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Patterns of Clinical Presentation and Early Management of Anorectal Injuries in Bangladesh: A Cross-Sectional Study

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Abstract: ***Background*:** Traumatic anorectal injuries are infrequent but associated with significant morbidity due to contamination, hemorrhage, frequent pelvic/urogenital involvement, and diagnostic delay. Evidence on presentation patterns and early management in Bangladesh is limited. This study aimed to characterize injury mechanisms, clinical presentation, injury patterns, associated injuries, time-to-care intervals, immediate management, and short-term outcomes among patients with traumatic anorectal injuries. ***Methods*:** This hospital-based cross-sectional retrospective observational study was conducted at the Casualty Department, Dhaka Medical College Hospital (DMCH), a high-volume emergency referral center, and Department of Casualty, Shaheed Suhrawardy Medical College Hospital (ShSMCH), Dhaka, Bangladesh, from July 2022 to January 2024. A total of 200 consecutive patients with clinically evident anal injury, rectal injury, or suspected rectal injury were included irrespective of age and sex. Data were extracted from emergency records, operative findings, and postoperative charts using a semi-structured data sheet. Descriptive statistics were summarized as frequencies and percentages. ***Results*:** Most patients were aged 21–30 years (56, 28.0%) and male (152, 76.0%). Blunt trauma accounted for 150 (75.0%) cases, mainly due to road traffic accidents (118/150, 78.66%), while penetrating trauma comprised 50 (25.0%), most commonly from impalement (20/50, 40.0%). 148 (74.0%) patients arrived within 6 hours, and per rectal bleeding was the leading presentation (140, 70.0%); 92 (46.0%) were hemodynamically unstable on admission. Injury patterns included anal only (80, 40.0%), rectal only (50, 25.0%), and combined anal–rectal (70, 35.0%). The most common procedures were sigmoid loop colostomy (86, 43.0%) and surgical toileting/ debridement (68, 34.0%). 112 (56.0%) patients recovered uneventfully; the most frequent complications were wound infection (48, 24.0%) and wound dehiscence (40, 20.0%), with mortality in 12 (6.0%) cases. ***Conclusion*:** Traumatic anorectal injuries at this tertiary center were predominantly blunt, frequently presented with per rectal bleeding and physiological instability, and commonly required diversion procedures. Wound-related complications were the main short-term morbidities.

Keywords: Anorectal Injury, Rectal Trauma, Anal Trauma, Colostomy, Hartmann's Procedure.

Research Paper

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INTRODUCTION

Traumatic injuries to the anus and rectum are relatively uncommon in civilian practice but carry disproportionate clinical significance because contamination, hemorrhage, and missed injury can rapidly progress to pelvic sepsis, multi-organ dysfunction, and death. Contemporary civilian series estimate rectal trauma to represent roughly 1–3% of trauma cases, yet complication rates remain substantial, particularly when diagnosis or source control is delayed [1, 2]. The rectum is anatomically divided into intraperitoneal and extraperitoneal segments, and this

distinction underpins both diagnostic strategy and operative decision-making: intraperitoneal rectal injuries are generally managed akin to colonic injuries, whereas extraperitoneal injuries often require individualized approaches based on tissue destruction, contamination, and physiology [2, 3].

Diagnosis is frequently challenging. Rectal injuries may be occult on the initial secondary survey, especially in patients with blunt trauma, altered sensorium, distracting injuries, or pelvic fractures. As a result, expert guidance emphasizes a high index of suspicion and the use of targeted adjuncts—most commonly contrast-enhanced computed tomography (CT) in conjunction with endoscopic evaluation (rigid proctoscopy/sigmoidoscopy) where feasible—to improve detection of both rectal injury and associated pelvic or urogenital trauma [2-4]. At the systems level, the broader bowel-injury literature consistently links delayed recognition and treatment to increased infectious complications, reinforcing the importance of timely assessment and early operative control when injury is suspected [4, 5].

