International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Non-Traumatic Bowel Perforation: Clinical Profile, Surgical Interventions, and Postoperative Outcomes in a Tertiary Care Centre

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ABSTRACT

Background: Among the myriad surgical emergencies encountered by surgeons, hollow viscus perforation remains one of the most prevalent and formidable causes. Despite significant advancements in perioperative management, intensive care protocols, and broad-spectrum antimicrobial therapy, perforation peritonitis continues to be a major contributor to both morbidity and mortality in surgical patients.

Methods: A prospective observational study was conducted in the Department of General Surgery, Jawaharlal Nehru Medical College and Hospital (JNMCH), Aligarh Muslim University (AMU), Aligarh, between August 2022 and July 2024 to analyse the clinical profile, management protocols, and surgical outcomes of patients presenting with non-traumatic gastrointestinal perforations. A total of 358 patients, aged 12 years and above, who presented with acute abdomen due to non-traumatic gastrointestinal perforation and subsequently underwent emergency exploratory laparotomy, were included in the study.

Results: Perforation was more prevalent in males (73.74%), with the most common age group being 21-30 years (37.99%). Acute abdominal pain and tenderness (100%) were the most consistent clinical manifestations, followed by abdominal distension (69.83%), guarding, rigidity, and rebound tenderness in many cases. The ileum (62.57%) was the most frequent site of perforation, followed by the stomach (16.20%), with intraoperative findings often revealing feculent or bilious peritonitis. A history of NSAID-induced mucosal injury was reported in 122 patients (34.08%). In the majority of cases, the underlying pathology was either non-specific or undetermined (152 cases, 42.46%). Among the identified aetiologies, enteric fever-related perforations were the most common (72 cases, 20.11%), followed by tubercular perforations (58 cases, 16.20%), perforated appendicitis (32 cases, 8.94%), gastric perforations due to peptic ulcer disease or gastritis (30 cases, 8.38%), diverticular perforations (8 cases, 2.23%), and colonic perforations secondary to malignancy (6 cases, 1.68%). The most frequently encountered postoperative complication was surgical site infection (SSI) (73.18%), followed by electrolyte imbalances (24.58%),

respiratory complications such as pneumonia and ARDS (21.23%), sepsis (15.08%), intra-abdominal abscess formation (7.26%), and wound dehiscence or burst abdomen (5.03%). The overall mortality rate was 8.38%.

Conclusions: Non-traumatic bowel perforations are a common surgical emergency, particularly in developing countries like India. This condition affects individuals of all age groups but is more prevalent in young adults (21-30 years) and males are disproportionately affected. Acute abdominal pain or tenderness, abdominal distension, nausea, vomiting, obstipation, and signs of peritonitis are the hallmark clinical presentations. The common aetiologies include typhoid fever-related perforation, tubercular ileitis, NSAID-induced peptic ulcer perforation, and perforated appendicitis, with less common causes such as diverticular disease and malignancies.

Timely diagnosis, utilizing contrast-enhanced CT (CECT) scan, erect abdominal X-ray (showing pneumoperitoneum), and ultrasound (FAST for free fluid detection), is critical. Aggressive resuscitation with fluid resuscitation, electrolyte correction, broad-spectrum intravenous antibiotics, and nasogastric decompression is essential before proceeding to emergency exploratory laparotomy. Intraoperative findings typically reveal feculent or bilious peritonitis, necessitating definitive surgical intervention, including primary repair, omental patching, resection and anastomosis, or stoma creation based on the site, size, and cause of perforation. Meticulous post-operative care, including haemodynamic monitoring, ventilatory support when necessary, strict glycaemic control, early enteral nutrition, and infection control, plays a pivotal role in reducing morbidity and mortality.

Delayed presentation and advanced age were associated with higher mortality, primarily due to septic shock, multi-organ dysfunction syndrome (MODS), and persistent peritoneal contamination. Mortality can be mitigated through health education, strengthening primary healthcare infrastructure, improving the recruitment of skilled emergency medical personnel, and ensuring timely referral to higher centres for definitive management.

Keywords: Non-traumatic bowel perforation, Peritonitis, Laparotomy, NSAIDs, Enteric, Tubercular, Gastritis.

