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Original Research Article

Management of traumatic and non traumatic hollow visceral perforation in North India

Naresh Pal*, Vineet Mishra, Amit Jangra, Poonam, Udit Jain

Department of Surgery, Pt. B D Sharma PGIMS, Rohtak, Haryana, India

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***Correspondence:**
Dr. Naresh Pal,
E-mail: nareshpalsinghdr@gmail.com

ABSTRACT

Background: Hollow visceral perforation is the commonest perforation among all the hollow viscera in the body. The perforation can be traumatic or non-traumatic and it constitute commonest surgical emergency worldwide. The diagnosis of perforation can be made clinically but for confirmation basic radiological investigations and sometimes special investigation are required.
Methods: This is a prospective observational study conducted in our institute in the Department of General Surgery. The patients who are included in this study were more than 15 years of age in both sexes having hollow visceral perforation presenting in accident and emergency department.
Results: Out of 624 patients, 530 (84.93%) were males while only 94 (15.06%) were females, with a male: female ratio of 5.63:1. The site of perforation are ileum 37.01% duodenum, 28.36% maximum sites of hollow viscous perforation. Acid peptic disease was the cause of perforation in 27.40% of 171 cases. Enteric fever accounted maximally for 29% of 181 cases and all in the ileum. Acute appendicitis resulted in perforation of the appendix in 64 cases (10.25%) while blunt trauma abdomen causes perforation in 12.66% of 79 cases. Perforation due to stab injury accounted for 5.12% and fire arm injury perforation seen in 19 patients (3.04%).
Conclusions: Early diagnosis of perforation, resuscitation with crystalloids with broad spectrum antibiotic coverage and urgent surgical intervention whenever patient is fit for anaesthesia are the important factors which decides the ultimate fate of the patient in case of hollow visceral perforation peritonitis.

Keywords: Peptic perforation, Hollow visceral perforation, Blunt trauma abdomen, Fire arm injury, Ileostomy, Exploratory laparotomy

INTRODUCTION

Secondary peritonitis due to intestinal perforation weather traumatic or non-traumatic constitute one of the most serious surgical worldwide as well as in our institute. In spite of advancements in preoperative diagnosis, perioperative care, good surgical techniques, broad spectrum anti-microbial therapy and availability of intensive care, the management of perforation of hollow viscera is very difficult and highly demanding.[1] Clinically perforation usually presents as acute abdomen which requires urgent exploration of abdomen and corrective surgery depending on aetiology.[2] Patients of acute abdomen presenting in accident and emergency form 20-40% of emergency surgical admission.[2] Peritonitis after perforation of hollow viscera can have local as well as systemic sign symptoms. With local sign symptoms includes-tenderness, guarding or rigidity, distension of abdominal and diminished or absent bowel sounds. The systemic sign symptoms can be fever of any grade, may be associated with rigors and chills, tachycardia, tachypnoea, restlessness, dehydration, sweating, oliguria, disorientation and ultimately death can occur due shock septicaemia.[3] Perforations of hollow viscous have various

causes but in India the common causes can be such as infective aetiology, typhoid ileal perforation, peptic ulcer, inflammatory disease, blunt or penetrating trauma, perforation due to iatrogenic, neoplasm perforation which require an early recognition and urgent intervention.[4] According to site of hollow viscous perforation which depends on the underlying pathology like, in duodenum or stomach mostly due to peptic ulcer disease. On the other hand, the terminal ileum perforation is mostly due to typhoid fever. With the increasing aging, peritonitis in a minority of patients may be due malignant perforation of large bowel. Drugs also have adverse effect on intestinal mucosa and increase the risk of peptic perforation, particularly NSAIDS, corticosteroids and chronic constipation due to opioids.[5] Perforation is highly expected after penetrating and even in non-penetrating abdominal trauma.[5] So the diagnosis can be made with clinical examination and with through history of sigh/symptoms in many cases in ours patients. But still radiological investigations like plain X-ray of thorax and abdomen, ultrasound abdomen and sometimes CECT abdomen are required to ascertain the diagnosis of perforation of hollow viscous. Where ever facilities of diagnostic laparoscopy are available, it can be helpful in confirmation of perforation in some cases. The emergency laparoscopic diagnostic facilities are still not available in most of government hospitals even at level of tertiary care.

The objective of this study was to evaluate the wide spectrum of hollow viscera perforation in terms of aetiology and surgical management and its incidence of different types of perforation of hollow visceral in a premium institute of North India.

