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## Acute peritonitis: A clinical study

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### Abstract

In this study we have tried to find out the incidence of acute peritonitis in relation to age group and sex of the patient and evaluate the relative incidence of various causes of acute peritonitis including trauma. We have also found out the relative incidence of complications and its relation to the primary cause and analyzed the various causes of mortality and morbidity and the factors influencing it.

**Methods:** 50 cases of acute peritonitis due to traumatic and non-traumatic causes admitted in tertiary care center was included in this study. After detailed medical history and clinical examination the patients were taken up for treatment as per the proforma for acute peritonitis.

**Results:** In this series maximum number of cases was seen between the age group of 15-50 years with male patients accounting for 80% of cases. Mean age of patients was 36 years. Pain abdomen (100%), vomiting (56%) and fever (50%) were most common presenting symptoms in all cases of peritonitis. Tenderness and rigidity were present in all the cases. In this series duodenal perforation was the most common cause of acute peritonitis followed by appendicular perforation (16%), ileal (8%), intestinal gangrene (8%), jejunal perforation (6%), gastric perforation (4%) and colonic perforation (2%). All the patients were taken for surgery. Wound infection was most commonest complication (10%) seen in the post-operative period. This was followed by fecal fistula (6%) and pelvic abscess (4%). In general complications septicemia (12%) was the most common. Mortality rate was (12%) in this study with septicemia and multi organ failure being the commonest cause of mortality. Mean age of patients who expired was 51 years. Mortality was clearly more in patients who presented more than 24 hours duration after the onset of symptoms.

**Conclusion:** Duodenal perforation was the most common cause of acute peritonitis, having male predominance. Laparotomy was the treatment of choice.

**Keywords:** Duodenal perforation, acute peritonitis, exploratory laparotomy

### Introduction

Peritoneum is the largest serous smooth membrane of human body with surface area of about 2 m<sup>2</sup>, approximately to surface area of skin. [1] Peritonitis is defined as inflammation of a portion or all of the parietal and visceral peritoneum. It is one of most common surgical emergencies which present to surgery department. Peritoneum becomes inflamed secondary to bacterial invasion or chemical insult. Pathogenic organisms reach the peritoneal cavity through viscus perforation, through intraperitoneal visceral suppuration, from abdominal wound, through the blood, lymphatics or via open ends of fallopian tubes. Chemical peritonitis results from blood, bile gastric fluids, or foreign bodies left after surgery like glove lubricant such as talc, cellulose fibres from gauze pads, drapes and gown. Peritonitis may be acute or chronic, septic or aseptic, primary or secondary, localized or generalized. Diagnosis of peritonitis is made largely by clinical evaluation. Routine investigations add little information in evaluation. Once diagnosis is confirmed patient's general condition is improved so that he/she can with stand surgery. Till beginning of 21<sup>st</sup> century peritonitis was considered as fatal condition. Despite spectacular advances in understanding pathogenesis of disease, in diagnostic modalities discovery of broad spectrum antibiotics, invention of modern advance equipments like ventilators, advancement of knowledge in surgical and anaesthesiology field, peritonitis still poses major problem for surgeons as far as morbidity and mortality is concerned.

Changes in life style like reduced physical activity, excessive intake of high calorie diet, smoking, alcoholism and drugs have added to the problem.

The aim of the dissertation is to analyze various aspects of acute peritonitis and to find out measures to decrease morbidity and mortality resulting from it.

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## Materials and Methods

This clinical study of acute peritonitis was conducted in RVM Medical College & Research Centre, Mulugu, and Telangana, India. Cases for present clinical study were collected from Teaching & General Hospital wards attached to Department of Surgery, from September 2017-August 2019.

## Methods

This study comprises of 50 cases of acute peritonitis coming to RVM Medical College & General Hospital, Mulugu in a study period from September 2017 to August 2019. A pre-tested proforma was used to collect the relevant information by history, clinical examination of patients, relevant investigations required and treatment.

Patients were admitted as and when they presented with the following inclusion and exclusion criteria.

## Inclusion criteria

In study, all the cases that were provisionally diagnosed with acute peritonitis and subjected to relevant investigations and underwent surgery were included.

