

Prospective observational assessment of the aetiopathological profile of on small bowel perforation and its management

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Abstract

Aim: The objective of the study was to study the various causes, incidences and clinical features of small bowel perforations and various surgical procedures and it's the outcome.

Methods: The present study was conducted in the Department of General Surgery for the period of 2 years and all the patients of small bowel perforation of both sexes and of different ages was included. 50 patients were included in the study. The protocol was reviewed and approved by the ethics committees of this institution. Patients were included after taking their informed consent for the study.

Results: In the present study, majority of the patients (36%) were of age group 36-45 followed by (28%) 26-36 age groups. There were 40 (80%) males as compared to females 10 (20%). In this study, 35 cases (70%) of perforation were due to peptic ulcers. Next order cases due to trauma consist of 10 cases (20%). Tubercular perforation was seen in 2 patients (4%), and due to Crohn's disease, only 1 case was found. Typhoid perforation was seen in 1 case. Malignant perforation was in 1 case (2%) which was found to be gastrointestinal stromal tumours after histopathological examination. In this study, free peritoneal fluid was found in 43 cases (86%). Free gas in the peritoneal cavity was found in 40 cases (80%) due to third space fluid collection and escape of bowel gas into the peritoneum, respectively. Mesenteric lymphadenitis and thickened omentum were found in 2 cases (4%) due to tuberculosis and malignancy.

Conclusion: Duodenal perforation is the most common cause of small intestinal perforation. Smoking and consumption of alcohol & NSAIDS are the most important risk factors for small bowel perforation. Patients mainly presented with abdominal pain and distension with features of peritonitis. X-ray abdomen suggested of pneumoperitoneum in most of the patients. Resuscitation followed by closure of perforation with omental patch was the most common management procedure done.

Keywords: Perforation, peritonitis, laparotomy, management, small bowel

Introduction

Abdominal emergencies have remained a great challenge from time immemorial. Small intestinal perforation and peritonitis are common abdominal emergencies that need the attention of all instantaneously. Intestinal perforation results from damage to the mucosa of

the intestinal wall due to violation of the closed system. This exposes the structures within the peritoneal cavity to gastrointestinal contents. Bowel perforation can be secondary to many factors: inflammation, infection, obstruction, trauma, or invasive procedure^[1]. Delays in resuscitation and definitive surgery will rapidly develop into septic shock, multiple organ dysfunction and death. Hence it should be one of the first diagnoses to be considered and excluded for all patients with acute abdominal pain^[2].

Presentation to hospital in these cases varies depending upon access availability, patient awareness and, of course, economy and, in late cases, established generalized peritonitis with purulent/ faecal contamination and varying degree of septicemia^[3]. In India, gastroduodenal perforation is one of the most common sites, followed by intestinal, appendicular perforations. However, the relative incidence, location, aetiology etc., of various perforation show large regional differences. Ileal perforation is another common surgical emergency in the Indian subcontinent and tropical countries^[4].

Perforation of the small intestine causing peritonitis is one of the most common abdominal surgical emergencies encountered in our region. Small bowel perforations are broadly classified into traumatic and spontaneous. Traumatic injuries are either blunt or penetrating. Blunt traumatic small bowel perforations include those caused by falls, blow from animals or blunt objects, bicycle handlebar injuries and motor vehicle accidents^[5]. Stab wounds, bullet injuries, ingested foreign bodies (e.g., fishbone, needles, safety pins, magnets), endoscopic studies, ERCP with papillotomy, laparoscopy, laparoscopic cholecystectomy, are the common causes for penetrating small bowel perforations. The cause of spontaneous perforation in the duodenum include peptic ulcer disease due to *H. pylori* infection, chronic NSAIDS ingestion, chronic alcohol intake, cigarette smoking^[6]. The causes of spontaneous perforation in the ileum includes infectious diseases like enteric fever, tuberculosis, roundworm infestation, Meckel's diverticulum, radiation enteritis, Crohn's disease and malignancies like lymphoma, adenocarcinoma and melanoma.

For diagnosis, various modalities like erect X-ray abdomen, serum amylase, peritoneal tapping are performed. However, not much time should be devoted to diagnosing the case, and laparotomy is the ultimate diagnostic procedure. So early operative procedures are beneficial to the patient^[7]. Various surgical procedures advocated by different authors include simple perforation closure, Resection and anastomosis, Ileostomy, Graham's Patch Repair. Even with such a variety of procedures, small bowel perforation still has a high morbidity and mortality rate^[8].

The objective of the study was to study the various causes, incidences and clinical features of small bowel perforations and various surgical procedures and it's the outcome.

