



Perforation Peritonitis: Clinical Insights from a Three-Year Experience

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ABSTRACT

Background: Peritonitis caused by gastrointestinal perforation is a frequent surgical emergency globally. Early detection and treatment are vital in reducing complications and death. Surgical intervention and good perioperative care improve outcomes. A clinical trial assessed the outcome of perforation peritonitis at a tertiary healthcare institute to identify factors contributing to morbidity and mortality. **Materials and Methods:** The study conducted at IMS, BHU, was a Prospective Observational Study for 3 years. Patients of all ages presenting with acute abdominal pain and gas under the diaphragm were enrolled. After examination through different methods, after resuscitation, Laparotomy was performed in all patients, followed by thorough peritoneal lavage. The site, size, type, and number of perforations were documented, and biopsy was taken from the edge of the perforation when necessary. **Results:** The study showed that duodenal ulcer perforation was the leading cause of gastrointestinal perforation, followed by appendicitis, typhoid perforation, and malignancy. Primary closure was the most common surgical procedure, followed by appendectomy, gut resection, and

exteriorization. Mortality rate was, and observed morbidity included wound infection, fever, respiratory complications, residual abscess, electrolyte imbalances, burst abdomen, sepsis, cardiac complications, and anastomotic disruption. Conclusion: Gastrointestinal perforation is a common complication of acid peptic disease and typhoid. To control acid peptic disease, NSAIDs and triple therapy for H. pylori eradication can be used. Early and primary treatment for typhoid should be prioritized on a larger scale, and common practitioners should be educated to increase awareness about the disease.

Keywords: Perforation peritonitis, emergency laparotomy, mortality.

INTRODUCTION

Gastrointestinal perforation is a serious medical condition that requires immediate medical attention. It occurs when there is a hole in the gastrointestinal tract, which can happen anywhere from the mouth to the anus. Some of the most common causes of gastrointestinal perforation include chronic inflammation, stress, smoking, alcohol or coffee consumption, appendicitis, diverticulitis, typhoid, malignancy, or trauma. When a hollow viscus is perforated, it can lead to bacterial contamination of the peritoneal cavity, which can result in peritonitis, a potentially life-threatening condition characterized by inflammation of the abdominal cavity's lining. Generalized sepsis, multiorgan failure, shock, and abdominal abscess formation may also occur (1). Immediate resuscitation, antibiotics, and surgical intervention are the mainstays of treatment to eliminate the source of bacterial contamination. Early intervention is critical in the management of gastrointestinal perforation, as the mortality rate for perforation peritonitis is highly dependent on early approach to the hospital, quick diagnosis, and prompt surgical treatment (2). Delay in treatment can lead to complications such as electrolyte imbalance, wound infection, respiratory failure, sepsis, and thrombotic episodes. Patients with gastrointestinal perforation often present with sudden onset of severe abdominal pain, nausea, vomiting, and fever. These symptoms should not be ignored, and immediate medical attention should be sought. In conclusion, gastrointestinal perforation is a medical emergency that requires prompt diagnosis and management. Early surgical intervention and antibiotic therapy can significantly improve the patient's outcome. The purpose of this study was to investigate the diverse clinical manifestations, underlying causes, treatment approaches, and potential postoperative complications associated with perforative peritonitis (3).

METHOD AND MATERIAL

Gastrointestinal perforation is a serious medical condition that requires prompt treatment to prevent complications. To better understand this condition and its management, the Department of Surgery at the Institute of Medical Sciences, BHU conducted a study on 500 cases of gastrointestinal perforation between May 2019 and October 2022. The study aimed to provide a comprehensive examination of patients presenting with gastrointestinal perforation and to determine the efficacy of standard surgical procedures in managing this condition. Patients included in the study were those aged 18 years and above with non-traumatic perforation peritonitis. The study excluded patients with iatrogenic perforations, pregnancy and lactation, and patients not willing to participate in the study. The patients underwent a complete clinical examination and were subjected to special investigations such as ultrasound and CT scan of the abdomen. These tests were performed to determine the source and type of contamination. The patients were then treated with antibiotics before undergoing emergency