Management of rectal trauma has evolved substantially from historical wartime paradigms. Traditional "four Ds" (debridement, diversion, presacral drainage, and distal rectal washout) have been increasingly questioned, particularly in nondestructive extraperitoneal injuries [3]. Evidence-based guidelines from the Eastern Association for the Surgery of Trauma (EAST) address key components of initial operative management—proximal diversion, presacral drainage, and distal washout—highlighting that routine use of some adjuncts may not confer benefit in modern civilian cohorts [6]. Similarly, the Western Trauma Association algorithm reflects contemporary practice in which presacral drainage and distal washout are now rarely routine and may be reserved, if at all, for highly selected scenarios [7].

Despite advances in diagnostic imaging, resuscitation, antibiotics, and operative technique, outcomes remain highly dependent on physiological status at presentation and time to definitive management. In low- and middle-income settings, additional barriers—pre-hospital limitations, referral delays, and resource constraints—may further magnify risk. Against this backdrop, country-specific data describing presentation patterns, early management choices, and short-term outcomes are essential to inform pragmatic protocols and quality improvement. Therefore, this study aimed to characterize the patterns of clinical presentation, mechanisms and extent of injury, associated injuries, early management strategies, time-to-care intervals, and immediate outcomes among patients with traumatic anorectal injuries managed at a major tertiary referral center in Bangladesh.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based cross-sectional retrospective observational study conducted to evaluate the clinical presentation patterns, early management strategies, and immediate outcomes of patients with traumatic anorectal injuries between July 2022 and January 2024.

The study was conducted at two tertiary care centers in Dhaka, Bangladesh: The Casualty Department, Dhaka Medical College Hospital (DMCH), a high-volume emergency referral center, and the Department of Casualty, Shaheed Suhrawardy Medical College Hospital (ShSMCH). Both institutions provide comprehensive emergency and surgical care and serve as major tertiary-level referral centers for trauma patients.

Study Population

The study population comprised patients admitted with traumatic anorectal injury during the study period, including those with clinically evident anal injury, rectal injury, or suspected rectal injury. All eligible cases presenting to the Casualty Department of both hospitals were considered for inclusion irrespective of age and sex. Patients were included if they presented with penetrating or blunt anorectal trauma, and cases with associated injuries, including extra-abdominal trauma, were also enrolled. Importantly, patients presenting with extensive fecal contamination and/or shock were not excluded, as these conditions represent the real-world clinical spectrum of anorectal trauma.

Patients were excluded if they were clinically suspected to have rectal injury, but laparotomy revealed injury at sites other than the rectum, indicating misclassification of the primary injury. Additionally, patients who died before initiation of necessary management steps or who were brought dead were excluded because early management details and outcome assessment could not be reliably documented for these cases.

Sample Size and Sampling Technique

The sample size for this cross-sectional study was estimated using the single population proportion formula:

$$n = \frac{Z^2 p(1-p)}{d^2}$$

Where n represents the required sample size, Z denotes the standard normal deviate at the 95% confidence level (1.96), p indicates the expected

proportion (prevalence) of the key outcome, and d refers to the margin of error (precision) at the 7%. As there was no reliable prior estimate regarding the proportion of traumatic anorectal injuries or major clinical presentation patterns in Bangladesh, p = 0.50 was used to ensure the maximum sample size, n=195.9 ≈ 196. After rounding up and considering record completeness, the final sample size was determined to be 200 patients.

All eligible patients with traumatic anorectal injury admitted to the Casualty Department of both Hospitals during the study period (July 2022 to April 2024) were included until the required sample size was reached.

Data Collection Procedure

Data were collected using a semi-structured data collection sheet specifically designed for this study to capture all relevant information related to traumatic anorectal injuries. This tool recorded patient demographics, the mechanism and cause of injury, clinical presentation, physical examination findings, time intervals from injury to hospital arrival and definitive management, associated injuries, operative findings, immediate management options, and short-term outcomes.