1. Introduction

Among surgical emergencies, hollow viscus perforation remains one of the most prevalent and life-threatening conditions, with a rising incidence due to the widespread and unsupervised use of over-the-counter NSAIDs [1]. Non-traumatic intestinal perforations are diagnosed after meticulously excluding external trauma as a causative factor [2]. Peritonitis, a grave sequela of perforation, is classified into primary, secondary, and tertiary types, resulting from hematogenous bacterial dissemination, intraperitoneal contamination due to organ rupture, or persistent intra-abdominal infection despite surgical and antimicrobial intervention [3]. Bowel perforations can be free (open), leading to gross faecal peritonitis with extensive contamination of the peritoneal cavity, or contained (sealed), where surrounding structures such as the omentum or adjacent bowel loops attempt to localize the spillage [4]. Gastrointestinal perforation may progress to diffuse purulent peritonitis, intra-abdominal abscess formation, or enterocutaneous fistula, depending on the anatomical site and the host's inflammatory response. Despite advancements in perioperative optimization, intensive care strategies, and broad-spectrum antimicrobial regimens, perforation peritonitis continues to pose a high burden of morbidity and mortality [5]. Non-traumatic bowel perforations, often underestimated compared to traumatic

perforations, necessitate a comprehensive diagnostic approach, including contrast-enhanced CT scans, intraoperative histopathology, and microbiological cultures, to establish aetiology and guide management. The etiological spectrum exhibits geographic variability, with colonic perforations predominating in Western populations, while gastroduodenal and ileal perforations are more prevalent in India, often attributed to typhoid, tuberculosis, and NSAID-induced mucosal injury [6, 7]. A significant proportion of patients present in a delayed and toxic state with generalized peritonitis, septic shock, and systemic inflammatory response syndrome (SIRS), predisposing them to multiorgan dysfunction syndrome (MODS) and high mortality rates [7]. The cornerstone of surgical management involves aggressive fluid resuscitation, hemodynamic stabilization, source control via emergency exploratory laparotomy, and definitive surgical procedures such as primary closure, resection with anastomosis, or stoma creation (ileostomy/colostomy), depending on intraoperative findings and contamination severity. Postoperatively, intensive monitoring, early enteral nutrition, ventilatory support in cases of respiratory compromise, and judicious antimicrobial stewardship remain pivotal in improving patient outcomes.

2. Methods:

A prospective observational study was conducted in the Department of General Surgery, Jawaharlal Nehru Medical College and Hospital (JNMCH), Aligarh Muslim University (AMU), Aligarh, between August 2022 and July 2024 to analyse the clinicopathological and microbiological spectrum of non-traumatic gastrointestinal perforations, along with their operative management strategies, postoperative morbidity, and patient outcomes. The study included all patients presenting to the Emergency Surgical Team (EST) with a confirmed diagnosis of non-traumatic bowel perforation, necessitating emergent surgical intervention such as exploratory laparotomy, primary closure, segmental resection with anastomosis, exteriorization, or stoma formation based on intraoperative findings and hemodynamic stability. Ethical approval was obtained from the Institutional Ethical Committee (**IECJNMC/851**), Faculty of Medicine, JNMCH, AMU, Aligarh. Prior to enrolment, written informed consent was obtained from all study participants, and the study methodology, objectives, and rationale were thoroughly explained in their native language (Hindi) to ensure comprehension. Preoperative resuscitation, including fluid resuscitation, electrolyte correction, broad-spectrum intravenous antibiotics, and hemodynamic stabilization, was performed as per advanced surgical protocols. Intraoperative parameters such as the site and size of perforation, peritoneal contamination, and degree of peritoneal inflammation were meticulously recorded. Postoperative care involved intensive monitoring for complications such as surgical site infections (SSI), anastomotic dehiscence, intra-abdominal abscess formation, septicaemia, paralytic ileus, and multi-organ dysfunction syndrome (MODS). Patients were managed with appropriate antimicrobial therapy, nutritional support, and timely re-exploration if indicated. Any queries or concerns were duly addressed to uphold ethical and patient-centred research practices, ensuring strict adherence to evidence-based surgical protocols and perioperative management guidelines.

