3 %)	30 (85. 7%)	
Male	20 (35.1 %)	37 (64. 9%)	0.3 40	2 (3.5 %)	55 (96.5 %)	1.0 00	5 (8.8%)	52 (91. 2%)	0.6 71	5 (8.8 %)	52 (91.2 %)	0.40 3	10 (17.5 %)	47 (82. 5%)	0.2 73

Female	9 (47.4 %)	10 (52.6%)		1 (5.3 %)	18 (94.7 %)		3 (15.8 %)	16 (84.2%)		1 (5.3 %)	18 (94.7 %)		1 (5.3%)	18 (94.7%)	
Rural	22 (47.8 %)	24 (52.2%)	0.0 32*	3 (6.5 %)	43 (93.5 %)	0.2 74	6 (13.0 %)	40 (87.0%)	0.4 62	4 (8.7 %)	42 (91.3 %)	1.00 0	8 (17.4 %)	38 (82.6%)	0.5 11
Urban	7 (23.3 %)	23 (76.7%)		0 (0.0 %)	30 (100.0%)		2 (6.7%)	28 (93.3%)		2 (6.7 %)	28 (93.3 %)		3 (10.0 %)	27 (90.0%)	
Presenting Complaint															
Abdominal Pain	18 (40.0 %)	27 (60.0%)	0.8 05	0 (0.0 %)	45 (100.0%)	0.0 06*	3 (6.7%)	42 (93.3%)	0.4 03	0 (0.0 %)	45 (100.0%)	<0.0 01*	6 (13.3 %)	39 (86.7%)	0.3 89
Abdominal Distention	5 (31.3 %)	11 (68.8%)		0 (0.0 %)	16 (100.0%)		2 (12.5 %)	14 (87.5%)		6 (37.5 %)	10 (62.5 %)		4 (25.0 %)	12 (75.0%)	
Hematuria	6 (40.0 %)	9 (60.0%)		3 (20.0 %)	12 (80.0 %)		3 (20.0 %)	12 (80.0 %)		0 (0.0 %)	15 (100.0%)		1 (6.7%)	14 (93.3%)	

Note: $p < 0.05$ indicates statistical significance. Values are presented as **n (%)**. Significant p-values are marked with an asterisk (*).

DISCUSSION

The results show that infection of wounds is the most common complication, being experienced by 29 patients (38.2%), followed by septicemia with 11 patients (14.5%), wound dehiscence for 8 patients (10.5%), and paralytic ileus for 6 patients (7.9%), with the least common complication being bile leak for only 3 patients (3.9%). The high prevalence rate of infection might be associated with poor handling of tissues and delayed presentation due to the presence of bacteria and contaminants that would hinder the healing process. The increased number of patients with septicemia could result from systemic inflammation and the transfer of bacteria from the gut wall. Furthermore, there was a significant higher number of patients with wound infection from the rural community (22 patients, 47.8%) compared to the urban community (7 patients, 23.3%). Such an observation could arise from poor sanitation, delayed presentation, and lack of facilities for wound treatment in the rural areas. Bile leakage and paralytic ileus showed a significant relationship with the development of pain, implying that pain is an important factor that could denote internal injury to the bowel and biliary ducts.

The findings of present study showed wound infection as most common complication 29 (38.2%), which is comparable with Bhatti AA et al. 12 reporting 24% and Bansal AR et al. 13 showing wound complications 33%, though slightly higher in current data, possibly due to trauma-related contamination and delayed intervention. Similar

trend also observed by Amrit P et al. 14 with wound complications 33% and Chauhan S et al. 15 with 11.4%, however lower rates in some studies may be due to better perioperative care and early management. Septicaemia 11 (14.5%) in present findings is higher than Chauhan S et al. 16 reporting 8% and Chaudhary SH et al. 17 showing 5.6%, which may be explained by severity of abdominal trauma and higher risk of systemic infection in such patients. Wound dehiscence 8 (10.5%) is nearly similar to Bhatti AA et al. 12 (10.67%) and Iqbal S et al. 18 (10.1%), suggesting consistent pattern related to poor wound healing, infection and increased intra-abdominal pressure. Paralytic ileus 6 (7.9%) is lower than Amrit P et al. 14 and Bansal AR et al. 13 (26%), possibly due to variation in patient selection and early mobilisation practices. Bile leak 3 (3.9%) remained least common, which is expected finding due to limited hepatobiliary injuries, also supported indirectly by trauma distribution described in Pooria A et al. 19

Higher wound infection in rural population 22 (47.8%) is in line with general observations of increased complications in resource-limited settings, although not directly quantified in most studies, but Hatewar A et al. 20 suggested influence of socio-demographic factors on outcomes. Lack of significant association with age and gender is consistent with Iqbal S et al. 18 where no demographic impact was noted, possibly indicating that surgical and injury-related factors play more dominant role than baseline characteristics. Overall, complication burden observed is comparable with multiple emergency

laparotomy studies such as Murtaza B et al. 21 (33.7%) and Chauhan S et al. 15 (36.57%), though slightly higher rates in present findings may be due to trauma-specific pathology and late presentation.

Limitations

The limitation of this study is that it was done on a single-center basis. This can be seen as a factor that affects the ability to generalize from the results. Another limitation that could affect the strength of the research is that a smaller sample size was used in the experiment. Non-probability sampling increases the chances of having a bias in the study.

CONCLUSION

Conclusions of our study show that early complications following exploratory laparotomy for abdominal trauma are prevalent, with the majority of patients developing wound infections as the leading complication. Septicaemia, wound dehiscence, and paralytic ileus were other complications encountered by the subjects in our study group. Being from rural settings and having specific clinical presentations were linked with the development of complications.

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Conflict of Interest: It is stated that no conflicts of interest was present in this study.

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