exploratory laparotomy. During the procedure, biopsies were taken to confirm the diagnosis and determine the source of contamination. The patients were then followed post-operatively, and any complications were managed. The standard surgical procedure was followed, which included fluid resuscitation, intravenous antibiotics, and laparotomy with peritoneal lavage. The outcome was assessed within 30 days by clinical observation, with acute pain in the abdomen with gas under the diaphragm seen on either chest radiograph or x-ray erect abdomen. Patients with positive diagnostic aspirations were included in the study. The results of the study provide valuable insights into the management of gastrointestinal perforation. The standard surgical procedure followed in this study was effective in managing the condition in the patients studied. The study also highlights the importance of a comprehensive examination of patients presenting with gastrointestinal perforation and the need for prompt and appropriate treatment. The findings of this study have significant implications for healthcare professionals and researchers working in the field of gastrointestinal perforation. By providing a comprehensive examination of patients presenting with this condition and evaluating the efficacy of standard surgical procedures, the study offers insights that can help improve the management and treatment of patients with gastrointestinal perforation. The results can inform the development of new treatment approaches, and ultimately lead to better outcomes for patients in the future. The findings of the study highlight the importance of a comprehensive examination of patients presenting with gastrointestinal perforation and the need for prompt and appropriate treatment.

RESULT

Over a span of three years, from May 2019 to October 2022, an observational study was conducted on 500 patients who underwent emergency laparotomy for gastrointestinal perforation. The study population consisted of 317 males and 183 females, resulting in a male-to-female ratio of 1.7:1 (Table-3). The patient cohort in the study appears to be a reasonably representative sample of the different demographic patterns associated with the disease. Most patients were in their fifth to seventh decade of life, with the highest incidence observed in the fifth decade. The predominant symptom observed at the time of presentation in all patients was pain, followed by vomiting (in 75% of cases), abdominal distention (in 55%), fever (in 23%), constipation (in 9%), sepsis (in 7%), and shock (in 2%). Around 30% of cases in the study had accompanying co-morbid conditions, with chronic obstructive pulmonary disease (COPD) being the most common, followed by high blood pressure, disturb cardiac profile, diabetes, tuberculosis, kidney diseases, and malignancy.

Before the surgical procedure, the diagnosis was primarily based on clinical examination, which was reinforced by diagnostic tests such as X-ray of the chest, revealing the presence of free gas under the right dome of the diaphragm, as well as ultrasound and abdominal paracentesis in necessary cases. CT scans of the abdomen were only performed in patients with trauma or in situations where the diagnosis was uncertain. The majority of patients (65%) underwent surgical intervention within 24 hours of perforation, while 19% of patients were operated on between 24-48 hours after perforation. Around 16 % of patients underwent surgery after 48 to 72 hours after perforation.

In our study, the primary reason for gastrointestinal perforation was duodenal ulcer perforation, which was observed in 40.6% of cases. The second most common cause was appendicitis, which accounted for 27.2% of cases. Typhoid perforation in the ileum was

responsible for 15.2% of cases, while perforation caused by obstruction was observed in 8.4%. Gastric perforations were found in 3.6% of cases, while malignancy was responsible for 2.8%. Iatrogenic perforation accounted for 1.8% of cases, and recurrent perforation was observed in only 0.4% of cases (Table -2).

