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Study of Clinical Features, Etiology and Management of Perforation Peritonitis in Adults at a Tertiary Hospital

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ABSTRACT
Perforation peritonitis is the most common surgical emergency encountered by surgeons all over the world. Clinical presentation varies according to the site of perforation and duration of perforation. Present study was aimed to study clinical features, etiology and management of perforation peritonitis in adults at a tertiary hospital. Present study was single-center, prospective, observational study, conducted in patients of age 18 years and above, irrespective of sex, presenting with gastrointestinal perforation with peritonitis and undergoing exploratory laparotomy. The annual incidence of gastrointestinal perforation peritonitis in adult patients observed in our study was 26.7%. In present study, out of 50 adult patients. most commonly affected age group was 51-60 years (38%). Mean age of patients in our study was 47.8 years. Male to female ratio is 3.1:1. Common co-morbidities were hypertension (14%) and diabetes (8%), Pain in abdomen was most common (100%) presenting symptom in our patients followed by guarding and rigidity (92%). Majority patients presented within 48 hours after onset of symptoms (48%), required less than 6 hours for resuscitation (76%). On plain abdominal radiograph pneumoperitoneum was noticed in 37 (74%) patients. Acid peptic disease (60%) is the most common etiology followed by appendicular perforation (22%) and idiopathic (6%). Duodenum (56%) is the most common site of perforation followed by appendicular perforation (22%) noted in our study. Old age, associated co-morbid conditions and delayed presentation to hospital from the onset of symptoms leading to delayed treatment were the factors observed in these patients. Mortality rate was 8%. Old age, Delayed presentation to the hospital, shock at the time of admission, associated co-morbidities, adversely affected the final outcome in these patients.

INTRODUCTION

Perforation peritonitis is the most common surgical emergency encountered by surgeons all over the world[1,2]. Perforation causes exposure of the peritoneum to the gastro-intestinal contents which results in peritonitis[3]. In developing countries the most common causes of gastrointestinal perforation includes, duodenal ulcer perforation, typhoid ileal perforation, perforation due to trauma, perforation due to malignancy whereas malignancy and diverticulitis are more common in developed nations[4]. Patients with perforation peritonitis usually presents with abdominal pain, distension, vomiting, absolute constipation, dehydration and shock. But the clinical presentation varies according to the site of perforation and duration of perforation. Surgical treatment of perforation peritonitis is highly demanding and complex[5]. If not treated promptly, can lead to multisystem organ failure and death[6,7]. A prompt diagnosis and urgent surgery is life-saving for all patients with generalized secondary peritonitis[8].

Surgical treatment includes emergency exploratory laparotomy and management of the underlying etiology. The mortality rate increases with the length of interval between the time of hollow organ perforation and time of surgery[9]. Present study was aimed to study clinical features, etiology and management of perforation peritonitis in adults at a tertiary hospital.

MATERIALS AND METHODS

Present study was single-center, prospective, observational study, conducted in department of General Surgery, at Dr. V.M.G.M.C. Solapur, Maharashtra, India. Study duration was of 2 years (September 2019 to November 2021). Study approval was obtained from institutional ethical committee.

Inclusion Criteria:

- All the patients of age 18 years and above, irrespective of sex, presenting with gastrointestinal perforation with peritonitis and undergoing exploratory laparotomy, patients/relatives willing to participate in present study

Exclusion Criteria:

- Patients below the age of 18 years
- Patients with primary peritonitis/spontaneous bacterial peritonitis, post- operative peritonitis due to anastomotic leakage, peritonitis following ingestion of corrosive poison, peritonitis following traumatic and iatrogenic bowel perforation will be excluded from the study
- Patients not undergoing exploratory laparotomy

Study was explained to patients/relatives in local language and written consent was taken for participation and study. On admission detailed history regarding, time of appearance and duration of pain in abdomen associated with distention, vomiting and fever were recorded. Also, enquiry made about cough, constipation, NSAID's use and alcoholic status. Inquiry was also be made regarding the patients medications, past medical history and chronic medical conditions (like Diabetes, Hypertension, Tuberculosis) in addition to drug allergy. On admission if patients were in hypotension, then they were resuscitated initially and when became hemodynamically stable, shifted for radiological investigations and then in surgical ward.