## Exclusion criteria

- Cases who were ruled out after investigations.
- Cases in paediatric age group (<15 years) as they come under superspeciality.
- Cases that were treated conservatively.
- Cases who refused surgery.
- Cases unfit for surgery.

Cases clinically diagnosed as peritonitis underwent x-ray erect abdomen, and blood investigations like CBC, Blood urea, serum creatinine, urine routine and microscopy. Serum amylase and Widal test was done if pancreatitis or enteric fever was suspected respectively.

After stabilization, patients were taken up for surgery. Laparotomy was done under general anaesthesia or epidural anaesthesia.

Postoperatively patients were followed till discharge from hospital and reviewed in OPD for 1 month.

Mortality in this study refers to death of the patient in the hospital during same admission as episode of peritonitis.

## Results

This study represents a systematic analysis of fifty operated case of peritonitis.

Period of study was from September 2017-August 2019.

**Table 1:** Age Distribution

Age in years	No. of Cases	Percentage
15-25	16	32
26-35	12	24
36-45	9	18
46-55	10	20
56-65	1	2
66-75	2	4

Paediatric age group is not included in present study. Most of patients are between second and third decade of life, while majority is middle age group i.e., in third, fourth and fifth decade of life. Less patients seen in sixth and seventh decade of life.

**Table 2:** Sex Distribution

Sex	No. of Cases	Percentage
Male	40	80
Female	10	20

Male patients accounted for 80% of cases while females accounted for 20% of cases. The sex ratio being 4:1.

**Table 3:** Mean Age and Sex distribution

	Mean age	Range
Male	37	15-74
Female	35	15-60

Mean age of patients is 36 years. Mean age in males is 37 years and mean age in females is 35 years. The youngest patient was 15 years old and eldest patient was 74 years.

**Table 4:** Cause of peritonitis

Pathology	No. of Cases	Percentage
Duodenal perforation	28	56
Appendicular perforation	8	16
Ileal perforation	4	8
Gastric perforation	2	4
Jejunal perforation	3	6
Intestinal gangrene	4	8
Colonic perforation	1	2
Total	50	100

The most frequent operative finding was duodenal perforation seen in about 56% of the cases. This was followed by appendicular perforation seen in 16% and ileal perforation seen in 8% of cases. Of the 4 cases of ileal perforation 1 was due to tuberculosis, 2 were due to enteric fever and 1 was secondary to stab injury.

Peritonitis secondary to intestinal gangrene was found in 8% of cases. 2 cases were secondary to strangulated hernia, 1 case was secondary to volvulus and strangulation around fibrotic bands and 1 case was secondary to volvulus around Meckel's diverticulum.

3 cases showed jejunal perforation all of them were due to blunt injury abdomen. 2 cases showed gastric ulcer perforation which were prepyloric in site, none of which were found to be of malignant origin on histopathology. Colonic perforation was seen in 1 case which was secondary to carcinoma colon.

**Table 5:** Analysis of Symptoms and Signs

Symptoms & Signs	Duodenal perforation		Appendicular perforation		Ileal perforation		Others		Total	
	No	%	No	%	No	%	No	%	No	%
Pain	28	100	8	100	4	100	10	100	50	100
Vomiting	15	54	4	50	2	50	7	75	28	56
Diarrhoea	0	0	4	50	2	50	3	30	9	18
Constipation	2	7.1	0	0	0	0	2	20	4	8
Distension	9	32.7	4	50	3	66.6	2	20	18	36
Fever	14	50	6	75	2	50	3	30	25	50
Tachycardia	15	54	5	63	2	50	7	70	29	58
Hypotension	7	25	1	6.2	1	11	2	20	11	22
Tenderness	28	100	8	100	4	100	10	100	50	100
Rigidity	28	100	8	100	4	100	10	100	50	100
Obliteration of liver dullness	12	43	0	0	1	25	3	30	16	32
Absent/Diminished bowel sounds	13	46.4	4	50	4	100	6	60	27	54

Pain was found to be present in all cases of peritonitis irrespective of pathology.

Vomiting was seen with 54% of cases with duodenal ulcer perforation, 50% of cases with ileal perforation, 50% of cases with appendicular perforation. 75% of cases of peritonitis due to other causes had vomiting. In total 56% of cases had vomiting. The next most common symptom was fever which was seen in about 50% of the total number of cases studied.

