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Original Research Article

Clinical study and management of small bowel perforation in a tertiary care teaching institute

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ABSTRACT

Background: Small bowel perforation is one of the most common abdominal surgical emergencies encountered in present study region. Late presentation makes them a diagnostic and treatment dilemma. The aim of present study was to determine the age, sex, incidence, etiological factors, clinical features and various surgical procedures for small bowel perforations and its complications in the setup.
Methods: Present study is a prospective observational study of 100 cases, conducted in a single teaching institute from October 2015 to December 2016. Various data such as presentation by the patient, age and sex incidence, etiologies, pathological features, morbidity and mortality associated with the causation and management were evaluated, tabulated and assessed. By analyzing the data, common etiologies of small bowel perforation, the most appropriate modality of investigation, treatment, and complications associated with different methods of management and possible ways to prevent them were studied.
Results: Among all small bowel perforation, duodenal perforation (70%) was the commonest cause of small bowel perforation followed by ileal (23%) and jejunal (7%) perforations. The most common causes of ileal perforation was typhoid (47.8%) followed by tuberculosis (13%) and traumatic (13%). Overall mortality in small bowel perforation was 15%, with ileal perforation (39%) showing higher mortality rate than duodenal perforation (8.5%). Wound infection, toxaemia, uraemia, hypotension, and respiratory complications were common complications, more commonly noted in cases of ileal perforation.
Conclusions: The study showed that effective pre-operative management with adequate fluid resuscitation, immediate operative intervention and good post-operative care led to better outcomes in these cases. Hence timely diagnosis and prompt management is the gold standard for favourable outcome in patients with small bowel perforation.

Keywords: Complications mortality, Management, Perforation, Small bowel, Typhoid perforation

INTRODUCTION

Perforation peritonitis is the most common surgical emergency in India. Surgeons operating on cases of peritonitis should be aware of various possibilities of small bowel perforation as majority of them (75.55% and 70.8%) are due to perforation of the small bowel.[1,2] The spectrum varies much from the west[2]. The mortality due to small bowel perforation still continues to be high ranging from 11.5% to 37% in various studies and prompt diagnosis is extremely vital in these situations.[3] It hence becomes mandatory for us to have in depth knowledge of their numerous etiologies, presentations and management. Small bowel perforations were and

continue to be a great challenge for surgeon's despite of the better understanding of pathophysiology, advances in diagnosis, surgery, antimicrobial therapy and intensive care support. This study aims to study the various etiologies, incidence rates, clinical presentations and surgical outcomes of small bowel perforations.

METHODS

A prospective study of 100 patients who underwent operative intervention for peritonitis due to small bowel perforation from October 2015 to December 2016 in Victoria Hospital, Bangalore, India was done. Patients below the age of 12 were excluded. Decision for surgery was made, based on clinical assessment with the aid of plain X-rays or CT scans, which would be performed based on the surgeons 'choice. Adequate fluid resuscitation and pre-operative parenteral antibiotics were given. Continuous decompression using nasogastric tube was also done. All patients underwent exploratory laparotomies and the decision of type of operative management was purely dependent on the surgeon's operative assessment.

All intestinal anastomoses were hand-sewn. Copious peritoneal wash was given, and two drains were placed, one in the pelvis and one at the site of perforation, prior to closure. The patients were transferred post operatively to the post op ward and monitored closely. The need for ICU admission post operatively was a combined decision of the surgeon and anaesthetist based on the perioperative events. The data collected included age, gender, comorbid conditions, presenting signs and symptoms, and clinical parameters. Laboratory values of the routine pre-operative blood work-up were also recorded. Patients underwent USG abdomen and pelvis as a part of routine pre-operative work-up. A Widal test was done in all cases that were suspected to have perforations secondary to typhoid. HPE of the ulcer edge or any suspicious lymph nodes were done whenever needed. In addition, cause of perforation, operative findings and interventions, perioperative complications, mortality, and length of hospital stay were also documented. Data collected was analysed using descriptive statistical analysis.

RESULTS

Hundred patients were included in this study, where 90 of them were male and rest 10 female. The age of the patients varied from 16 to 62 years. The age group most commonly affected was from 31 to 40 years of age. The age and sex wise distribution is shown in table 1. Most of the patients belonged to low socio-economic strata and 95% were the sole working member of the family, hence causing serious financial and psychological repercussions to themselves and their families. Seventy-two patients had BMI below 20kg/m^2 and 67 of them had hemoglobin was <11gm%, indicating overall poor nutritional status in them.