The location of the gastrointestinal perforation depended on the underlying cause. Duodenal perforations were exclusively located in the anterior wall of the duodenum, primarily in its first part. Appendicular perforations were more prevalent in patients at the extremes of age (Table-1). Typhoid perforations typically occurred in the second week of fever and were usually multiple. The most commonly performed procedure was primary closure of the perforation, with duodenal perforation being the most common location for this procedure, followed by appendectomy for appendicular perforation. The third most common procedure was resection and anastomosis, which was typically done in the ileum. However, in cases where there was a significant amount of contamination or the patient's general condition was poor, the gut was exteriorized through ileostomy or colostomy. Our study revealed a mortality rate of 8%, with respiratory or cardiac complications and septic shock being the leading causes of death. Late presentation, extremes of age, low preoperative hemoglobin levels, poor nutrition, low albumin, associated malignancy or tuberculosis, preexisting cardiac conditions, and irreversible shock were common factors observed in all cases. The most prevalent complication observed in the patients was surgical site wound infection, occurring in 32% of the cases, followed by post operative fever in 44%, pulmonary complications in 23%, intrabdominal abscesses in 20%, burst abdomen in 11%, electrolyte imbalance in 15%, sepsis in 4%, cardiac complications in 5%, and anastomotic leak in 3% of the patients, paralytic ileus in 33% patient's ad mortality in 8% of patients (Table-5). The main risk factors for peptic ulcer perforation are smoking, medication use, and alcohol consumption. In fact, 25% of cases were attributed solely to NSAIDs and oral steroids, while another 24% were caused in part by medication use. Smoking and medication use were present in 13% of cases, while alcohol and smoking were present in 17%. A combination of all three risk factors (alcohol, smoking, and medication use) was observed in 11% of cases (Table-6)

Table-1. (Age wise distribution)

Age (Years)	No. of patients	%
<10 years	25	5%
10-20 years	28	5.6%
20-30 years	45	9%
30-40 years	71	14.2%
40-50 years	90	18%
50-60 years	114	22.8%
60-70 years	90	18%
>70 years	37	7.4%
Total	500	100%

Table-2. Etiology of perforation

Duodenal ulcer	203	40.6%
Appendicitis	136	27.2%
Typhoid	76	15.2%
Obstruction	42	8.4%
Gastric ulcer	18	3.6%
Malignancy	14	2.8%
Iatrogenic	9	1.8%
Recurrent	2	0.4%
Total	500	100%

Table-3. Sex Profile of Patients

	Male	Female
Duodenal ulcer	138	65
Appendicitis	79	57
Typhoid	47	29
Obstruction	26	16
Gastric ulcer	10	8
Malignancy	9	5
Iatrogenic	6	3
Recurrent	2	0
Total	317	183

Table- 4 Size of Perforations

Size of perforation (cm) No. of patients	Size of perforation (cm) No. of patients
0 - <0.5cm	366
0.5 - <1cm	71
1 - <2cm	44
>2cm	19

Table-5. Complications

Wound infection	160	32%
Fever	220	44%
Respiratory complications	115	23%
Intraabdominal Abscess	100	20%
Electrolyte imbalance	75	15%
Burst abdomen	55	11%
Paralytic ileus	165	33%
Sepsis	20	4%
Cardiac complications	25	5%
Anastomotic leak	15	3%
Gangrenous Stoma/ileostomy	10	2%
Death	40	8%

Table-6. Risk factors in Perforations

Risk	Number	Percentage
Somking	130	26%
Medication	125	25%
Alcohol and smoking	85	17%
Smoking and medication	65	13%
Alcohol, smoking and medications	55	11%
No risk	40	8%