3. Inclusion criteria:

Patients above 12 years of age.

Patients presenting with non-traumatic gastrointestinal perforation and undergoing emergency laparotomy.

4. Exclusion criteria:

Patients with primary peritonitis.
Patients with tertiary peritonitis following anastomotic leak.
Patients presenting with oesophagus, pancreato-biliary tree, or genitourinary tract perforation.

5. Therapeutic intervention

All patients admitted to the Emergency Surgical Team (EST) with acute abdominal pain, without a history of trauma, underwent a comprehensive evaluation, including a detailed history of symptom onset, duration, and progression. Initial resuscitation was performed using intravenous crystalloids (Ringer's lactate, normal saline, dextrose normal saline), broad-spectrum antibiotics (piperacillin-tazobactam, meropenem, metronidazole, amikacin), analgesics (paracetamol, diclofenac, tramadol), and electrolyte correction in hemodynamically unstable patients. A history of prior gastrointestinal disorders, particularly dyspepsia, NSAID abuse, and addictions such as smoking and alcohol consumption, was documented. A thorough general and abdominal examination was conducted, and in cases with clinical features suggestive of peritonitis, further diagnostic workup was initiated.

Radiological investigations included an erect X-ray abdomen and chest X-ray to detect pneumoperitoneum, indicating free gas under the diaphragm. All cases underwent ultrasonography (USG) of the abdomen to assess peritoneal fluid collection and identify any potential aetiology of peritonitis. Computed tomography (CT) scans were performed selectively for better localization of the perforation site and to rule out other intra-abdominal pathology. Routine laboratory tests, including complete blood count (CBC), renal function tests (RFT), blood sugar levels (BS), serum electrolytes (SE), and tetanus toxoid (TT) administration, were conducted. Electrocardiography (ECG) was done to rule out any underlying cardiac comorbidities. Typhoid IgM dot tests were performed in suspected cases of enteric perforation.

After adequate resuscitation, including nasogastric decompression with Ryle's tube insertion, urinary catheterization with Foley's catheter, and preoperative skin preparation, patients were scheduled for exploratory laparotomy. Preoperative prophylactic intravenous antibiotics were administered, and general anaesthesia was induced under continuous hemodynamic monitoring. After induction, standard aseptic precautions were followed, and the operative field was prepared with antiseptic solutions before draping. A midline laparotomy incision was performed in all cases for optimal exposure. The intraoperative findings, including the site and size of the perforation, the extent of peritoneal contamination, the nature of peritoneal fluid (purulent, bilious, feculent), and the presence of adhesions or gangrenous bowel, were meticulously recorded. Based on the intraoperative assessment, the definitive surgical procedure was determined, including primary closure of the perforation, resection with anastomosis, stoma formation, or bowel diversion techniques.

Extensive peritoneal lavage with warm normal saline (5–6 litres) was performed to reduce bacterial load and minimize the risk of postoperative infections. Peritoneal fluid samples were sent for microbiological culture and sensitivity testing. Tissue biopsies were obtained in suspected cases of malignancy or tubercular perforation and submitted for histopathological examination.

Postoperatively, patients were managed in the surgical ward, high-dependency unit (HDU), or surgical intensive care unit (SICU) based on their clinical condition. They were monitored for postoperative complications, including surgical site infections (SSI), anastomotic leaks, intra-abdominal abscesses, paralytic ileus, and septic shock. Oral feeds were introduced once adequate bowel sounds were

auscultated, and stoma functionality was confirmed in patients who underwent stoma formation. Mortality and morbidity data were systematically recorded. Data entry was done in Microsoft Excel, and final statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) software, IBM Corporation, Chicago, USA, version 25.0.

6. RESULTS:

The study was conducted in the Department of General Surgery, Jawaharlal Nehru Medical College and Hospital (JNMCH), Aligarh Muslim University (AMU), Aligarh. A total of 358 patients above 12 years of age who presented with non-traumatic gastrointestinal perforation and subsequently underwent emergency exploratory laparotomy were included in the study. The majority of cases (136 patients, 37.99%) belonged to the age group of 21 to 30 years. Detailed intraoperative findings, including the site and aetiology of perforation, peritoneal contamination, and the surgical procedure performed, were meticulously documented to assess perioperative morbidity and postoperative outcomes.