All the patients with perforation peritonitis were examined thoroughly as general examination, per-abdominal examination (inspection for abdominal distension, previous operative scar -supra-umbilical/infra-umbilical, etc. palpation done for tenderness, rebound tenderness, guarding and rigidity), per-rectal examination (to rule out any anorectal pathology) and baseline findings were recorded.

Laboratory investigations complete blood count (CBC), blood grouping and cross matching, bleeding time and clotting time, urine examination, LFTs, RFTs, blood sugar, Serum electrolyte, HIV testing and hepatitis B testing were done in all patients. ECG (Electrocardiogram) was done whenever required. Radiological investigations such as plain abdominal radiograph in erect posture, chest radiograph and ultrasonography of abdomen and Pelvis were done in all patients. CT scan abdomen is done only when indicated and only in doubtful cases where ultrasound findings are inconclusive. After the final diagnosis was made, patients were resuscitated and then posted laparotomy.

Preoperatively consent was explained to patients and relatives, patients were kept nil by mouth at least 6 hours prior to surgery. A nasogastric tube inserted for gastric decompression. Single dose of broad-spectrum antibiotic was administered at the time of induction of anaesthesia in all cases. Operative procedures were carried out under General anaesthesia or epidural anaesthesia, depending upon the condition of patient. All the patients were subjected to emergency exploratory laparotomy. Depending upon the intraabdominal pathology appropriate surgical procedure was carried out.

Post operatively the patients were monitored in surgical ward and if required selected patients were shifted to surgical ICU for continuous monitoring in consultation with anaesthetist. (Standard postoperative care was provided to all patients. Check dressing of suture line was done in all the patients

on 3rd postoperative day for possible wound complications. All the patients were monitored for other possible complications in postoperative period. In uncomplicated cases skin sutures were usually removed on 10th or 12th postoperative day. After suture removal patients were discharged and advised to follow up in OPD for examination after one month, three months and then 6 months.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. p>0.5 was considered as statistically significant.

RESULTS AND DISCUSSIONS

The annual incidence of gastrointestinal perforation peritonitis in adult patients observed in our study was 26.7%. In present study, out of 50 adult patients. most commonly affected age group was 51-60 years (38%). Mean age of patients in our study was 47.8 years. Male to female ratio is 3.1:1. Common co-morbidities were hypertension (14%) and diabetes (8%), Pain in abdomen was most common (100%) presenting symptom in our patients followed by guarding and rigidity (92%). Majority patients presented within 48 hours after onset of symptoms (48 %), required less than 6 hours for resuscitation (76%). On plain abdominal radiograph pneumoperitoneum was noticed in 37 (74%) patients.

Acid peptic disease (60%) is the most common etiology followed by appendicular perforation (22%) and idiopathic (6%). Duodenum (56%) is the most common site of perforation followed by appendicular perforation (22%) noted in our study. Common surgical procedures performed were Primary closure with Grahm's omental patch repair (60%) followed by Appendicectomy (22%), Primary repair (10%) and Resection with anastomosis (4%). Wound infection (18%) is the most common post-operative complication noted in our study. Other less common complications noted were paralytic ileus (4%), burst abdomen (4%), pneumonitis (4%), septicemia (2%) and acute renal failure (2%).

Majority of patients (50%) the hospital stay was between 14-16 days. Mean hospital stay in our study was 15 days. 46 (92%) patients survived while remaining 4 (8%) patients succumbed to death. All 4 patients died in the post operative period. Old age, associated co-morbid conditions and delayed presentation to hospital from the onset of symptoms leading to delayed treatment were the factors observed in these patients. Age more than 60 years, hypotension/Shock at the time of admission, admission to hospital more than 48 hours and associated co-morbid conditions were associated with adverse outcome in these patients and is statistically significant.