DISCUSSION

Perforation peritonitis is a frequent and serious condition in surgical practice, often leading to severe illness and death, which requires prompt surgical intervention (4-7). In every case, it is essential to provide proper resuscitation, conduct baseline investigations, and administer broad-spectrum antibiotics. The management of peritonitis depends on the underlying cause. The localization of peritonitis may be influenced by anatomical, pathological, and surgical factors. Peritonitis typically becomes widespread in patients who experience sudden anatomical disruptions, are at the extremes of age, have weakened immune systems, suffer from perforation above an obstruction, experience increased peristalsis (8-11). The symptoms shown by patients vary depending on where the perforation occurs. Individuals with duodenal perforations typically experience sudden pain in the upper abdomen or epigastrium, accompanied by general tenderness and muscle guarding, which develops over a short period of time (12-16). Perforations of the appendix typically cause a specific type of pain that begins in the periumbilical area or the right iliac fossa. Other common symptoms include vomiting and fever. In addition to the aforementioned symptoms, patients with appendix perforations often exhibit noticeable signs such as muscle guarding and rebound tenderness in the right iliac fossa. Ileal perforations typically occur after a patient has a history of some medical condition, which is then followed by a sudden onset of pain in the lower abdomen. Additional symptoms, including vomiting, abdominal guarding, and distention, typically appear later on. Our research findings indicate that the leading cause of perforation is duodenal ulcer (17-20). This result is consistent with the findings of other studies conducted by Gupta & Kaushik, as well as Gupta, R., & Singh. The leading cause of perforation in Western countries is malignancy, which differs significantly from the trend observed in our country, where duodenal perforation followed by appendicitis and gastric perforation are the most common causes (21-23). When compared to the Western population, our study showed that the most common symptom observed during presentation was pain, followed by vomiting, abdominal distention, fever, and constipation. Our study revealed that patients who sought medical attention promptly after perforation and had no concurrent co-morbid conditions demonstrated favorable postoperative outcome. In cases where patients exhibited significantly deteriorated general condition and irreversible shock, drains were placed under local anesthesia, and the patients received adequate resuscitation, antibiotic cover, and blood transfusions before undergoing laparotomy once their overall health improved. In all cases, closed drainage of the peritoneal cavity through an external system was deemed necessary (24-26). Following surgery, common complications included wound infection, fever, respiratory issues, residual abscesses, burst abdomen, electrolyte disbalance, sepsis, complicated cardiac profile, and anastomotic leak, all of which are recognized risk factors associated with high mortality rates (27).

CONCLUSION

Perforation of the visceral organs is a prevalent complication associated with acid peptic disease and typhoid. Effective management of acid peptic disease may involve controlled use of NSAIDs and triple therapy to eradicate *H. pylori*. Similarly, prompt and comprehensive treatment of typhoid fever should be prioritized, with a need to increase awareness and knowledge among healthcare practitioners.

References

1. Gupta S, Kaushik R, Sharma R. The management of large perforations of duodenal ulcers. *BioMed Central Surgery* 2005; 5:1-9
2. Mandava N, Kumar S, Walter F. Perforated colorectal carcinomas. *Am J Surgery* 1996; 172: 236-38
3. Khanna AK and Misra Mk. Typhoid perforation of the gut. *J Postgraduate Medicine* 1984; 60:523-25 Gupta S, Kaushik R. Peritonitis-The Eastern experience. *World J Emerg Surg* 2006; 1:13
4. Agarwall N, Saha S, Srivastava A, Chumber S, Dhar A, Garg S. Peritonitis 10 years experience in a single surgical unit. *Trop Gastroenterol* 2007, 28(3):117-20.
5. Epidemiology, Management, and Prognosis of Secondary Non-Postoperative Peritonitis: A French Prospective Observational Multicenter Study | *Surgical Infections* [Internet]. [cited 2021 Feb 22].
6. Nthele M. A one-year study of relaparatomies at the University Teaching Hospital, Lusaka [Internet] [Thesis]. 2012 [cited 2021 Feb 22].
7. Watt DG, Wilson MSJ, Shapter OC, Patil P. 30-Day and 1-year mortality in emergency general surgery laparotomies: an area of concern and need for improvement? *Eur J Trauma Emerg Surg*. 2015 Aug;41(4):369-74.
8. Sondashi KJ, Odimba BFK, Kelly P. A Cross-sectional Study on Factors Associated With Perforated Peptic Ulcer Disease in Adults Presenting to UTH, Lusaka. *Med J Zambia*. 2011;38(2):15-22.
9. UTH Main Intensive Care Unit: One year audit. Lusaka, Zambia: University Teaching Hospital, Surgery Department; 2018 Jan.
10. Chanda S. A study to determine the historical pattern of non-traumatic ileo-cecal perforations and to evaluate the XPER MTB/RIF assay for rapid diagnosis of intestinal TB at the University Teaching Hospital, Lusaka [Internet] [Thesis]. The University of Zambia; 2015 [cited 2021 Feb 22].
11. Das K, Ozdogan M, Karateke F, Uzun A, Sözen S, Ozdas S. Comparison of APACHE II, P-POSSUM and SAPS II scoring systems in patients underwent planned laparotomies due to secondary peritonitis. *Ann Ital Chir*. 2014 Apr 23;85:16-21.
12. Ayandipo OO, Afuwape OO, Irabor DO, Abdurrazzaq AI, Nwafulume NA. OUTCOME OF LAPAROTOMY FOR PERITONITIS IN 302 CONSECUTIVE PATIENTS IN IBADAN, NIGERIA. *Ann Ib Postgrad Med*. 2016 Jun;14(1):30-4.
13. Wabwire B, Saidi H. Stratified Outcome Evaluation of Peritonitis. *Ann Afr Surg* [Internet]. 2014 [cited 2021 Feb 22];11(2).
14. Gilshtein H, Ghuman A, Dawoud M, Yellinek S, Kent I, Sharp SP, et al. Indications for, and outcomes of, end ileostomy revision procedures. *Colorectal Dis Off J Assoc Coloproctology G B Irel*. 2020 Nov 17;