Information was primarily obtained from hospital records, including emergency department assessment notes, admission files, investigation reports, operative notes, and postoperative monitoring charts. For each eligible patient, the initial resuscitation measures, hemodynamic status at presentation, and clinical signs suggestive of anorectal or intra-abdominal injury were systematically documented.

Operative and management-related data were extracted from surgical records, detailing the site and extent of anorectal injury, degree of fecal contamination, associated intra-abdominal organ involvement, and the specific operative procedures performed (e.g., primary repair, diversion colostomy, Hartmann's procedure, presacral drainage, and surgical toileting). Postoperative progress was monitored until discharge, and early complications such as wound infection, wound dehiscence, septicemia, pulmonary complications, fecal incontinence, colostomy-related issues, and mortality were recorded.

All collected data were checked for completeness and consistency before being entered into the database. Data processing included careful editing, coding, and computerization to minimize errors and ensure accurate analysis.

Clinical Assessment and Management Protocol

All patients were assessed and managed according to standard trauma protocols with initial stabilization following airway, breathing, and circulation (ABC) principles. Hemodynamic status was evaluated on admission, and patients received intravenous fluids, blood transfusion when required, broad-spectrum antibiotics, and tetanus prophylaxis as part of immediate care.

After stabilization, diagnosis was based mainly on history, clinical presentation, and physical examination, including abdominal and perineal assessment. Patients with suspected intra-abdominal injury, peritonitis, significant contamination, or hemodynamic instability were prioritized for operative intervention, and associated injuries were assessed and managed simultaneously.

During surgery, anorectal injuries were evaluated for extent of damage and contamination, and managed using appropriate operative options such as primary repair, proximal diversion (sigmoid loop colostomy), or Hartmann's procedure, with presacral drainage and surgical toileting/debridement when indicated. The peritoneal cavity was irrigated with normal saline and betadine solution, and pelvic drainage was used in most cases. Postoperatively, patients received routine monitoring, wound care, and follow-up until discharge, and early complications were recorded.

Statistical Analysis

After data collection, all variables were checked for completeness and consistency, then coded and entered into a computerized database. Statistical analysis was performed using SPSS (Statistical Package for Social Sciences). Descriptive statistics were used to summarize the findings. Categorical variables (e.g., sex, mechanism of injury, clinical features, injury pattern, management options, and complications) were presented as frequencies and percentages, while continuous variables (e.g., time intervals and duration of hospital stay) were summarized using mean ± standard deviation (SD) and/or ranges where appropriate. Results were displayed in tables and figures to describe patterns of clinical presentation, early management, and short-term outcomes.

Ethical Considerations

The institutional review board at Shaheed Suhrawardy Medical College Hospital (ShSMCH) and Dhaka Medical College Hospital (DMCH) granted ethical approval for the study before its commencement. Participation was voluntary, and all patients or their legal guardians provided informed consent in Bangla after receiving a detailed explanation of the study's purpose. We ensured strict confidentiality and privacy by using anonymized data, which was accessible only to the

research team. Participants were explicitly informed that choosing not to participate would not affect their treatment or the standard of care, and that all information collected would be used solely for research purposes.

RESULTS

Among the 200 patients, the most common age group was 21–30 years, 56 (28.0%). Patients aged 0–10 years and 11–20 years each accounted for 40 (20.0%), while those aged 31–40 years comprised 36 (18.0%). Smaller proportions were observed in the 41–50 years group 14 (7.0%), 51–60 years (10, 5.0%), and >60 years 4 (2.0%). Regarding sex distribution, 152 (76.0%) patients were male, and 48 (24.0%) were female. In terms of injury mechanism, blunt/non-penetrating trauma was reported in 150 (75.0%) cases, while penetrating trauma accounted for 50 (25.0%) cases.