Table 1: Age distribution

Age	Frequency (N)	Percentage (%)
13 to 20 years	78	21.79%
21 to 30 years	136	37.99%
31 to 40 years	50	13.97%
41 to 50 years	36	10.06%
51 to 60 years	32	8.94%
61 to 70 years	18	5.03%
71 to 80 years	8	2.23%
Mean ± SD	33.42 ± 15.7	
Median (25^{th}-75^{th} percentile)	29(22-42.5)	
Range	13-78	

The majority of non-traumatic gastrointestinal perforation cases were observed in the 21–30 years age group (136 patients, 37.99%), followed by adolescents and young adults aged 13–20 years (78 patients, 21.79%). The incidence exhibited a progressive decline with advancing age, with fewer cases in middle-aged and elderly cohorts. Geriatric patients were the least affected, with only 8 cases (2.23%) in the 71–80 years group. The mean age at presentation was 33.42 ± 15.7 years, with a median of 29 years (IQR: 22–42.5), and an overall age range spanning 13–78 years.

Table 2: Gender distribution

Gender	Frequency	Percentage
Female	94	26.26%
Male	264	73.74%
Total	358	100.00%

Our study showed a male predominance, with 264 males (73.74%) and 94 females (26.26%) out of 358

patients. This aligns with previous studies, linking higher male incidence to risk factors like smoking, alcohol use, dietary habits, and occupational stress. Delayed healthcare-seeking may also contribute to advanced presentations requiring surgery. Targeted prevention and early intervention are crucial to reducing morbidity and mortality.

Table 3: Clinical presentation distribution

Clinical presentation	Frequency	Percentage
Distension	250	69.83%
Pain/tenderness	358	100.00%
Vomiting	112	31.28%
Constipation	92	25.70%
Fever	68	18.99%
Shock	54	15.08%

Table 3 delineates the clinical presentation of 358 patients with non-traumatic gastrointestinal perforation. Generalized abdominal pain and tenderness were universal findings (100%), indicative of peritoneal irritation. Abdominal distension, suggestive of paralytic ileus or evolving peritonitis, was the most prevalent associated symptom (69.83%). Other common manifestations included vomiting (31.28%), likely due to gastric stasis or intestinal obstruction, and constipation (25.70%), reflecting compromised bowel motility. Fever (18.99%) signified a systemic inflammatory response, potentially due to sepsis or intra-abdominal infection. Hemodynamic instability with shock (15.08%) indicated advanced peritoneal contamination, necessitating urgent resuscitation and emergent laparotomy to mitigate morbidity and mortality.

Table 4: Site of perforation distribution

Site of perforation	Frequency	Percentage
Ileal	224	62.57%
Gastric	58	16.20%
Jejunum	10	2.79%
Transverse colon	2	0.56%
Appendix	38	10.61%
Sigmoid	4	1.12%
Ascending colon	2	0.56%
Descending colon	2	0.56%
Caecum	20	5.59%

Table 4 highlights the anatomical distribution of perforation sites in 358 patients with non-traumatic gastrointestinal perforation. The ileum was most affected (224 cases, 62.57%), mainly due to typhoid or tuberculosis, requiring primary closure or resection with anastomosis. Gastric perforations (58 cases, 16.20%) were managed with Graham's patch or acid-reducing surgery. Appendiceal perforations (38 cases, 10.61%) necessitated appendectomy with lavage. Less common sites included the caecum (5.59%),

jejunum (2.79%), sigmoid colon (1.12%), and rare colonic perforations (0.56% each), often requiring resection or diversion. The variability in sites emphasizes tailored surgical approaches and vigilant postoperative care.