Methods

The present study was conducted in the Department of General Surgery for the period of 2 years and all the patients of small bowel perforation of both sexes and of different ages was included. 50 patients were included in the study. The protocol was reviewed and approved by the ethics committees of this institution. Patients were included after taking their informed consent for the study. The present study was approved by the institutional Ethical Committee.

Inclusion criteria

- Patients admitted with a diagnosis of small bowel perforation.
- Both male and female above 15 years of age.

Exclusion criteria

- Patients with extreme age [>65 yrs] and less than 15 years of age.
- Patients with advanced cancer.
- Patients who are not fit for surgery.

A detailed history, particularly name, age of the patients, religion, socioeconomic status and chief complaints in chronological order with duration and progresses, personal history, marital status and family history were taken. In addition, significant history and drug history was taken. Importance was given to symptoms, mode of onset of symptoms, duration of symptoms, association with pain, history of trauma. All the patients were undergone surgical management. Furthermore, the surgical management constituted explorative laparotomy. Wherever available, the resected specimen was sent for histopathological study. The preoperative results were analyzed with the histopathological study of the resected specimen wherever available, and a conclusion was derived.

Results

Table 1: Age and sex distribution

Age in years	N%
15-25	7 (14)
26-35	14 (28)
36-45	18 (36)
46-55	7 (14)
56-65	6 (12)
Gender	
Male	40
Female	10

In the present study, majority of the patients (36%) were of age group 36-45 followed by (28%) 26-36 age group. There were 40 (80%) males as compared to females 10 (20%).

Table 2: Causes of Perforation

Causes	N%
Duodenal ulcer	35 (70)
Traumatic	10 (20)
Tuberculosis	2 (4)
Typhoid	1 (2)
Crohn's disease	1 (2)
Malignancy	1 (2)
Total	50 (100)

In this study, 35 cases (70%) of perforation were due to peptic ulcers. Next order cases due to trauma consist of 10 cases (20%). Tubercular perforation was seen in 2 patients (4%), and due to Crohn's disease, only 1 case was found. Typhoid perforation was seen in 1 case. Malignant perforation was in 1 case (2%) which was found to be gastrointestinal stromal tumours after histopathological examination.

Table 3: Associated Operative findings

Associated Operative findings	N%
Free fluid in the peritoneum	43 (86)

Free gas in the peritoneum	40 (80)
Mesenteric lymphadenitis	2 (4)
Thickened omentum	2 (4)

In this study, free peritoneal fluid was found in 43 cases (86%). Free gas in the peritoneal cavity was found in 40 cases (80%) due to third space fluid collection and escape of bowel gas into the peritoneum, respectively. Mesenteric lymphadenitis and thickened omentum were found in 2 cases (4%) due to tuberculosis and malignancy.

Table 4: Different Surgical Procedures

Different Surgical Procedures	N%
Only toilet and closure of perforation	40 (80)
Resection and anastomosis	7 (14)
Only drainage	2 (4)
Ileostomy	1 (2)

In this present study maximum number of operations performed was toileting and simple closure of the perforation in 40 cases (80%), followed by resection and anastomosis in 7 cases (14%). In only 2 cases (4%), only drainage by abdominal drain was done as the perforation was sealed, and ileostomy was done in 1 case (2%).

Table 5: Operative Procedures according to diagnosis

Diagnosis	No of Cases	Simple closure	Resection and anastomosis	Only drainage	Ileostomy
Duodenal ulcer	35	34	-	1	-
Traumatic	10	8	2	-	-
Typhoid	1	-	-	-	1
Tuberculosis	1	-	1	-	-
Malignancy	2	-	2	-	-
Crohn's diseases	1	-	1	-	-
Total	50	42	6	1	1

In the study, it is seen that all the 34 duodenal perforation simple closure was done. In only 2 cases, only drainage by abdominal drain was done as the perforation was sealed. In the 10 traumatic cases, 8 cases underwent simple closure and 2 cases of resection and anastomosis were done as there were multiple perforations. The only typhoid case underwent ileostomy. Moreover, all other resections and anastomosis were done.

Table 6: Post-operative Morbidity

Diagnosis	No of Cases	Burst abdomen	Fecal fistula	Wound sepsis	Death
Duodenal ulcer	35	1	-	8	3
Traumatic	10	1	-	2	1
Typhoid	1	1	-	-	-
Tuberculosis	1	-	-	1	-
Malignancy	2	-	1	-	1
Crohn's diseases	1	-	-	-	-
Total	50	3		11	5

Though the proper preoperative and post-operative care has been taken, the study shows several cases developed postoperative complications. In 1 case, they developed a burst

abdomen and 1 case faecal fistula. Wound sepsis in 11 cases and death occurred in 5 cases. All the rest cases recovered smoothly.