METHODS

This study is observational prospective study conducted in the Department of General Surgery of Pt. B D Sharma PGIMS Rohtak Haryana India. We studied 624 patients of hollow viscous perforation both due to traumatic and non-traumatic from November 2016 to January 2019. All these patients were studied in terms of clinical presentation, cause of perforation, site of perforation, surgery performed. suspected patients of perforation peritonitis due hollow visceral perforation. They were resuscitated first and provisional diagnosis was made on the basis of history, clinical examination and radiological investigations. All the emergency investigations were done including complete blood counts blooding time, clotting time, prothrombin time or international normalized ratio, serum urea, creatinine, electrolytes, blood sugar, urine albumin and sugar, electrocardiography and chest X-rays. As soon as the diagnosis was made, resuscitation was started with large volume of crystalloids (blood transfusion if necessary) and broad-spectrum antibiotics were administered. Following adequate resuscitation, all the patients who were fit for anaesthesia underwent emergency exploratory laparotomy by midline incision and intraoperative findings were noted. The operating surgeon decision was final for the procedure which was performed. Peritoneal cavity was thoroughly irrigated with 3-5 litres warm normal saline. Abdominal drains were placed in all patients for peritoneal drainage. abdomen was closed after achieving complete haemostasis. Postoperatively, intravenous broad-spectrum antibiotics were given. All operative findings were recorded as per proforma. Post operatively, the patient was monitored either in general ward or high-dependency unit or intensive care unit depending on patient's condition and availability of bed in high end areas.

Inclusion criteria

All patients of hollow viscera perforation (≥15 years) of both sexes who underwent exploratory laparotomy for the same.

Exclusion criteria

Cases of primary peritonitis or laparotomies done for blunt trauma abdomen and later found to be have hemoperitoneum due to solid organ injury. Laparotomies done on clinical ground of peritonitis and later on found to be have acute pancreatitis. Paediatrics patients less than 15 years and those died during the surgery or before the operation.

RESULTS

The majority of the patients 530 (84.93%) were males while only 94 (15.06%) were females, with a male: female ratio of 5.63:1. The age of the patients ranged from 15 to 86 years. The maximum number of cases were in the age group of 21 to 30 (164) 26.28% while the least number was in the age group of >70 (13) 2.08% as reported in Table 1. The site of perforation was as shown in Table 2 are ileum 37.01% duodenum, 28.36% are the maximum sites of hollow viscous perforation. Perforation of appendix 10.25% is third most common perforation and large intestine were less common in which cecum and recto-sigmoid perforation is seen equally 3.04%. All sites of perforations were maximally seen in males except gall bladder perforation in which four were females and one patient was male. Overall the most common site of perforation was ileum seen in (231 patients). Less common sites of perforations are, five patients of gall bladder perforations, three males of urinary bladder perforation, two patients of ileum perforation at site of Meckel's diverticulum, two patients of oesophagus perforation and one patient of uterus perforation during suction an evacuation for septic abortion.

The etiological background dictated the site of perforation among hollow visceral perforation. Acid Peptic disease was the cause of perforation in 27.40% of 171 cases. Enteric fever accounted maximally for 29% of 181 cases and all the perforation present in ileum. Acute appendicitis resulted in perforation of the appendix in 64

cases (10.25%) while blunt trauma abdomen causes perforation in 12.66% of 79 cases. Perforation due to Stab injury accounted for 5.12% and fire arm injury perforation seen in 19 patients (3.04%). There were few patients of rare perforation in which one male patient of descending colon perforation during percutaneous nephrolithotomy (PCNL) procedure, one female and one male patient of sigmoid colon perforation during colonoscopy examination. Two patients each were seen in which oesophagus perforation after corrosive poisoning, strangulated hernia perforation in which one male after ileum perforation in inguinal hernia and one female after perforated ileum in umbilical hernia. Three male patients having sigmoid colon perforation were seen due to sigmoid colon volvulus. One patient of jejunum perforation was seen during suction and canula for septic abortion.

Table 1: Sex wise distribution of hollow viscous perforation patients.

Age group (in years)	Male	Female	Total (n=624)	Percentage (%)
≤20	55	12	67	10.73
21-30	144	20	164	26.28
31-40	123	13	136	21.79
41-50	107	23	130	20.83
51-60	63	11	73	11.69
61-70	31	7	38	06.08
>70	7	8	13	02.08
All age	530	94	624	100

Table 2: Sex wise distribution of site of hollow viscous perforation in studied patients.