Table 5: Pathology of perforation distribution

Pathology of perforation	Frequency	Percentage
Not known	152	42.46%
Appendicitis	32	8.94%
Carcinoma colon	6	1.68%
Diverticulitis	8	2.23%
Enteric	72	20.11%
Gastritis	30	8.38%
Tubercular	58	16.20%
Total	358	100.00%

Table 5 highlights the pathological causes of non-traumatic gastrointestinal perforation in 358 patients. The aetiology was unknown in 152 cases (42.46%), reflecting diagnostic challenges. Enteric fever (20.11%) and tuberculosis (16.20%) were leading causes, requiring intraoperative assessment and antimicrobial therapy. Appendicitis (8.94%) necessitated appendectomy, while gastritis-related perforations (8.38%) were managed with omental patch repair. Less common causes included diverticulitis (2.23%) and colonic carcinoma (1.68%), requiring resection. The diverse pathology emphasizes the need for thorough surgical exploration, histopathological evaluation, and tailored management.

Table 6: Procedure performed distribution

Procedure performed	Frequency	Percentage
Appendicectomy with primary repair with loop ileostomy	2	0.56%
ELPL with Appendectomy	36	10.06%
Resection with end ileostomy	6	1.68%
ELPL with hemicolectomy with end ileostomy with mucus fistula	2	0.56%
ELPL with limited hemicolectomy	2	0.56%

ELPL with loop ileostomy	142	39.66%
MOD graham's omental patch repair	58	16.20%
Primary repair with feeding jejunostomy	2	0.56%
Primary repair with proximal loop ileostomy	44	12.29%
Resection anastomosis with feeding jejunostomy	8	2.23%
Resection anastomosis with proximal loop ileostomy	14	3.91%
Resection with end ileostomy with mucus fistula	40	11.17%
Right hemicolectomy	2	0.56%
Total	358	100.00%

Table 6 outlines the surgical interventions for 358 patients with non-traumatic gastrointestinal perforation. The most common procedure was exploratory laparotomy (ELPL) with loop ileostomy (142 cases, 39.66%), crucial for managing contamination and obstruction. Modified Graham's omental patch repair (58 cases, 16.20%) addressed gastric perforations, while primary repair with proximal loop ileostomy (44 cases, 12.29%) protected high-risk anastomoses. Resection with end ileostomy and mucus fistula (40 cases, 11.17%) was required for extensive bowel necrosis. Appendectomy with ELPL (10.06%) managed perforated appendicitis. Complex procedures like hemicolectomy were performed selectively. The diverse approaches highlight the need for individualized surgical planning and vigilant postoperative care.

Table 7: Postop complications distribution.

Post-op complications	**Frequency**	**Percentage**
Electrolyte imbalance	88	24.58%
Respiratory complication	76	21.23%

Abdominal collection	26	7.26%
Surgical site infection	262	73.18%
Sepsis	54	15.08%
Burst abdomen	18	5.03%

Table 7 highlights postoperative complications among surgical patients. Surgical site infection (73.18%) was the most common, posing a high risk of wound infections and impaired healing. Electrolyte imbalance (24.58%) and respiratory complications (21.23%) reflected metabolic and pulmonary challenges. Sepsis (15.08%) and intra-abdominal collections (7.26%) indicated systemic and localized infections. Burst abdomen (5.03%), a severe laparotomy wound dehiscence, required urgent intervention. These findings stress the importance of meticulous perioperative care, aseptic techniques, and early complication management to improve surgical outcomes.

Table 8: Mortality distribution

Mortality	Frequency	Percentage
No	328	91.62%
Yes	30	8.38%
Total	358	100.00%

Table 8 shows the mortality distribution among surgical patients, with 30 deaths (8.38%) out of 358 cases. While the mortality rate is low, it reflects risks linked to comorbidities, hemodynamic instability, and postoperative complications like sepsis and multiorgan dysfunction. Reducing mortality requires meticulous haemostasis, fluid-electrolyte balance, and timely complication management. These findings emphasize strict adherence to evidence-based surgical protocols to enhance patient survival.

7. DISCUSSION:

Non-traumatic bowel perforations leading to perforation peritonitis are among the most prevalent surgical emergencies encountered by surgeons in a developing country like India [8]. Despite significant advancements in medical science, including a deeper understanding of disease etiopathogenesis and refinements in surgical techniques, these cases continue to pose a substantial clinical challenge with high morbidity, mortality, and postoperative complications. Delayed hospital presentation and inadequate initial management further exacerbate patient outcomes. A favourable prognosis relies on early diagnosis, expeditious surgical intervention, and meticulous postoperative care. Effective management necessitates aggressive resuscitation, advanced surgical strategies, broad-spectrum antimicrobial therapy, precise electrolyte correction, and vigilant intensive care, all of which are essential for improving overall patient survival and recovery.