Table 1: Baseline characteristics and mechanism of injury (n = 200)

Variable	Category	n (%)
Age group (years)	0–10	40 (20.0)
	11–20	40 (20.0)
	21–30	56 (28.0)
	31–40	36 (18.0)
	41–50	14 (7.0)
	51–60	10 (5.0)
	>60	4 (2.0)
Sex	Male	152 (76.0)
	Female	48 (24.0)
Mechanism of injury	Penetrating	50 (25.0)
	Blunt / non-penetrating	150 (75.0)

Causes of Injury by Mechanism

Among the penetrating injuries (n = 50), the most frequently reported cause was fall on an object/impalement in 20 (40.0%) patients. This was followed by self-insertion of a foreign body in 10 (20.0%) patients. Stab by knife and attack by domestic animal were each reported in 6 (12.0%) patients, while sodomy was reported in 4 (8.0%) patients. Khunti (spatula) and teta (a specialized sharp pointed traditional spear like instrTatt catch fish) were each documented in 2 (4.0%) patients.

Among blunt/non-penetrating injuries (n = 150), road traffic accident (compression) was the most common cause, reported in 118 (78.7%) patients. Fall from height/into water accounted for 16 (10.7%) cases, while physical assault (blow/kick) and barotrauma were each reported in 8 (5.3%) cases (Table 2).

Table 2: Causes of injury by mechanism (n = 200)

Mechanism	Cause	n (%)
Penetrating (n = 50)	Fall on an object / impalement	20 (40.0)
	Self-insertion of foreign body	10 (20.0)
	Stab by knife	6 (12.0)
	Attack by domestic animal	6 (12.0)
	Sodomy	4 (8.0)
	Khunti	2 (4.0)
	Tatta	2 (4.0)
Blunt / non-penetrating (n = 150)	Road traffic accident (compression)	118 (78.7)
	Fall from height/into water	16 (10.7)
	Physical assault (blow/kick)	8 (5.3)
	Barotrauma	8 (5.3)

Percentages are calculated within each mechanism group.

Time from Injury to Hospital Arrival

Among the 200 patients, 20 (10.0%) arrived at the hospital within <1 hour of injury. The majority presented within 1–6 hours, comprising 128 (64.0%) cases. A total of 32 (16.0%) patients reached the hospital within 6–12 hours, while 8 (4.0%) presented within 12–24 hours. Delayed arrival was observed in 8 (4.0%) patients who arrived within 24–48 hours, and 4 (2.0%) patients who arrived >48 hours after injury.

Table 3: Time from injury to hospital arrival of patient (n = 200)

Time to arrival (hours)	n (%)
<1	20 (10.0)
1–6	128 (64.0)
6–12	32 (16.0)
12–24	8 (4.0)
24–48	8 (4.0)
>48	4 (2.0)

For patients who underwent definitive surgery within 0–6 hours, 26 (54.2%) had uneventful recovery, 18 (37.5%) developed morbidity, and 4 (8.3%) died.

Time from Injury to Definitive Surgery and Outcome

Among those operated within 6–12 hours, 16 (17.8%) had uneventful recovery, 72 (80.0%) developed morbidity, and 2 (2.2%) died. For patients operated within 12–24 hours, 4 (28.6%) had uneventful recovery, 8 (57.1%) developed morbidity, and 2 (14.3%) died. Among those operated within 24–48 hours, 2 (20.0%) had uneventful recovery, 6 (60.0%) developed morbidity, and 2 (20.0%) died. For patients operated after >48 hours, 0 (0.0%) had uneventful recovery, while 2 (66.3%) developed morbidity and 2 (33.3%) died (Table 4).

Table 4: Time from injury to definitive surgery and outcome

Time to surgery (hours)	Uneventful recovery n (%)	Morbidity n (%)	Mortality n (%)
0–6	26 (54.2)	18 (37.5)	4 (8.3)
6–12	16 (17.8)	72 (80.0)	2 (2.2)
12–24	4 (28.6)	8 (57.1)	2 (14.3)
24–48	2 (20.0)	6 (60.0)	2 (20.0)
>48	0 (0.0)	2 (66.3)	2 (33.3)

Percentages in section are calculated within each time-to-surgery category.