Abdominal distension was seen in 36% of the cases. Bowel disturbances were seen in 26% of cases with 4 cases of appendicular perforation and 2 cases of ileal perforation presenting with history of diarrhea. Among the signs, tenderness including rebound tenderness, with abdominal wall rigidity was universal. 58% had tachycardia while 22% had hypotension. Hypotension was mainly seen in those cases presenting after long period of delay after the onset of symptoms. About 54% of the cases had absent or diminished bowel sounds. In 32% of the cases the liver dullness was obliterated in the anterior axillary line.

**Table 6:** Duration of Illness

Duration in hours	No. of Cases	Percentage
≥ 24	30	60
≤ 24	20	40

60% of patients had duration of illness more than 24 hours by the time they were taken for surgery. It was mainly because of late presentation to the hospital.

**Table 7:** Laboratory investigations

Laboratory investigations	Duodenal perforation		Appendicular perforation		Ileal perforation		Others		Total	
	No	%	No	%	No	%	No	%	No	%
Anemia	7	25	2	25	1	22	5	50	15	30
Leucocytosis	4	14.3	4	50	1	11.1	3	30	12	24
Leucopenia	5	18	0	0	1	22.2	2	20	8	16

30% of patients had anemia which included seven patients of duodenal perforation, one patient of ileal perforation and 2 patients of appendicular perforation. 50% of appendicular perforation had leucocytosis.

**Table 8:** Radiological Investigation

Laboratory investigation	Duodenal perforation		Appendicular perforation		Ileal perforation	
	No	%	No	%	No	%
Air under the diaphragm	18	64.3	1	12	1	22
Dilated loops, Multiple air fluid levels	1	3.5	1	12	3	75

Around 64.3% of patients of duodenal perforation showed gas under right dome of diaphragm. Only one patient of ileal perforation showed gas under diaphragm while most of patients of ileal perforation had dilated bowel loops with multiple air fluid levels.

Six patients of appendicular perforation i.e. 75% had normal x-ray findings while nine patients i.e. 32% of duodenal perforation had normal x-ray.

One case of colonic perforation showed multiple air fluid levels. All cases of gastric perforation had gas under diaphragm.

Most of the cases show findings of peritonitis on x-ray i.e. obliteration of psoas shadow and preperitoneal fat lines and generalized haze.

**Table 9:** Peritoneal aspirate

Laboratory investigations	Duodenal perforation		Appendicular perforation		Ileal perforation		Others		Total	
	No	%	No	%	No	%	No	%	No	%
Seropurulent	8	28	1	12.5	3	75	2	20	14	28
Purulent	8	29	6	75	0	0	4	40	18	36
Bilious	12	43	0	0	0	0	1	10	13	26
Hemorrhagic	0	0	0	0	0	0	0	0	0	0
Feculent	0	0	1	12.5	1	25	3	30	5	10
Total	28	100	8	100	4	100	10	100	50	100

Four quadrant aspirations were done in all cases. Peritoneal tap was positive in all cases of peritonitis. Peritoneal aspirate was found to be purulent in 36% of cases. In 8 patients of duodenal perforation and 6 patients of appendicular perforation tap was purulent. 43% of duodenal perforation patients had bilious aspirate, while purulent aspirate was predominant in appendicular perforation. Ileal perforation patients mainly had seropurulent and feculent aspirate.

**Table 10:** Results of culture of peritoneal fluid

Laboratory investigations	Duodenal perforation		Appendicular perforation		Ileal perforation		Others		Total	
	No	%	No	%	No	%	No	%	No	%
Sterile	9	33	0	0	1	25	3	30	13	26
<i>E. coli</i>	8	28.9	5	62.5	2	50	2	20	17	34
Mixed	2	8.1	2	25	0	0	1	10	5	10
<i>B. fragilis</i>	3	10	1	12.5	1	25	2	20	7	14
<i>Staphylococcus</i>	3	10	0	0	0	0	1	10	4	8
<i>Pseudomonas</i>	3	10	0	0	0	0	0	0	3	6
<i>Klebsiella</i>	0	0	0	0	0	0	1	10	1	2
Total	28	100	8	100	4	100	10	100	50	100

*E. coli* was predominant organism in the aspirate culture i.e. 34% of cases. It was most common – organism cultured in all duodenal, ileal and appendicular perforation. In 26% cases aspirate was sterile and 14% of cases had bacteroid fragilis present in the peritoneal tap.

