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Study of Incidence and Prognostic Factors in Perforative Peritonitis in a Tertiary Care Hospital

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ABSTRACT:
Background: Peritonitis caused by a perforation of the gastrointestinal tract is one of the most common surgical emergencies worldwide, with a high rate of morbidity and mortality. The aim of this study was to determine the incidence and prognostic factors in peritonitis patients that have a major impact on morbidity and mortality.
Methods: This is a prospective study done in our hospital over 18 months. Sample size is 100 patients with perforation peritonitis. All patients with non-truamatic gastrointestinal perforations above age of 10 years are included in the study. A detailed history and clinical examination were conducted, followed by standard blood tests and the use of relevant diagnostic techniques such as an X-ray of the erect abdomen, with the aid of abdominal ultrasound and abdominal CT scan. Various parameters were investigated and assessed.
Results: In this study, maximum number of patients belonged 21 to 40 years. 79% are male and 21% are female. The most common perforation which was found was duodenal ulcer perforation followed by ileal perforation. It is more commonly associated with alcohol abuse and history of NSAID intake. All the patients had pain in abdomen, abdominal tenderness and guarding. Post operative seroma formation was more common in females.
Conclusion : Most common age group affected is 21- 40 years. Perforation peritonitis is more common in males than females. Guarding and rigidity was present in 100 and 93 patients out of 100 patients respectively. Exploratory laparotomy with primary closure of duodenal ulcer with omentoplasty was the most common operative procedure. The most common postoperative complication observed was wound infection, seroma and burst abdomen.
KEYWORDS: Perforation peritonitis, Incidence, prognostic factors.

I. INTRODUCTION:

Peritonitis denotes inflammation of the peritoneal cavity and this may be caused by bacteria or by irritation of extravasated secretions. Intra-abdominal infection is defined as an inflammatory response of the peritoneal cavity to micro-organisms and their toxins, which results in production of purulent exudates within the cavity. Intra-abdominal abscess[1] is the culmination of the on-going inflammatory process, where the infection gets localized. It begins as a focal accumulation of neutrophils in an area of liquefactive necrosis around bacteria. It comprises of a localized collection of pus within a pyogenic membrane. Pus consists of necrotic leukocytes and tissue cells.

Gastrointestinal perforation is a common abdominal emergency and is still a dreaded condition with high mortality. Perforation of any part of the intestine is life threatening, which is most commonly managed by general surgeons. The vast majority of perforations are duodenal and gastric in origin, precipitated by alcohol and drugs. Malignancy and traumatic perforations are on the rise. Evaluation and management of gastro-intestinal perforations provide one of the most challenging experiences for a surgeon. Frequent causes of secondary bacterial peritonitis include perforation due to peptic ulcer disease, acute appendicitis, ileal perforation due to typhoid & tuberculosis, jejunal perforation most often due to blunt trauma, colonic perforations secondary to closed loop obstruction or malignancy [1, 2].

In India, perforation peritonitis still remains the most common surgical emergency. Its incidence is estimated to be anywhere between 8-13 **%** of cases presenting as an acute abdomen. The presentation to the hospital in our population is usually very late with well established generalized peritonitis and purulent/ faecal contamination with septicaemia. The proximal gastrointestinal tract perforations are six times as common as perforations of distal gastrointestinal tract in India, as against the studies from the western world where

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the distal gastrointestinal tract perforations are more common. Duodenal ulcer perforation and appendicular perforations are the leading causes of generalized peritonitis in India. Hollow visceral perforations due to abdominal trauma, both blunt and penetrating injury are on the rise and require appropriate management to reduce the morbidity and mortality.

The peritoneum is a single layer of mesothelial cells with a basement membrane supported by an underlying highly vascularised connective tissue layer. It has been estimated that a 1 mm increase in thickness of the peritoneum by fluid accumulation can result in sequestration of nearly 18 L of fluid, which accounts for the massive fluid shifts seen with diffuse peritonitis [3]. E. coli and Enterococci are the predominant organisms during the peritonitis stage; while B. fragilis predominated during the abscess stage. Polymicrobial infections, specifically combinations of aerobic and anaerobic species, exhibit greater lethality than single species of pathogenic bacteria.

II. REVIEW OF LITERATURE

A perforated gastric ulcer and a perforated duodenal ulcer were first reported in 1727 and 1746, respectively. The first successful closure of a perforated gastric ulcer was in 1892 and duodenal ulcer in 1894. The traditional treatment of a perforated ulcer is surgical closure with the use of free or vascularized omental patch, irrigation of peritoneal cavity and use of an antibiotic with broad coverage.