Site of perforation	Number of cases		Total	Percentage (%)
	Males	Females		
Oesophagus	2	0	2	0.32
Stomach	20	3	23	3.68
Duodenum	166	11	177	28.36
Jejunum	42	8	50	8.01
Ileum	208	23	231	37.01
Cecum	15	4	19	3.04
Ascend colon	4	0	4	0.64
Trans colon	16	1	17	2.72
Descend colon	7	0	7	1.12
Recto. sigmoid	17	2	19	3.04
Appendix	48	16	64	10.25
Gall bladder	1	4	5	0.80
Urinary bladder	3	0	3	0.48
Uterus	0	1	1	0.16
Meckel's diverticulum	2	1	3	0.48

Table 3: Sex wise distribution of aetiology hollow viscous perforation in studied patients.

Etiology	Number of cases		Total	Percentage (%)
	Males	Females		
Acid peptic disease	161	10	171	27.40
Blunt trauma abdomen	72	7	79	12.66
Fire arm inj.	18	1	19	3.04
Stab abdomen	26	6	32	05.12
Enteric per.	150	31	181	29.00
Tubercular	8	10	18	02.88
Malignancy	12	0	12	01.92
Non-specific per.	29	5	43	06.89
Iatrogenic during laparotomy	1	1	2	00.32
During PCNL	1	0	1	00.16
Srangulated hernia	1	1	2	00.32

Continued.

Etiology	Number of cases		Total	Percentage (%)
	Males	Females		
Corrosive poisoning	2	0	2	00.32
Cholecystitis	1	4	5	00.80
Septic abortion	0	1	1	00.16
Appendicitis	48	16	64	10.25
Colonoscopic perforation	1	1	2	00.32
Perorated due to volvulus	3	0	3	00.48

Table 4: Sex wise distribution of surgery performed in hollow viscous perforation in studied patients.

Surgery performed		Males	Females	Total
Primary repair				
Stomach		8	3	11
Jejunum		18	4	22
Ileum		65	7	72
Colon		8	1	9
Total		99	15	114
Graham's patch repair		170	11	181
Resection anastomosis				
Jejunum		20	2	22
Ileum		30	9	39
Colon		6	0	6
Total		56	11	67
Stoma				
Ileum	End	97	27	124
	Loop	34	9	43
	Double barrel	3	0	3
Colon	End	19	3	22
	Loop	4	0	4
Total stoma		224	39	263
Feedingjejunostomy		18	3	21
Gastro-jejunostomy		4	1	5
Right-hemicolectomy		17	0	17
Cholecystectomy		1	4	5
Whipples procedure		1	0	1
Appendicectomy		48	16	64

In our study, a variety of procedures were performed depending on the site of perforation, contamination of peritoneum, patients' general condition, and surgeons' decision as seen in Table 4. The operative procedures performed included primary repair of the hollow viscera perforation, resection with anastomosis, creation of stoma (ileostomy or colostomy) or appendectomy depending on the indication and type of perforation. The most commonly performed operative procedure was the stoma formation either end, loop or double barrel for perforation of ileum and colon seen in 263 patients. Graham's patch repair was performed in 181 patients and primary repair was done in 114 patients for stomach, jejunum, ileum and colon perforation. Appendicectomy was performed in 64 patients for perforated appendix. Feeding jejunostomy was performed in 21 patients for large perforation at duodenum. Right hemicolectomy was done as part of perforation at cecum and ascending or ileo- cecum junction in 17 patients. Gastro-jejunostomy and cholecystectomy was done in five patients each. Whipple's procedure was performed in one male trauma patient.

DISCUSSION

Perforations of gastrointestinal tract is very common in hollow visceral perforation as compared to other hollow visceral perforation and proximal perforations of gastrointestinal tract is more common in our institute as well as in other developing countries.[6] This is in contrast to developed countries, where distal gastrointestinal perforations are more common than proximal one, like in America, Japan and Greece.[7,8] In our study, the ratio of male to female in all types of hollow visceral perforation irrespective pathological condition and sites was 5.63:1. The proportion of male is more in our study, it may be due to male dominant society feeling their own right to

do any addiction like use of tobacco for smoking, alcohol consumption because of easily available and this increases the risk of perforation. In a study conducted by Ali et al the male to female ratio was 2.73:1.[9]

Table 5: Comparison of site of perforation with other studies.