Table 1: Gender and age distribution of study cases.

Age (years)	Male		Female		Total	
	No	%	No	%	No	%
12-20	4	5.7	3	30	7	7
21-30	30	42.8	4	40	34	34
31-40	40	57.1	2	20	42	42
41-50	9	12.8	1	10	10	10
>50	7	10	0	0	7	7
Total	90	100	10	100	100	100

Among the 100 cases, all presented with pain abdomen. Seventy-four patients presented with abdominal distension and 60 patients with vomiting as one of their presenting complaints. Tenderness, rigidity and absent bowel sounds are the most common signs elicited in the 100 patients. The distribution of various other presenting symptoms and signs respectively (Table 2,3). Out of the 100 patients in the study, 86 showed air under the diaphragm in a plain erect X-ray abdomen making it the most valuable radiological investigation.

Table 2: Distributions of symptoms.

Symptoms	Duodenal perforation	%	Jejunal and ileal perforation	%
Pain	70	100	30	100
Distension	51	72.8	23	76.6
Vomiting	40	57.1	20	66.6
Fever	21	30	20	66.6
Constipation	10	14	12	40
Headache	3	4.2	2	6.66
Loose motion	7	10	4	13.3
Chest pain	0	0	0	0

Table 3: Distributions of signs.

Signs	Duodenal perforation	%	Jejunal and ileal perforation	%
Tenderness	70	100	30	100
Distension	51	72.8	23	76.6
Guarding	65	92	28	93.3
Rigidity	58	82.8	27	90
Obliteration of liver dullness	50	71.4	18	60
Bowel sounds				
Absent	60	85.7	26	86.6
Present	10	14.3	4	13.3
Shock	18	25.7	10	33.3

All the 100 patients underwent operative intervention in form of an exploratory laparotomy. Seventy-two patients had a duodenal perforation, 23 ileal and 7 jejunal (Figure 1,2,3).

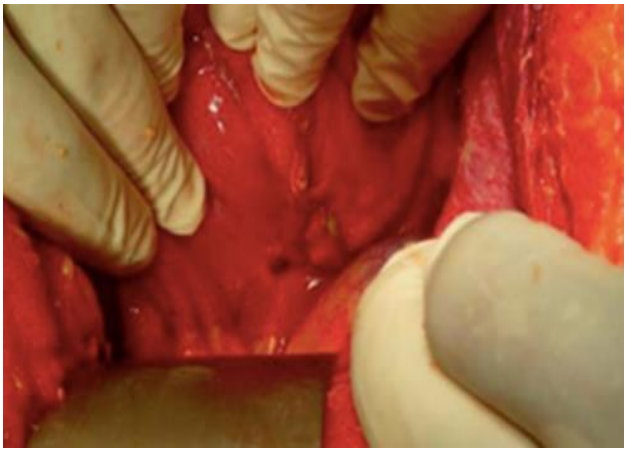

Figure 1: Duodenal perforation.

Figure 2: Ileal perforation.

Figure 3: Jejunal perforation.

Among the patients with duodenal perforation, 62 showed air under diaphragm on a plain erect X-ray. After locating the site of perforation, various procedures were followed depending on the surgeons' operative assessment and are elicited (Table 4). Eighty-seven patients underwent simple closure of the perforation. An omental patch was placed for all cases with duodenal perforation. Five patients required resection and anastomosis, whereas 2 required stricturoplasty combined with the simple closure of the perforation. Twenty cases were subjected to Widal test to rule out typhoid based on history and intra-operative findings and 11 were positive. HPE of 3 edge biopsies of the perforation tested positive for tuberculosis. The etiologies of ileal perforation were found to be typhoid (47.8%), tuberculosis (13%), traumatic (13%), iatrogenic (4.3%) and non-specific (21.7%). Jejunal perforation was caused by trauma (42.8%) usually and rest were non-specific (57.2%).

Table 4: Operative procedure used with frequency.

Procedure	Frequency			
	Duodenal	%	Jejunal and ileal	%
Simple closure with / without omentum	66	94.3	21	70
Resection and anastomosis	0	0	5	16.6
Simple drainage	4	5.7	2	6.6
Simple closure with stricturoplasty	0	0	2	6.6

Overall mortality in small bowel perforation was 15%, highest seen in ileal perforation (39%), followed by duodenal perforations (8.5%). Cases of ileal perforation had more post-operative complications when compared to duodenal and jejunal perforation. Wound infection (25%) is the most common post-operative complication. Toxaemia (22%) and respiratory infections (10%) are the other common complications. Table 5 lists all the complications noted.