Peritonitis can be classified as primary secondary or tertiary, depending upon the source of microbial contamination. Primary peritonitis is secondary to extra-peritoneal sources the infection spreading mainly through hematogenous dissemination without visceral perforation. Secondary peritonitis, on the other hand, is caused by resident flora of the gastrointestinal or urogenital tracts the organisms reaching peritoneum secondary to a mechanical break. Non-responding secondary peritonitis either due to failure of the host inflammatory response or overwhelming super infection leads to tertiary peritonitis[4].

The diagnosis is made clinically and confirmed by presence of gas under diaphragm on radiograph, but absence does not exclude the presence of perforation. When chest x-ray does not show pneumoperitoneum, or a relatively well-patient with a sealed perforation and uncertain diagnosis, a contrast enhanced computed tomography scan (CECT) of the abdomen is useful as it has a high diagnostic accuracy of 98%[6]. In present study the mean age of patient is 47.8 years. The findings in our study are comparable with other studies such as Singh *et al*.[10] (mean age 49 years), Chakma e*t al*.[11] (mean age 48.28 years) and Abdullah *et al*.[3] (mean age 44.8 years). In present study, male to female ratio was 3.1:1. This clearly indicates that incidence of gastrointestestinal perforation is more in male than female patient .Similar findings were also noted in various other studies such as Yadav *et al*.[12] (male to female ratio 4.9:1), Amit *et al*.[13] (male to female ratio 4.6:1) and Seth *et al*.[14] (male to female ratio 4.5:1).

In our present study abdominal pain was detected in all the patients 50 (100%). Vomiting in 24 (48%), fever in 28 (56%),Guarding/Rigidity in 46 (92%) and abdominal distention in 39 (78%)patients. In a study conducted by Kumar *et al*.[15] noted that all the patients 100 (100%) presented with abdominal pain while vomiting in 77 (77%) patients. Fever was detected in 84 (84%) patients. Guarding/Rigidity in 91 (91%) Abdominal distension in 79 (79%), Obliteration of liver dullness in 78 (78%) patients. Similar findings were noted in present study. Duodenum (56%) is the most common site of perforation followed by appendicular perforation (22 %) noted in our study. Similar findings were noted by Karbhari *et al*.[16] (Duodenum perforation in 60% patients), Vellapan *et al*.[17] (duodenal perforation in 52% patients) and Mewara *et al*.[18] (Gastroduodenal perforation in 81% patients). In present study the overall complication rate is 24%. The findings in our study are comparable

with Batra *et al*.[19] (overall complication rate 26.35%),

Table 1: General characteristics

Age groups (years)	No. of patients	Percentage
18-30	05	10
31-40	08	16
41-50	13	26
51-60	19	38
61-70	04	8
>70	01	2
Mean age (years)	47.8	
Gender		
Male	38	76
Females	12	24
Associated comorbidities		
Hypertension	07	14
Diabetes Mellitus	04	8
COPD (Chronic obstructive pulmonary disease)	02	4
Ischemic heart disease	01	2
Alcoholic liver disease	01	2
Clinical presentation		
Abdominal pain	50	100
Abdominal distension	39	78
Vomiting	24	48
Fever	28	56
Guarding /Rigidity	46	92
Time interval of onset of symptoms to presentation		
Within 12 hours	04	8
13 to 24 hours	16	32
25 to 48 hours	24	48
More than 48 hours	06	12
Time required for resuscitation		
Less than 6 hours	38	76
12 hours	10	20
More than 12 hours	02	4
Positive findings on investigations		
Pneumoperitoneum	37	74
Hypokalemia	09	18
Raised blood urea and Serum creatinine levels	07	14
Hyponatremia	05	10
Air fluid levels	02	4

Table 2: Etiology of perforation peritonitis

Etiology of perforation	No. of patients	Percentage
Acid peptic disease	30	60
Appendicular	11	22
Idiopathic	03	6
Typhoid	02	4
Jejunal GIST	02	4
Tuberculosis	01	2
Malignancy	01	2