Clinical Presentation, Injury Pattern, Immediate Management, and Outcomes

Among the 200 patients, the most frequently reported clinical feature was per rectal bleeding in 140 (70.0%) cases. Abdominal pain was present in 96 (48.0%) patients. Anorectal laceration and absent anal tone were each documented in 88 (44.0%) patients. Hematuria and abdominal rigidity were each observed in 76 (38.0%) cases, while hypotension was recorded in 72 (36.0%) patients. Abdominal tenderness was present in 64 (32.0%) cases. Dehydration and abdominal distension were each reported in 52 (26.0%) patients, and evisceration occurred in 48 (24.0%) cases. Absent bowel sound was noted in 40 (20.0%) patients, and fecal incontinence in 36 (18.0%) cases. Dyspnoea and obliteration of liver dullness were each present in 20 (10.0%) patients, while foreign body in anus/rectum was documented in 12 (6.0%) cases. Regarding injury pattern, anal injury only was recorded in 80 (40.0%) patients, both anal and rectal injury in 70 (35.0%), and rectal injury only in 50 (25.0%) patients. On admission, 108 (54.0%) patients were hemodynamically stable, while 92 (46.0%) were hemodynamically unstable (hypotension/shock).

Table 5: Clinical presentation, Injury pattern, immediate management, and outcomes (n=200)

Variable	n (%)
Clinical feature	
Per rectal bleeding	140 (70.0)
Abdominal pain	96 (48.0)
Anorectal laceration	88 (44.0)
Absent anal tone	88 (44.0)
Hematuria	76 (38.0)
Abdominal rigidity	76 (38.0)
Hypotension	72 (36.0)
Abdominal tenderness	64 (32.0)
Dehydration	52 (26.0)
Abdominal distension	52 (26.0)
Evisceration	48 (24.0)
Absent bowel sound	40 (20.0)
Fecal incontinence	36 (18.0)
Dyspnoea	20 (10.0)

Obliteration of liver dullness	20 (10.0)
Foreign body in anus/rectum	12 (6.0)
Injury pattern	
Rectal injury only	50 (25.0)
Anal injury only	80 (40.0)
Both anal and rectal injury	70 (35.0)
Hemodynamic status on admission	
Stable	108 (54.0)
Unstable (hypotension/shock)	92 (46.0)

Immediate Operative Management

Among the 200 patients, sigmoid loop colostomy was performed in 86 (43.0%) cases, while surgical toileting/debridement was undertaken in 68 (34.0%) cases. Hartmann's procedure was performed in 34 (17.0%) patients. Less frequently, presacral drainage was performed in 8 (4.0%) cases, and primary repair was performed in 6 (3.0%) cases (Table 6).

Table 6: Immediate operative management (n = 200)

Procedures	n (%)
Primary repair	6 (3.0)
Sigmoid loop colostomy	86 (43.0)
Hartmann's procedure	34 (17.0)
Presacral drainage	8 (4.0)
Surgical toileting/debridement	68 (34.0)

Multiple procedures could be performed in the same patient in ***immediate operative management***

Table 7: Short-term outcomes and complications (n = 200)

Outcome / complication	n (%)
Uneventful recovery	112 (56.0)
Wound infection	48 (24.0)
Wound dehiscence	40 (20.0)
Pyrexia	42 (21.0)
Pulmonary complications	16 (8.0)
Colostomy-related complications	16 (8.0)
Septicemia	12 (6.0)
Fecal incontinence	12 (6.0)
Urinary fistula	8 (4.0)
Intra-abdominal abscess	6 (3.0)
Enterocutaneous fistula	4 (2.0)
Osteomyelitis of sacrum	4 (2.0)
Death	12 (6.0)

DISCUSSION

This cross-sectional study describes patterns of clinical presentation and early management of traumatic anorectal injuries in a tertiary care setting. Traumatic rectal and anorectal injuries are uncommon in civilian practice, with civilian series reporting these injuries as a small proportion of all trauma admissions [8]. The rarity of these injuries has historically limited large prospective investigations, and much of the existing literature is derived either from military cohorts or heterogeneous trauma registries [2-9].