Name of author	Duodenal (%)	Gastric (%)	Appendicular (%)	Small bowel (%)	Colon (%)
Afridi et al[31] (n=300)	43	13	5	31	8
Patil et al[42] (n=150)	43	13	4	40	0
Gupta et al[43] (n=400)	44	3	24	14	3
Ramachandra et al[44] (n=50)[44]	64	0	12	24	0
Ali et al[9] (n=153)	16.3	6	14.3	64	0
Present study (n=624)	28.36	3.68	10.25	45.02	10.56

In an another studies, conducted by some authors, the male-to-female ratio varies from 1.34:1 to 7:1.[10] Male dominancy has been uniformly reported particularly from the developing countries, with the variation of ratio 3.3:1 to 9:1.[11] Jain et al in his study also found that sex ratio was 5:17.[12] Khanna et al In their study of 204 patients, have reported that most common cause of perforation is due to typhoid fever in 108 patients and duodenal perforation was the second commonest cause seen in (58 cases).[13] Also, Noon et al reported in a series of 430 patients, where they reported penetrating trauma to abdomen was the commonest cause of hollow visceral perforation (210 cases), followed by appendicular perforation (92 cases) and peptic ulcer perforation (68 cases).[14] These reports highlight the importance of infection in developing countries like India. The similar picture is also seen in our study also where very high incidence of perforation peritonitis due to typhoid fever (29%) and tuberculosis (2.88%) is present.

The site of perforation in hollow viscera in this study is ileum, in 37.01%, gastric, 3.68% and duodenum, 28.36% and together gastroduodenal perforation is 32.04%. large intestine perforation was less commonly seen, like in cecum 3.04%, ascend colon 0.64%, trans colon 2.72%, descend colon 01.12% and recto-sigmoid 3.04% and together they form 10.56% of colon perforation in all the hollow visceral perforation. Appendicular perforation is seen in 10.25% of patients. Patients of gastric and duodenum perforations or any other perforation in hollow viscera are mainly males in the present study. Whereas a retrospective analysis by Dorairajan et al in 250 patients revealed that perforations of the upper gastrointestinal tract occur in the majority unlike the west where perforations of the lower gastrointestinal tract predominate.[6] In a study done by Batra et al for site the site of perforation of hollow viscera was gastroduodenal 80.3%, small bowel 14.1%, appendix 3.8%, colon 1.3% and rectum 0.6% of patients.[15] Comparison of site of perforation is shown in Table 5.

Similar observations were noted by Jhobta et al in their study on 504 patients, where he reported that developed countries have more perforation in lower gastrointestinal tract.[16] Blunt trauma abdomen was the another common cause of gastro-intestinal perforation in our study. Seventy-nine (12.66%) had perforation peritonitis due blunt trauma abdomen. Jhobta et al in their study found 6% patients had gastrointestinal perforation due to blunt trauma abdomen. Out of 8 patients' perforation due to blunt trauma abdomen, 3 patients (43%) had ileal perforation, 3 patients (28.5%) had jejunal perforation, 1 patient (14.2%) had sigmoid colon perforation, 1 patient (14.2%) has gastric perforation and 1 patient (14.2%) had rectal perforation which was associated with ileal perforation.[16] Sule et al in their study on perforation peritonitis following blunt trauma abdomen found that the site of perforation in the order of frequency was jejunum (16.07%), ileum (14.2%), stomach (3.5%) and colon (3.5%).[17]

The diagnosis of typhoid intestinal perforation was made by clinical evaluation, laboratory investigation, radiological investigations and operative findings such as perforation on antimesenteric borde.[18] Among the less common sites of perforations in the present study are, five patients of gall bladder, perforations, three males of urinary bladder perforation, two patients of ileum perforation at site of Meckel's diverticulum, two patients of oesophagus perforation and one patient of uterus perforation during suction an evacuation for septic abortion as per Table 2. Some authors reported in the literature rare sites of perforation, causing peritonitis.[19,20]

Gallbladder perforation is an rare complication of acute and chronic cholecystitis (2-15%), but it is associated with a high mortality rate without early treatment.[21,22] Perforated or gangrenous gallbladder usually have some delay in reporting to surgeon due to delayed in diagnosis.[22,23] In case of complication, active surgical treatment is mandatory within 48 to 72 hours.[24] Mortality rates due to gallbladder perforation decreased to 7% to 16% in the recent time owing to surgery, developments of good anaesthesiology and availability of intensive care for sick patients.[25,26]