Graham's description reported in 1936 involved suturing of a piece of omentum [4]. Laparoscopic repair of perforated duodenal ulcer was first reported in 1990 by Mouset and collegues . Appendix may rupture at any spot but the most frequently the site of perforation is along the anti mesentric border. Beniwal Uday Singh in 2008 concluded that repair of the typhoid perforation is better procedure than temporary ileostomy in enteric perforation due to its cost effectiveness and absence of complication related to ileostomy. Until the end of 19th century, the intraabdominal infections were treated nonoperatively with a mortality of 90%. Surgical principles were enunciated during the first two decades of 20th century and have been uniformly applied in the management of peritonitis since 1930 [5].

Fig. 1: Radiograph showing free gas under diaphragm

The principles which have been remained unchanged are:

I. Elimination of the source of infection
II. Removal of infected material from peritoneal cavity [6].

With widespread application of these principles to the treatment of peritonitis, the mortality came down to 40-50%. The further trends of decline in the mortality became visible in 1970's and 1980's [7]. The drop is attributed to the better understanding of bacteriology of the disease, availability of powerful antibacterial agents against both aerobes and anaerobes seen in peritonitis and better understanding of organ dysfunction in sepsis and efficient ICU care. The insight gained into the bacterial etiology of disease has resulted in significant advances in the antimicrobial therapy of the disease.

Peptic Ulcer disease: Peptic ulcer disease remains one of the most prevalent and costly gastrointestinal diseases. Elective admission has decreased dramatically while admissions for complications related to ulcer disease have shown little change. Peptic ulcer disease has decreased in men and increased in women. It is speculated that the increase in women with peptic ulcer disease was in past due to an increase in smoking and at present due to an increase in NSAID ingestion. On the other hand there has been a consistent increase in the age of the population affected by perforated peptic ulcer in virtually every study worldwide. Approximately 98-99% of peptic ulcer occurs in either the duodenum or the stomach at a rate of 4:1. At least 98% of peptic ulcers are located in the first portion of the duodenum or in the stomach. The anterior wall of the duodenum is more often

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affected than the posterior wall; gastric ulcers are located along the lesser curvature.

Small intestine perforation: In the tropics; typhoid fever remains the commonest cause of non traumatic ileal perforation. Other causes included tuberculosis, amoebiasis, ascariasis and non-specific illness in comparison to west where strangulation of the bowel, diverticula, and foreign bodies, Crohn's disease and radio therapy are common. Typhoid enteritis is an acute systemic infection of several weeks' duration caused primarily by Salmonella typhi. Perforation usually takes place in the 2nd – 3rd week of illness with gradual onset in comparison to that of peptic ulcer and is seen in only 2% of cases. There will be hyperplasia and ulceration of the Peyer's patches of the intestine, mesenteric lymphadenopathy and splenomegaly.

III. AIMS AND OBJECTIVES :

1 To study the incidence of perforation peritonitis.
2 To study the prognostic factor in perforation peritonitis.
3 To study of the effect of prognostic factors on mortality and morbidity in perforation peritonitis.

IV. MATERIALS AND METHODS:

This is a prospective study done over period of 18 months.

Patients with perforation peritonitis admitted to the emergency and those who were fitting into the eligibility criteria are included in the study. A detailed history and clinical examination and blood investigation performed followed by use of appropriate diagnostic procedures such as X-ray, CT-scan with additional help of USG. Depending on the clinical and imaging findings, patients primarily resuscitated and stabilized hemodynamicly and after that exploratory laparotomy were performed. Intra-operative findings noted and peritoneal fluid sent for culture and sensitivity and ulcer biopsy or resected specimen for histopathology. On the basis of intra-operative findings and amount of contamination, decisions were taken to perform primary closure or resection and anastomosis or diversion. Post-treatment, patients were evaluated and overall complications, number of hospital days (morbidity) and final outcome (death/ discharged) were determined.

Inclusion Criteria: -

1. All cases of non-traumatic perforation peritonitis above age of 10 years
2. All cases of non-traumatic perforation peritonitis due to any cause.

Exclusion Criteria: -

1. Traumatic perforation peritonitis
2. Age below 10yrs

Parameters studied: Main parameters studied were age, sex, stage of presentation (early / late), addiction, comorbid diseases (HTN/ DM/ BA/ TB /COPD), mean systolic blood pressure at admission (</> 90 mmHg), heart rate (</> 100 per min), respiratory rate (</> 24 per min), hemoglobin (</> 10 mg/dl), serum creatinine (</> 1.5 mg/dl), number of perforations (single/multiple), size of the perforation (<1 cm or >1 cm), site of perforation, amount of peritoneal contamination (</>1000 ml), operative procedure (primary closure/ resection anastomosis/ stoma/ staged procedure), histopathology report, pus culture and sensitivity, number of hospital day, outcome (death or discharge), complications.