Table 5: List of complications with percentages.

Post op complications	Duodenal perforation	%	Jejunal and ileal perforation	%
Wound infection	15	21.4	10	33.3
Burst abdomen	4	5.7	3	10
Toxemia	12	17.1	10	33.3
Respiratory	5	7.1	5	16.6
Paralytic ileus	3	4.2	2	6.6
Fecal fistula	1	1.4	6	20
Uraemia	8	11.4	9	30
Cardiac arrest	3	4.2	1	3.3
Obstruction	0	0	0	0
Hypotension	8	11.4	7	23.3
Encephalopathy	0	0	0	0

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.[4] 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.[5,6]

Present study showed overall mortality in these patients of 15% which is in par with other studies conducted in India.[3] However cases of ileal perforation showed the highest mortality when compared to duodenal and jejunal perforation, which was also noted in other studies.[2, 6] This indicates that the site of perforation is an important factor in predicting outcome of the case.

Duodenal perforations

They form the major group of cases in present study and the similar trend is noted in various studies conducted in India, in spite of the major advances in the conservative management of peptic ulcer diseases.[2] The elective operative management of peptic ulcer have drastically reduced but the cases that end up with perforations are still same or rather increased.[7] In present study, author noted these patients came with classical features of peritonitis and showed pneumoperitoneum on the X-ray. Immediate surgeries resulted in a favourable outcome. Author preferred using simple closure of the perforation and placed a pedicle omental patch over it, among the various approaches. Various studies show that this technique obtains a very satisfactory result.[8] The mortality and post-operative complications are much lesser when compared to ileal and jejunal perforations, but these largely depend on various factors like age, co-morbidities, pre-operative status, size of the perforation, delay in presentation and delay in operation.[8]

Jejunal perforation

These perforations are comparatively rare and are nonspecific.[9] Some had a history of trauma associated.[10] Overall majority of these cases presented with a very vague history and signs of peritonitis. In present study, most of these perforations were treated with simple closure and they had a very favourable outcome.

Ileal perforations

After duodenal perforations, this the most common site for the occurrence of perforations.[5] The most common reason for these perforations was typhoid, followed by tuberculosis. This shows that majority of ileal perforations are mainly due to infections, which was also noted in present study. Ileal perforations secondary to enteric fever show a higher mortality rate when compared to other causes.[5,11,12]

A 'non-specific' etiology is a term used when the perforation cannot be classified on the basis of clinical symptoms, gross examination, serology, culture and histopathological examination into any disease state such as enteric fever, tuberculosis or malignancy. These ulcers are usually single and commonly involve terminal ileum. It has been proposed that submucous vascular embolism, chronic ischemia due to atheromatous vascular disease or arteritis, or drugs such as enteric coated potassium tablets are responsible for them.[3] These are the second most common cause of ileal perforation after typhoid.

Tuberculosis is the third most common cause of ileal perforation. Abdominal tuberculosis when associated with perforations mostly involves the ileum and is also associated with strictures.[13] After the surgical management, they were treated with multi-drug regimen for TB. Perforations secondary to ileal tuberculosis have a high mortality rate like those secondary to typhoid fever.[13]

Many studies have noted various other causes to ileal perforations other than the ones mentioned above like Crohn's disease, Behcet's disease, radiation enteritis, adhesions, ischemic enteritis and SLE which author did not come across.[9]

The difficulty in management of ileal perforation lies in the operative techniques. Multiple techniques like simple closure, wedge excision or segmental resection and anastomosis, ileostomy, side to side ileo-transverse anastomosis after primary repair of the perforation are practiced.[5,12] They showed varied results in the different studies. A simple closure can be considered in cases where the bowel and patient are both healthy.

Post-operative period

Ileal perforations have the highest rate of post-operative complications.[2] Most common complication being wound infections in cases of small bowel perforation.[14] Laparoscopic repair of these perforations have shown to reduce occurrence of wound infection.[15] Other common complications include respiratory complications e.g. pneumonia, atelectasis, pleural effusion or ARDS, septicaemia and dyselectrolaemia which are preventable and should be detected early and aggressively treated.[1]

CONCLUSION

Several factors are important for favorable outcomes in the cases of small bowel perforation peritonitis. Adequate resuscitation and use of higher antibiotics always improve the outcome. 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.

Study in this field is less, may be due to the emergency nature of these cases. 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. As data of jejunal perforation is less, study can be undertaken to demystify the clinical spectrum of the same. Role of laparoscopy surgery in the management of the same can be evaluated.

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