Table 3: Site of perforation

Site of perforation	No. of patients	Percentage
Duodenal	28	56
Appendicular	11	22
Ileum	06	12
Pre-pylori (Gastric)	02	4
Jejunum	02	4
Colon	01	2

Table 4: Surgical procedures performed

Surgical procedures performed	No. of patients	Percentage
Primary closure with Grahm's omental patch	30	60
Appendicectomy	11	22
Primary repair	05	10
Resection with anastomosis	02	4
Ileostomy	01	2
Perforation closure with colostomy	01	2

Table 5: Post operative complications

Post operative complications	No. of patients	Percentage
Wound infection	09	18
Paralytic ileus	02	4
Burst abdomen	02	4
Pneumonitis	02	4
Septicemia	01	2
Acute renal failure	01	2
Total	17	34

Mewara *et al*.[18] (overall complication rate 21%) and Goel *et al*.[19] (overall complication rate 27.2%). In present study of 50 patients overall mortality rate was 8%. Similar findings were noted by Agrawal *et al*.[20] (mortality rate 10%), Batra *et al*.[12] (mortality rate 5.7%), Chakma *et al*.[11] (mortality rate 10%)and Abdullah *et al*.[3] (mortality rate 7.3%). The overall mortality rate of generalized peritonitis is about 40% Mortality rates are below 10% in patients with perforated ulcers or appendicitis. Factors contributing to a high mortality rate are type of primary disease and its duration, associated multiple organ failure before treatment, age of the Patient, general health of the patient and time interval between the occurrence of perforation and initiation of treatment. There is approximately a fivefold increase in the mortality among the patient who received treatment after 24 hours compared to the patients who reached within 6 hours[21]. Thorough peritoneal toil along with adequate fluid and electrolyte replacement, improvement in critical care and ICCU facilities are some of the factors which have improved the prognosis of duodenal ulcer perforation. Identifying variables which influence the outcome of patients with peritonitis is an important initial step. Once these factors have been identified, the outcome of patients can be correctly predicted and better management can be instituted to those patients in need. Patient

Table 6: Post-operative hospital stay

Post operative Hospital Stay	No. of patients	Percentage	Mean hospital stay (days)
5-7 days	0	0	15 days
8-10 days	01	2	
11-13 days	12	24	
14-16days	27	54	
16 -20 days	09	18	
21-30 days	01	2	

Table 7: Final outcome

Final outcome	No. of patients	Percentage
Survived (Improved)	46	92
Expired	4	8

Table 8: Risk factors for death in perforation peritonitis

Parameters	Total patients	Survived (%)	Death (%)	p-value
Age<60 years	45	44 (97.8)	01(2.2)	p<0.01
Age >60 years	05	02 (40)	03 (60)	
Hypotension/Shock at the time of admission	06	03 (50)	03 (50)	p<0.01
No hypotension/Shock at the time of admission	44	44 (100)	0 (0)	
Male	38	35 (92.1)	03 (7.9)	p>0.05
Female	12	11 (91.7)	01 (8.3)	
Admission time<48 hour	44	43 (97.8)	01 (2.2)	p<0.01
Admission time>48 hours	06	03 (50)	03 (50)	
Associated co-morbidities	15	11 (73.3)	04 (26.7)	p<0.01
No co-morbidities	45	45 (100)	00 (0)	

education about appropriate medical management of peptic ulcer, enteric fever, tuberculosis and avoiding the precipitating factors such as alcohol, smoking may reduce the incidence of perforation peritonitis.

CONCLUSION

Acid peptic disease was the most common etiological factor for perforation peritonitis. Duodenum was the commonest site of perforation followed by appendicular perforation. Unregulated and indiscriminate use of NSAIDs still accounts for the high rate of duodenal perforation. Old age, Delayed presentation to the hospital, shock at the time of admission, associated co-morbidities, adversely affected the final outcome in these patients.

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