V. RESULTS

In the present study, patients of age group 10-20, 21-40, 41-80 years were included with the mean age being 21 to 40 +/- 10 years. The maximum number of patients belonged 21 to 40 years. Total sample size was 100 cases.

67% of patients belonged to the age group below 40 years, and 32% are above 40 years. Gender differentiation was 79% male and 21% female. 100% of the patients had pain in abdomen, as was the inclusion criteria of the study. 98% of them had vomiting, where 2% were not suffered from vomiting. Age wise distribution says that age group 21-40 yr is more prone for perforation peritonitis. The youngest patient in this study was 12 years who was having duodenal perforation and the oldest patients was 70 years, with duodenal ulcer perforation. Perforation was found in very less frequent below 20 yrs of age. Perforation was found more commonly in males (79 cases) as compared to the females (21 cases).

Table 1: Age wise comparison of Historical analysis (N=100); where N is sample size.

Age Group	Suffering	Pain in Abdomen	Vomittings	Constipation	Abd. Distention	H/O of Alcoholic	History of medication
10 to	Yes	13	13	10	12	1	3

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20	No	0	0	0	0	0	0
21 to 40	Yes	55	54	47	50	25	11
	No	0	1	7	5	30	44
41 to 60	Yes	22	22	18	18	11	4
	No	0	0	4	4	11	18
61 to 80	Yes	10	9	9	9	4	3
	No	0	1	1	1	7	8
Grand Total		100	100	100	100	41	21

Table 2: Gender wise distribution of Historical Analysis.

Gender	Suffering	Pain in Abdomen	Vomittings	Constipation	Abd. Distention	H/O of Alcoholic	History of medication
Male	Yes	79	78	67	71	39	17
	No	0	1	11	8	40	62
Female	Yes	21	20	17	18	1	3
	No	0	1	4	3	20	18

Finally, out of the total score, the patients were categorized under 8 categories.

[1] History
[2] Past History
[3] General Examination
[4] Abdominal Examination
[5] Investigations
[6] Operative Procedure
[7] Operative Findings
[8] Post Operative Outcome

1) History: Most common symptom in patients presenting with perforation was pain, present in all of the patients. Most commonly the patients came to the hospital within 24hrs of onset of pain in abdomen. All these patients accounted for pain in Abdomen. The other symptoms commonly present after pain abdomen were vomiting, fever. Vomiting was present in 98 patients, followed by constipation which was present in 67 male and 17 females. Abdominal distention was found to be 50% in 21 to 40 years age group followed by 41 to 60 years age group. Alcoholic addiction was prominently found in males than in females. 40 patients were addicted to alcohol.

2) Past history :

Similar episodes, previous surgery and TB/DM/HTN were studied under past history data. In age group 21-40 yr, only one patients out of 54 were having similar episodes , whereas in age group 41-60 yr, only three patients were having similar episodes. In Age group 61-80 yr, single patient was having similar episodes.

Table 3: Age wise distribution of past history data

Past History Data				
Age Group	Suffering	Similar Episodes	Surgery	TB/DM/HTN
10 to 20	Yes	1	0	3
	No	12	13	10
21 to 40	Yes	1	1	4
	No	53	53	50
41 to 60	Yes	3	0	1
	No	19	22	21
61 to 80	Yes	1	0	0

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	No	**10**	**11**	**11**

3) General Examination:

General examination for perforative peritonitis includes Pulse rate, Respiratory rate.

Table 5: Gender wise distribution of Maximum and Minimum Pulse rate.

Gender	Max of Pulse rate	Min of Pulse rate
Female	118	90
Male	120	90

Table 6: Gender wise distribution of Maximum and Minimum Respiratory rate.

Respirator Rate	No
High Respiratory Rate (18 to 22)	**13**
Low Respritory (Below 16)	**18**
Moderate (16 to 18)	**69**

4) Abdominal examination:

Per Abdominal Examination includes 5 parameters- soft, distension, tenderness, guarding and rigidity.

Table 7: Age wise distribution of P/A Examination.