Table 7: Mortality

Duration of hospital stay	No of cases Recovered %	No of cases died %
<12 days	28 (56)	3 (6)
>12 days	16 (32)	3 (6)
Total	44 (88)	6 (12)

The study shows that 28 of the cases recovered in <12 days period, and 3 died in this period. In > 12 days period, 16 cases recovered, and 3 died. In this study, 50 cases of small bowel perforation due to different cause total, 6 died, showing a death rate of 12%.

Discussion

Perforation peritonitis is one of the most common surgical emergencies encountered on a day to day basis in an Indian hospital. It commonly affects young men in their prime which is very different from that in the west, where the mean age is 45-60 years^[9]. There is a scarcity of data regarding the different perforations, but in India upper GI perforations are much more common than lower GI perforations in contrast to the west where it is the other way around^[10, 11].

The signs and symptoms are typical and it is possible to make a clinical diagnosis of peritonitis in all patients. The perforations of proximal gastrointestinal tract were six times as common as perforations of distal gastrointestinal tract as has been noted in earlier studies from India which is in sharp contrast to studies from developed countries like United States, Greece and Japan which revealed that distal gastrointestinal tract perforations were more common. Not only the site but the etiological factors also show a wide geographical variation^[4, 12-14].

In the study population of 50 patients, it was found that the incidence of a male presenting to the Emergency department with features suggestive of small bowel perforation was 80%, and the incidence of females was only 20%. This suggests that small bowel perforation is more prevalent in the male gender in the Southern Part of Odisha. Nahar *et al.* studied 90 patients, and the male cases were 81%, and 19% were female cases^[15].

In the study conducted by Jhobta *et al.* and Seth *et al.*, the duration of conservative management were <12hrs for the 79% and 100% of all cases, respectively and in this present study, it is 34.65% of cases for the first 12 hours as in the later cases more number of patients were not haemodynamically stable^[16, 17]. Jhobta *et al.* found that 21% of the cases were managed conservatively, but in this current study, 65.35% of cases were managed for >12 hours^[16].

In the study conducted by Nahar *et al.* and Seth *et al.*, the duodenal ulcer was present in 54.44% and 63.63% of cases, similar to the present study, which is 69.25% of all the cases^[15, 17]. As far as the traumatic perforations are concerned, Nahar *et al.* and Seth *et al.* found 10% and 6.06% cases in their study contrary to the present study, which is 19.25% as the road traffic accidents are more in nowadays^[15, 17]. Nahar *et al.* and Seth *et al.* found tuberculosis of small bowel 6.66% and 9.09% in their study and typhoid of ileum was found to be 26.66% and 15.15%, which is again very less in the present study as the infectivity is being decreased^[15]. In the study conducted by Nahar Crohn's, the disease was present in 1.11% of the cases, whereas, in the present study, it is present in 1.9% of the cases, which is similar to the former. Nahar *et al.* and Seth *et al.* found the small bowel malignancy were 1.11 and 6.06% of the cases, respectively. The present study is 4%, as the malignancy risk factors are implicated differently in different study groups^[15, 17].

In the study conducted by Seth *et al.*, Bhanuprakash *et al.* and Jain *et al.*, only toilet and

closure of the perforation was done in 63.63%, 87% and 44.2% of the cases, respectively^[17-19]. However, in the present study, peritoneal toileting and closure did in 80% of the cases, which is almost twice the number of cases done by Jain *et al.* because the number of duodenal perforation was less in their case^[19]. So far, resection and anastomosis are concerned with Seth *et al.*, Bhanuprakash *et al.* and Jain *et al.* 12.12%, 5% and 19.3% of the cases^[17-19]. Though proper preoperative and post-operative care has been taken, the study shows several cases developed postoperative complications. Burst abdomen was present in 7% of the cases in Bhanuprakash *et al.* and 3.84% in the present study due to better abdominal muscle closure^[18]. In the study conducted by Nahar *et al.*, Bhanuprakash *et al.* and Jain *et al.*, the faecal fistula was found in 4.44%, 7% and 11.5%, respectively, which is more than the present study^[15, 18, 19].

In this study, 3 patients died in 6-8 days period. In 9-12 days, 2 cases have died. In more than 14 days period only 1 case died. In the study conducted by Nahar *et al.*, Seth *et al.* and Bhanuprakash *et al.*, the mortality was 5.55%, 6.06% and 15%, respectively^[15, 18, 19]. However, in the present study, the mortality rate was 11.54% which is governed by various factors such as duration of presentation, haemodynamic status and stage of peritonitis.