Why the colon perforate spontaneously is not have definite cause. In general, colonic perforation caused by solid faeces is the most frequent occurrence as per literature. In these cases, the solid feculent mass

compresses the colonic wall, leads to ischemia and ultimately necrosis of colonic mucosa. The ulcer might lead to colonic rupture in some cases.[27,28] Maurer et al have its own views for colonic perforation: (1) rounded shape, more than 1 cm in diameter; (2) the colon is usually full of stool, it spilled in abdominal cavity after perforation causing perforation peritonitis; (3) due to pressure changes, there is ischemia leading to ulceration which can be confirmed by histological examination.; (4) we must exclude any external injury to colon or malignancy.[28] The present study shows 43 patients (6.89%) non-specific perforation. Another cause of colon as per literature is idiopathic colonic perforation. The increased pressure in the colonic lumen distributes asymmetrically, leading to an excess pressure increase at the level of the angle.[29]

In the study of Kasahara et al, 68% (44 out of 65) of idiopathic colonic perforation were located at those sites.[30] Afridi et al in their study found colonic cancer perforation was found in 2% of the patients.[31] One patient (1.8%) had obstructed left inguinal hernia with perforation of ascending colon. Patient was treated with herniorrhaphy and primary closure of the perforation of the ascending colon and diversion ileostomy. One patient (1.8%) in this study had strangulated incisional hernia with perforation of the transverse colon. Jhobta et al in their study found that strangulation of bowel leading to perforation peritonitis was found in 5% of the patients.[16]

The standard management for perforation of hollow viscera is resuscitation, optimization followed by surgery and this protocol was also followed in ours institute. Gupta et al and some other authors recommended the patch omental patch repair in peptic perforations.[32] Dickson et al in his study recommended simple closure of perforation, whenever possible.[33] In case of ileal perforation, resection of small bowel in multiple typhoid perforations of the terminal ileum; but at the same time recommended stoma formation in very sick patients and where small bowel was not healthy.[34] In case of tubercular perforations resection of the segment of ileum is the treatment of choice recommended by some authors.[35,36] Gupta et al In their study advised primary closure of hollow visceral perforation by trauma.[37] The protocol also followed by us in the present study. Townsend et al also performed the primary closure in cases of traumatic perforations in hollow viscera.[38] The operative procedures included primary repair of the perforation, resection with anastomosis, stoma (ileostomy or jejunostomy) or appendectomy depending on the clinical indication.

Graham's omental patch repair was the performed in all the patients of peptic perforation in the present study. Leeman et al in their study 91% of gastric ulcer was treated with Graham's omental patch and large perforations more than 2 cm was treated either by simple closure (4.5%) or distal gastrectomy (4.5%).[39] Chaudary et al in their study concluded that gastrointestinal ulcer larger than 2 cm can be treated with jejunal loop as serosa patch.[40]

Noon et al studied the 430 patients of intestinal perforation in which 210 patients were penetrating trauma to abdomen, appendicitis was present in 92 patients and peptic ulcer perforation was present in 68 patients.[41] This Sensoria's can present in developed countries due high vehicular accidents. Our study has different presentations, the most common cause is infection by typhoid (29%) and tuberculosis (2.88%) together forming 32% among all hollow visceral perforations. Nowadays there is gradual trends towards the minimal invasive techniques for treatment of secondary peritonitis. Wherever facilities are available, some authors have started laparoscopic surgery approach for the management of peritonitis by hollow visceral perforation.[1] We are not doing laparoscopy in emergency surgeries and patients of perforation in hollow viscera have been managed by exploratory laparotomy.

CONCLUSION

Peritonitis due to hollow viscera will remains the significant challenge for their management having very high mortality even in best centres. Ileum perforation will remain the most common site of perforation in hollow visceral perforation, whatever may the aetiology of perforation. Stoma formation is the most common surgical procedure performed and graham's patch repair is second in all the patients of hollow visceral perforation in this study. There are also some rare causes of perforation causing peritonitis such as corrosive poisoning, during septic abortion, colonoscopy perforation, during PCNL procedure, chronic cholecystitis etc. The basic principal for treatment of perforation in hollow viscera will remain the same. All patients must be treated as early as possible. So early diagnosis with good resuscitation with intravenous fluids and broad-spectrum antibiotics followed by surgical intervention in peritonitis with hollow viscera will still remain the cornerstones to avoid mortality and morbidity.

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