In our study, the mean age of the study subjects was 33.42 ± 15.7 years, aligning with findings from other Indian studies but differing from Western data, where bowel perforations are more prevalent among the elderly [9]. The median age was 29 years (25th-75th percentile: 22-42.5 years), with an overall age range of 13–78 years. The highest incidence was observed in the 21–30 years age group (37.99%, 136 cases),

followed by 13–20 years (21.79%, 78 cases), 31–40 years (13.97%, 50 cases), 41–50 years (10.06%, 36 cases), 51–60 years (8.94%, 32 cases), 61–70 years (5.03%, 18 cases), and 71–80 years (2.23%, 8 cases). These findings are consistent with a study by Sharma S et al [5], which also reported the highest incidence in the 21–30 years age group. The predominance of younger patients may reflect regional epidemiological factors, including higher rates of infection, dietary habits, and healthcare accessibility.

Our study observed a significant male preponderance, with 264 (73.74%) males and 94 (26.26%) females, yielding a 2.81:1 ratio. This aligns with previous surgical studies [5, 10–13]. The higher male incidence may be linked to risk factors like smoking, alcohol use, dietary habits, and occupational stress. Additionally, delayed healthcare-seeking behaviour in males may contribute to more complicated cases requiring surgical intervention.

In our study, nearly all patients (358) presented with acute abdominal pain and exhibited tenderness on clinical examination. Additionally, 250 patients (69.83%) had abdominal distension, 112 (31.28%) experienced vomiting, 92 (25.70%) reported constipation, 68 (18.99%) had fever, and 54 (15.08%) presented in shock. These findings are comparable to studies by Singla et al [14] and Gupta et al [15], where pain, distension, and fever were observed in 100%, 66%, and 20% of cases, respectively. Huttunen et al [16] reported that all patients exhibited peritoneal signs, aligning with our findings, while Dickson et al [17] noted tenderness in 97.3% of cases. Chandra et al [18] documented abdominal pain in 98.8% of cases, mirroring our study. Similarly, Jain NK et al [7] identified abdominal pain as the most consistent and predominant symptom, present in nearly all cases (100%). These findings emphasize the crucial role of early clinical assessment, including peritoneal signs, guarding, and rigidity, in the prompt diagnosis and surgical management of bowel perforation.

In our study, out of 358 patients, 236 cases (65.92%) had no history of NSAID use, whereas 122 cases (34.08%) reported prior NSAID consumption, primarily prescribed by private healthcare providers for symptomatic pain management. Our findings are comparable to those of Mukherjee S et al [1], who documented a history of chronic NSAID use in 42% of cases. The significant proportion of NSAID-associated cases underscores the potential role of these medications in gastrointestinal mucosal injury, predisposing patients to perforation. This highlights the need for judicious NSAID prescribing, gastroprotection strategies, and early surgical consultation in high-risk patients to mitigate complications such as perforation peritonitis.

In our study, the ileum was the most common site of perforation, accounting for 224 cases out of 358 (62.57%), followed by gastric perforations in 58 cases (16.20%), appendiceal perforations in 38 cases (10.61%), and caecal perforations in 20 cases (5.59%). Less frequently, perforations were observed in the jejunum (10 cases, 2.79%), sigmoid colon (4 cases, 1.12%), and transverse, ascending, and descending colon (2 cases each, 0.56%). Our findings align with studies by Memon et al [19], Quereshi et al [20], and Dorairajan et al [21], who also identified the distal gastrointestinal tract, particularly the ileum, as the predominant site of perforation. The higher incidence of ileal perforations may be attributed to infectious aetiologies, ischemic events, and inflammatory conditions common in developing regions. Prompt surgical intervention, including primary repair or resection with anastomosis, remains crucial in managing these cases to prevent peritoneal contamination and sepsis.