In this cohort, both penetrating and blunt mechanisms were represented, with blunt trauma being more frequent (75.0% of cases), predominately due to road traffic accidents (78.7% of blunt injuries). This differs from some prior civilian series in which penetrating mechanisms predominated, particularly firearm-related trauma [8-10]. Nonetheless, blunt pelvic trauma, especially associated with compression mechanisms such as road traffic accidents, has been previously documented to contribute significantly to rectal injury in non-military settings [2-11]. The distribution of injury patterns—including isolated anal or rectal injury and combined lesions—aligns with the spectrum of trajectories observed in other trauma populations.

The clinical presentation in this cohort encompassed a spectrum of features. Per rectal bleeding was the most common sign (70.0%), followed by

abdominal pain (48.0%), anorectal laceration (44.0%), and absent anal tone (44.0%), are consistent with established presentations of lower gastrointestinal trauma [12]. Hematuria and pelvic signs reflect the frequent coexistence of urogenital and pelvic fractures reported in other series, underscoring the need for comprehensive assessment in trauma patients [8-13].

Time to care was an important variable in this cohort. Although 74.0% of patients reached the hospital within 6 hours of injury, only 24.0% underwent definitive surgery within that timeframe. Among those operated on within 0–6 hours, a higher proportion had an uneventful recovery (54.2%) than among patients receiving delayed surgery, where morbidity predominated. Although causality cannot be inferred in this observational design, these patterns reinforce the critical role of timely surgical intervention in contaminated abdominal and perineal trauma. Early operative control is widely recognized for reducing infectious complications and facilitating better physiologic stabilization [2-14].

Operative management in this cohort included a range of procedures, from primary repair and fecal diversion to more extensive approaches such as Hartmann's procedure. These options reflect historical and contemporary trauma practice, with sigmoid loop colostomy performed in 43.0% of patients and Hartmann's procedure in 17.0%. Primary repair was less common (3.0%), consistent with selective repair guided by injury severity and contamination, wherein intraperitoneal injuries are often treated similarly to colonic injuries, and extraperitoneal injuries are managed with diversion and selective repair [2-15]. Prior studies have also reported variation in the utilization of diversion, repair, presacral drainage, and adjuncts such as distal washout, with some findings suggesting that certain adjunctive procedures may not uniformly improve outcomes [3-16].

The documented postoperative complications in this series, including wound infection, dehiscence, abscess, sepsis, and colostomy-related issues, are similar to those reported in other rectal trauma cohorts [2-17]. Morbidity associated with anorectal trauma has been linked to the degree of contamination, the presence of associated injuries, and delays in definitive care, consistent with trauma literature demonstrating that complex pelvic and rectal injuries are associated with increased infectious and wound-related complications [8].

Mortality in this study occurred exclusively among patients with hemodynamic instability at presentation. Hemodynamic compromise is a well-recognized predictor of adverse outcomes in trauma and often prompts damage-control strategies, reflecting contemporary approaches that prioritize physiologic optimization prior to definitive repair [18].

The findings presented here provide context-specific data on immediate management and short-term outcomes of anorectal injuries in a high-volume tertiary care center. They also add to the broader evidence base by documenting how mechanisms, clinical presentations, operative approaches, and early outcomes manifest in a predominantly blunt trauma setting. These observations may inform future prospective studies and contribute to evolving best practice recommendations in the assessment and early management of traumatic anorectal injuries.

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