**Table 11:** Operative Procedure adopted

Operative procedure	No. of Cases	Percentage
Closure with omental graft (Graham's patch)	28	56
Simple closure of perforation	8	16
Peritoneal toilet only	1	2
Resection and anastomosis	4	8
Transverse colostomy	1	2
Appendectomy	8	16
Total	50	100

Duodenal ulcer perforations were closed using omental patch (Graham's patch). All appendicular perforation cases underwent appendectomy. All cases of gastric perforation were closed with simple closure. Jejunal and ileal perforations were closed with simple closure. One case of sealed ileal perforation was treated with peritoneal toilet. One case of colonic perforation underwent resection of gangrenous part and transverse colostomy. All cases underwent peritoneal lavage and drainage after surgery.

**Table 12:** Postoperative complications-local

Laboratory investigations	Duodenal perforation		Appendicular perforation		Ileal perforation		Others		Total	
	No	%	No	%	No	%	No	%		
Wound infection	4	14.4	1	12.5	0	0	0	0	5	10
Fecal fistula	0	0	0	0	2	50	1	10	3	6
Pelvic abscess	2	7	0	0	0	0	0	0	2	4
Duodenal fistula	1	3.6	0	0	0	0	0	0	1	2
Burst abdomen	0	0	0	0	0	0	1	10	1	2
Paralytic ileus	0	0	0	0	0	0	1	10	1	2
Total	7	25	1	12.5	2	50	3	30	13	26

Wound infection was commonest complication seen in 10% of cases, four cases of duodenal perforation and one case of appendicular perforation developed wound infection. It was treated by antibiotics and regular dressings. Fecal fistula was seen in 3 cases, 2 cases were seen in ileal perforation and both patients expired. Two cases of duodenal perforation developed pelvic abscess. Prolonged paralytic ileus was present in 1 case. It was treated by nasogastric aspiration and maintaining electrolytes. One case of intestinal gangrene developed burst abdomen. One patient developed duodenal fistula and was treated with re-laparotomy and closure.

**Table 13:** Postoperative complications-general

Complications	No. of Cases	Percentage
Respiratory	2	4
Septicemia	6	12
Renal	2	4
Cardiac	1	2
Total	11	22

12% of patients had persistent septicemia in post-operative period. They were managed with antibiotics, IV fluids and blood transfusions. Two cases developed acute renal failure and needed dialysis. One case had cardiac complication in the form of ischemic changes. Two patients had respiratory complications. All were smokers and developed pneumonia and diagnosed clinically and on chest-x-ray.

**Table 14:** Mortality in relation to cause

Cause	Mortality	Percentage
Gastric perforation	0	0
Duodenal perforation	2	7.2
Jejunal perforation	0	0
Ileal perforation	2	50
Appendicular perforation	0	0
Colonic perforation	1	100
Intestinal gangrene	1	25

Total of 6 patients expired. 4 patients died of septicemia and multiple organ failure. Mortality in duodenal perforation cases is 7.2% and in ileal perforation cases its 50%. Only 1 case of colonic perforation present so mortality cannot be considered. 2 patients of duodenal perforation died of septicemia and multiple organ failure. A case of colonic perforation died of myocardial infarction.

**Table 15:** Mortality in relation to duration of illness

Duration in hours	No. of Cases	Death	CFR%
≥24	30	5	16
≤24	20	1	5

The group of patients in whom onset of symptoms was present

more than twenty four hours before surgery, had higher number of death. Even case fatality rate was higher in this group which was 16%. It was more than double of the group in whom surgical intervention was done early.

**Table 16:** Mortality in relation to age of patients

No. of cases	Mean age	Range
Expired	51 years	28-65
Survivors	35 years	15-74

Mean age of survivors is 35 years while mean age of patients who expired is higher i.e. 51 years.

**Discussion**

The patients in present study were admitted and treated in RVM Medical College & Hospital, Mulugu in a study period from September 2017 to August 2019. 50 cases of peritonitis who were treated surgically were included in the study as and when they presented to our Hospital.