Conclusion

Duodenal perforation is the most common cause of small intestinal perforation. Smoking and consumption of alcohol & NSAIDs are the most important risk factors for small bowel perforation. Patients mainly presented with abdominal pain and distension with features of peritonitis. X-ray abdomen suggested of pneumoperitoneum in most of the patients. Resuscitation followed by closure of perforation with omental patch was the most common management procedure done. Several factors are important for favorable outcomes in the cases of small bowel perforation peritonitis. Time between the onset of symptoms and presenting to the surgeon, also immediate operative interventions have major impact on the outcome. Site of perforation proves to be an indicator to the outcome; hence appropriate steps can be taken post-operatively to increase chances of survival. However, studies to co-relate time of presentation after onset of symptoms and time of operative procedure after onset of symptoms with outcome can be conducted. Role of laparoscopy surgery in the management of the same can be evaluated.

References

1. Long B, Robertson J, Koyfman A. Emergency Medicine Evaluation and Management of Small Bowel Obstruction: Evidence-Based Recommendations. *J Emerg. Med.* 2019 Feb;56(2):166-76.
2. Svanes C. Trends in perforated peptic ulcer: incidence, etiology, treatment, and prognosis. *World J Surg.* 2000 Mar;24(3):277-83.
3. Kemparaj T, Narasimhaiah NK, Mayigaiah RK. Our experience in gastrointestinal perforations: a retrospective study. *International Surgery Journal.* 2017 Jan;4(2):593-7.
4. Soll AH. Pathogenesis of peptic ulcer and implications for therapy. *N Engl. J Med.* 1990 Mar;322(13):909-16.
5. Rajagopalan AE, Pickleman J. Free perforation of the small intestine. *Ann Surg.* 1982;196(5):576-9.
6. William NS, Bulstrode CJ, Connell PR. Bailey and Love. Short practice of surgery, 25th edition; c2013. p. 10-07.
7. Adesunkanni AR, Ajao OG. Typhoid ileal perforation: A prospective study, *Journal of royal college of surgeons Edinburg.* 1997;25(4):311-315.
8. Sharma A, Adiga S, Ashok M. Knowledge, attitude and practices related to dietary

- supplements and micronutrients in health sciences students. Journal of clinical and diagnostic research: JCDR. 2014 Aug;8(8):HC10.
9. Svanes C, Salvesen HE, Espehaug B, Søreide O, Svanes KN. A multifactorial analysis of factors related to lethality after treatment of perforated gastro-duodenal ulcer, 1935-1985. *Ann Surg.* 1989;209(4):418.
 10. Chatterjee H, Jagdish S, Pai D, Satish N, Jayadev D, Reddy PS. Changing trends in outcome of typhoid ileal perforations over three decades in Pondicherry. *Tropical gastroenterology. Official J Digest Dis Found.* 2001;22(3):155-8.
 11. Sharma L, Gupta S, Soin AS, Sikora S, Kapoor V. Generalized peritonitis in India the tropical spectrum. *Surg Today.* 1991 May;21(3):272-7.
 12. Tripathi MD, Nagar AM, Srivastava RD, Partap VK. Peritonitis-study of factors contributing to mortality. *Indian J Surg.* 1993;55(7):342-9.
 13. Nomikos IN, Katsouyanni K, Papaioannou AN. Washing with or without chloramphenicol in the treatment of peritonitis: a prospective, clinical trial. *Surgery.* 1986 Jan;99(1):20-5.
 14. Shinagawa N, Muramoto M, Sakurai S, Fukui T, Hori K, Taniguchi M, *et al.* A bacteriological study of perforated duodenal ulcers. *The Japanese journal of surgery.* 1991 Jan;21(1):1-7.
 15. Nahar S, Ranjan A. Observational study of small bowel perforation in a tertiary care hospital. *International Surgery Journal.* 2017 Jul;4(8):2746-50.
 16. Jhobta RS, Attri AK, Kaushik R, Sharma R, Jhobta A. Spectrum of perforation peritonitis in India-review of 504 consecutive cases. *World journal of Emergency surgery.* 2006 Dec;1(1):1-4.
 17. Seth S, Agrawal KK. Small bowel perforations: Review of 33 cases. *Medical Journal of Dr. DY Patil University.* 2016 Mar;9(2):186.
 18. Bhanuprakash KR, Aruna MS, Shetty KK. Clinical study and management of small bowel perforation in a tertiary care teaching institute. *International Surgery Journal.* 2018 Feb;5(3):855-9.
 19. Jain BK, Arora H, Srivastava UK, Mohanty D, Garg PK. Insight into the management of non-traumatic perforation of the small intestine. *J Infect Dev Ctries.* 2010 Oct;4(10):650-4.