In our study 142 cases (39.66%) underwent ELPL with loop ileostomy which was the most common procedure performed followed by 58 cases (16.20%) underwent Modified Graham's omental patch repair, 36 cases (10.06%) underwent ELPL with appendicectomy, 40 cases (11.17%) underwent resection with end ileostomy with mucus fistula, 44 cases (12.29%) underwent primary repair with proximal loop

ileostomy. Additionally, 14 cases (3.91%) underwent resection anastomosis with proximal loop ileostomy, 8 cases (2.23%) underwent resection anastomosis with feeding jejunostomy, 6 cases (1.68%) underwent resection with end ileostomy. Furthermore, 2 case (0.56%) each for appendectomy with primary repair with loop ileostomy, ELPL with hemicolectomy with end ileostomy with mucus fistula, ELPL with limited hemicolectomy, primary repair with feeding jejunostomy, and right hemicolectomy.

Ileostomy was the most commonly performed procedure in our study which was similar with Memon et al [19]. We performed primary closure with proximal ileostomy in all other patients who presented late and had faecal contamination of peritoneal cavity, friable and gut and/or poor clinical condition, this is also supported by other studies like Adisunkanmi et al [22], Maurya et al [23].

In our study in majority of cases the pathology of perforation was non-specific or not known which were 152 cases (42.46%). Among the known pathology the most common was enteric which were 72 cases (20.11%) followed by 58 cases (16.20%) were tubercular, 32 cases (8.94%) were due to appendicitis, 30 cases (8.38%) were due to gastritis, 8 cases (2.23%) were due to diverticulitis, and 6 cases (1.68%) were due to carcinoma of the colon. Michael et al concluded as per histopathology report, non-specific ileitis (55%) as the most common type of perforation encountered which was similar to our study. This was followed by tubercular perforation which involved 8 patients (20%). Third most common category was perforation secondary to tumours (12%), followed by enteric perforation (10%). Only 1 patient (2.5%) was reported to have perforation secondary to Meckel's diverticulitis [24].

In our study the most common complication post operatively was surgical site infection which was seen in 262 cases comprising 73.18% of all cases followed by 88 cases (24.58%) had electrolyte imbalances, 76 cases (21.23%) had respiratory complications, 54 cases (15.08%) had sepsis, 26 cases (7.26%) had abdominal collections, and 18 cases (5.03%) had burst abdomen. Hameed et al 2020 concluded surgical site infection (~24.6%), both superficial and deep, as the most common complication in their study which is similar to our study although the incidence is different. A burst abdomen was noticed in more than 9% of cases and intra-abdominal pus collection was seen in 6.6% of cases [25]. Sharma et al 2019 in their study reported wound infection as the most common complication (29.64%), followed by pulmonary complications (22.14%), wound dehiscence in 22 cases (7.86%). Electrolyte imbalances were seen in 11% cases [5].

In our study the overall mortality was 30 cases out of the 358 cases operated comprising 8.38% of all the cases. The rest 328 cases (91.62%) survived. The mortality was similar to Sharma et al 2019 where the mortality rate was 7.5% [5], P. Tanwar et al reported overall mortality rate of 8% [26], Gupta et al also reported mortality rate of 8.64% (15). 8% mortality was reported in the study by Thirumalagiri et al [27].

8. CONCLUSION:

Non-traumatic bowel perforations are a prevalent surgical emergency in developing countries like India. The etiological spectrum, pathological basis, clinical presentation, diagnostic modalities, surgical management, and postoperative outcomes were analysed in 358 patients. While it affects individuals of all ages, the highest incidence was observed in young adults (21–30 years), with a marked male predominance. Common clinical manifestations included acute abdominal pain with tenderness, abdominal distension, vomiting, and constipation. Leading causes included typhoid, tuberculosis, NSAID-induced mucosal injury, and appendicitis. Early recognition, comprehensive diagnostic evaluation, aggressive resuscitation, and timely surgical intervention are critical in optimizing patient outcomes, while meticulous postoperative care plays a pivotal role in recovery. The overall mortality rate was 8.38%, with

higher fatality observed in cases of delayed presentation and older age groups. Mortality can be reduced through improved health awareness, strengthened primary healthcare infrastructure, deployment of skilled emergency medical personnel, and timely referrals to specialized surgical centres.

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