In this study patients in paediatric age group were not included as they are treated by super specialist. The youngest patient was 15 years old while eldest was 74 year old. Mean age of patients is 37years. In study by MD Tripathi<sup>2</sup> 41.25% patients were between 21-40 years. In study by LA Desa<sup>3</sup> mean age of patients was 31.5 years.

**Sex Distribution**

In this study 80% of patients were male while 20% were females. The sex ratio was 4:1. In a study by MD Tripathi<sup>2</sup> 72.5% of cases were males and 27.5% were females. According to LA Desa<sup>[3]</sup> study 82.6% were males and 17.4% were females. In study by Kachroo<sup>4</sup> male and female ratio was almost equal.

**Duration of illness**

Most of patients presented late. 60% of patients had duration of illness more than 24 hours, by the time they were taken for surgery. In study by Kachroo<sup>[4]</sup> mean delay when patients presented were 4 days. Most of patients presented late, in our study because of their poor socioeconomic status, lack of transport facilities and absence of surgical facility in nearby place.

**Causes of Peritonitis**

In the present series, 56% of cases of peritonitis were due to duodenal perforation, 16% were due to appendicular perforation, and 8% were due to ileal perforation 8, 8% were due to intestinal gangrene, 6% were due to jejunal perforation, 4% were due to gastric perforation and 2% were due to colonic perforation.

In a study by LA Desa<sup>[3]</sup>, 32.29% cases were of duodenal ulcer perforation, 27.33% were ileal perforation and 18% were appendicular perforation. Kachroo reported<sup>[4]</sup> 16.7% incidence of duodenal perforation, 41% incidence of appendicular perforation and 13.3% of ileal perforation.

**Symptoms and Signs**

In this study pain abdomen was seen in all patients. Same was seen in study by Kachroo<sup>70</sup> where it was seen in 89 patients out of 90 patients. LA Desa<sup>68</sup> reported pain in only 86.96% of patients.

Vomiting was seen in 56% of cases in this study which relates well with 53.42% seen in LA Desa<sup>[3]</sup> series. Bowel disturbance was seen in 26% of patients in this series while it was 30.43% in LA Desa<sup>[3]</sup> series.

Distension of abdomen was seen in 36% cases while in LA desa<sup>3</sup> series it was seen in 52.7% cases. Fever was present in 50% of our cases while in LA Desa<sup>[3]</sup> series it was present in 44.1% cases. 58% of our patients had tachycardia at presentation, while 22% patients were in state of shock, In LA Desa<sup>[3]</sup> study, 39.75% of cases came in shock.

Abdominal tenderness and rigidity was present in all patients in this series and it correlates well with Kachroo<sup>[4]</sup> series where it was same. But in study by LA Desa<sup>69</sup> it was present in 85.71% of cases only.

Liver dullness was obliterated in 32% of the cases in this series, where as in LA Desa<sup>[3]</sup> series it was obliterated in 50.93% of cases.

Bowel sounds were absent or diminished in 54% cases in our study and it relates well with LA Desa<sup>3</sup> series in which paralytic ileus was present in 51.5% cases. In study by Kachroo<sup>4</sup> bowel sounds were absent in 44% cases.

### Laboratory Investigations

In our study 30% patients were anaemic, 24% of patients had leucocytosis while leucopenia were seen in 16% of cases. Kachroo<sup>4</sup> reported that majority of patients in his series had leucocytosis with low hemoglobin levels. The white cell count may be low or elevated in acutely ill patients.

### Radiological Investigation

On erect abdominal x-ray 64% of duodenal perforation cases showed, 3.5% had multiple dilated bowel loops. 3 patients of duodenal perforation had both dilated bowel loops with air fluid levels and gas under right dome of diaphragm.

LA Desa<sup>[3]</sup> recorded 72.72% incidence of air under diaphragm in duodenal perforation cases. Kachroo<sup>4</sup> reported gas under diaphragm in 13 out of 15 cases of duodenal perforation, i.e., in 86.6% cases.

### Peritoneal aspirate

In above study peritoneal tap was positive in all cases. The aspirate was purulent in 36% of cases while it was seropurulent in 28% cases and bilious in 26% cases.

A study conducted to evaluate diagnostic abdominal paracentesis by SRS Rao<sup>5</sup> found peritoneal tap to be positive in all cases of peritonitis and right lower quadrant was always found to be positive. It was found to be positive in 95.3% cases of visceral perforation, 100% cases of intestinal obstruction with gangrene, 100% in cases of traumatic intraperitoneal hemorrhage.