Age Group	Suffering	Soft	Distention	Tenderness	Gaurding	Rigidity
10 to 20	**Yes**	**0**	**11**	**13**	**13**	**13**
	No	**13**	**2**	**0**	**0**	**0**
21 to 40	**Yes**	**0**	**49**	**54**	**54**	**50**
	No	**54**	**5**	**0**	**0**	**4**
41 to 60	**Yes**	**0**	**17**	**22**	**22**	**19**
	No	**22**	**5**	**0**	**0**	**3**
61 to 80	**Yes**	**0**	**9**	**11**	**11**	**11**
	No	**11**	**2**	**0**	**0**	**0**

Tenderness was maximum in young age group and least in old age group. Out of 79, 69 males were suffered from distention where as out of 21, 17 females were suffered from distention. Comparative data says females are more prone to distention than males. Out of 79, all the males were having tenderness where as out of 21; all the females were having tenderness. Considering the guarding 79 males out of 79 were suffered from gaurding where as all the females were showing symptoms of guarding. 74 males out of 79 were suffered from rigidity while 19 females out of 21 were suffered from rigidity. This data analysis says general tenderness and guarding/rigidity was very common case found in perforative peritonitis.

5) Investigations:

In 69 patients, free gas under diaphragm was seen on chest or abdominal radiograph in erect position. Among all 100 cases, the maximum WBC count is 21300 found in male where as maximum WBC count found in female was 17100. Lowest WBC count 988 was found in female where in males lowest WBC count was 2500. It results that females are having lower WBC count than in males and hence more prone to immune compromised situations. Platelet was found to be maximum (22.2) in male with age group 21-40 yr and minimum 1.01 in female with age group 21-40. Females are more prone to deficiency of platelet count in given case study. The minimum hemoglobin found was 7.2 in male of age group 41-60 yr and maximum hemoglobin count was found to be 16.4 in male within same age group.

6) Operative procedure:

Depending on the choice of the operating surgeon, the procedure carried mainly omental patch repair was done for all Duodenal perforations and Gastric perforation , whereas simple

perforation repair was done for Intestinal and Rectal perforations. Resection and anastomosis was done in a case of jejunal diverticulosis and ileal chronic ulcer suspicious of malignancy. Sigmoidectomy and Right hemicolectomy was done in case of sigmoid and ascending colon perforation respectively. Operative procedure for 21 females and 79 males was different with different age group.

7) Post operative outcome:

Parameters studied under post operative analysis are wound infection, seroma formation, wound healing and burst abdomen.

Healthy wound is prominently found in all age group, where as age group 21-40 yr was having highest healthy wound patients. Healthy wound were reported in 71 cases out of 100. Their case study analysis was 11 in 10-20 yr, 38 in 21-40 yr, 15 in 41-60 yr, 7 in 61-80 yr.

Seroma was reported in 33 cases only, out of which highest was observed in 21-40 yr group followed by 41-60 yr group. Gender wise distribution in post operative analysis was studied and it is found that seroma is found in 10 females where only 23 out of 76 patients in male. Burst abdomen was seen in 8 patients in our study. It was in age group more than 40 years.

VI. OBSERVATIONS

The present study was conducted to find out the Incidence and prognostic factors in perforation peritonitis in our hospital. The age distribution was 79% male and 21% females. In this present study, duodenal ulcer perforation was more common in the age group of above 50 years.

The ratio of men to women with all types of perforation irrespective of site and pathological condition was 8:2 in the present study. In the present study the number of male patients with duodenal ulcer perforation and appendicular perforation were 79 and the number of female patients with duodenal ulcer and appendicular perforation were 21.

In this case study, pain in abdomen, vomiting, fever were the predominant symptoms. Tenderness, guarding rigidity, were the predominant signs. In the present study, pain abdomen was present in all cases. Vomiting was present in 98 0ut of 100 patients. Constipation was present in 84 out of 100 patients. Andominal distention was present in 89 % and Alcohol addiction was present in 40%. Guarding and rigidity was present in 100 and 93 patients out of 100 patients.

Diagnosis is made clinically and confirmed by the presence of pneumoperitoneum in radiograph. Free gas under diaphragm was present in 69 cases of duodenal ulcer perforation (69%), all cases of ileal perforation, jejunal perforation. one case of ascending colon and rectal perforation showed minimal free air in radiograph.

This all examination summarize that the patients from young age group (21-40 year) are more prone to perforative peritonitis. Where in females with peritonitis was more prone to wound infections and immune deficiency.

VII. CONCLUSION

- The most common age group affected is 21-40 years and above.
- Most of these patients present with clinical signs of peritonitis 24 hours after the onset of pain.
- 79% of the patients were male and 21% of the patients were female.
- Guarding and rigidity was present in 100 and 93 patients out of 100 patients respectively.
- Diagnosis is made clinically and confirmed by presence of free air under diaphragm in 69 % of patients.
- Exploratory laparotomy with primary closure of duodenal ulcer with omentoplasty was the most common operative procedure.
- The most common postoperative complication observed was wound infection, seroma and burst abdomen.

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