15. Sartelli M, Chichom-Mefire A, Labricciosa FM, Hardcastle T, Abu-Zidan FM, Adesunkanmi AK, et al. The management of intraabdominal infections from a global perspective: 2017 WSES guidelines for management of intra-abdominal infections. *World J Emerg Surg*. 2017 Jul 10;12(1):29.
16. K B, P K, M K. Large bowel perforation: morbidity and mortality [Internet]. Vol. 6, Techniques in coloproctology. Tech Coloproctol; 2002 [cited 2021 Feb 22].
17. Insight into the management of non-traumatic perforation of the small intestine - PubMed [Internet]. [cited 2021 Feb 22].
18. Tilt A, Falola RA, Kumar A, Campbell TJ, Marks JM, Attinger CE, et al. Operative Management of Abdominal Wound Dehiscence: Outcomes and Factors Influencing Time to Healing in Patients Undergoing Surgical Debridement with Primary Closure. *Wounds Compend Clin Res Pract*. 2018 Nov;30(11):317–23.
19. Ngulube A, Muguti GI, Muguti EG. Validation of POSSUM, P-POSSUM and the surgical risk scale in major general surgical operations in Harare: A prospective observational study. *Ann Med Surg*. 2019 May 1; 41:33–9.
20. Kumar A, Suman S, Kundan K, Kumar P. Evaluation of POSSUM scoring system in patients with perforation peritonitis. *Int Surg J*. 2016;2181–6.
21. World society of emergency surgery: Studies and statistics; 2016.
22. Khan PS, Dar LA, Hayat H. Predictors of mortality and morbidity in peritonitis in a developing country. *Ulus Cerrahi Derg*. 2013;
23. Dandapat MC, Mukherjee LM, Mishra SB, Howlader PC. Gastrointestinal perforations. *Indian J Surg*. 1991;53(5):189-93
24. Sharma L, Gupta S, Soin AS, Sikora S, Kapoor V. Generalized peritonitis in India-the tropical spectrum. *Jpn J Surg*. 1991;21(3):272-7.
25. Kim JP, Oh SK, Jarrett F. Management of ileal perforation due to typhoid fever. *Ann Surg*. 1975;181(1):88-91
26. Di Venere B, Testini M, Miniello S, Piccinni G, Lissidini G, Carbone F, Bonomo GM. Rectal perforations. Personal experience and literature review. *Minerva Chir* 2002, 57(3):357-62.
27. Uccheddu A, Floris G, Altana ML, Pisanu A, Cois A, Farci SL: Surgery for perforated peptic ulcer in the elderly. Evaluation of factors influencing prognosis *Hepatogastroenterology* 2003, 50(54):1956-68.