### Peritoneal Aspirate Cultures

*E. coli* was found in 34% of cases of peritoneal aspirate culture. Culture yielded no growth in 26% of cases. Mixed growth of organisms was obtained in 10% of cases.

*Bacteroides fragilis* was most common anaerobe cultured in 14% of cases. Culture was positive for staphylococcus, pseudomonas and klebsiella in 8%, 6% and 2% of cases respectively.

Duodenal perforation aspirate was sterile in 33% cases, while *E.coli* was Predominant in rest of positive cultures. LA Desa<sup>3</sup> study found most common aerobic organisms are *E. coli*, Klebsiella and proteus. Staphylococcus aureus and pseudomonas were less commonly grown.

MD Tripathi<sup>[2]</sup> series reported 15% of sterile aspirate, *E. coli* was most common organism in 45% of cases and mixed infection was seen in 15% of the cases. Pseudomonas, klebsiella, proteus and staphylococcus were present in 8.75%, 8.75%, 5%

and 2.5% of their cases respectively.

### Operative procedure

28 patients of duodenal perforation cases underwent surgery in form of closure with omental patch (Grahams patch).

In one case of sealed ileal perforation, only peritoneal toilet was done. In cases of appendicular perforations, appendicectomy was done.

Simple closure of perforation was done in eight cases, three cases were of ileal perforation, three were of jejunal perforation, and two were of gastric perforation. Resection and anastomosis was done in total four cases. All four patients were of intestinal gangrene.

### Post-operative complications

Patients were observed till discharge from Hospital. Wound infection was commonest complication found in 10% of cases. Three patients developed fecal fistula. Two patients were of ileal perforation, one case was of volvulus of intestine around fibrotic band.

Pelvic abscess, duodenal fistula, burst abdomen and prolonged paralytic ileus was present in 4%, 2%, 2% and 2% of patients respectively.

In a study by LA Desa<sup>[3]</sup>, wound infection, was commonest complication. R. Kachroo reported wound infection, paralytic ileus, and fecal fistula and burst abdomen in 20%, 12%, 2% and 1.1% of patients respectively<sup>[4]</sup>.

### Mortality

In present study mortality rate, was 12%, while in LA Desa<sup>3</sup> series it was 24.8%, and in Kachroo series it was 8.8%. In present study mean age of patients expired was higher than mean age in survivors i.e. 51 years and 35 years respectively.

Hunt<sup>2</sup> in a study of 54 patients with generalized peritonitis found that average age of patients who expired was 62 years compared to 49 years in those who survived. In study LA Desa<sup>[3]</sup> mean age of those who succumbed was 49.2 years.

In present study patient in whom duration of illness was more than 24 hours, case fatality rate was double than those who were operated early, i.e., 16% and 5% respectively. Patients presented late because of poor socioeconomic status, poor transportation facility and lack of surgical facility in nearby areas.

In present study four patients died of septicemia and multiple organ failure. Bolon<sup>6</sup> in a study of 176 patients with peritonitis found that in patients with one organ failure and delay in surgery for more than 24 hours of onset of peritonitis, the mortality was 88%.

In present study mortality rate from duodenal ulcer perforation, intestinal gangrene and ileal perforation was 7.2%, 25% and 50% respectively. There was no mortality in gastric ulcer perforation and appendicular perforation patients. A Study by R.Goris<sup>7</sup> reported a mortality rate of 9% to 40% in perforated gastric ulcer or duodenal ulcer cases.

### Conclusion

From my study of 50 cases of peritonitis following conclusions can be drawn-Most of the cases of peritonitis are middle aged male patient with mean age of 37 years and male to female ratio of 4:1. Abdominal pain is the most common symptom followed by vomiting and fever. Guarding, rigidity, tachycardia and absent bowel sounds are most common signs seen in peritonitis. Duodenal ulcer perforation is the commonest cause of peritonitis followed by appendicular perforation. Most of duodenal perforations can be detected by erect abdominal x-ray.

Peritoneal tap was positive in all cases of peritonitis. E coli were the most common organism found on peritoneal aspirate culture. Around one fourth of cases had sterile culture. Wound infection is a most common postoperative complication. Mortality is proportional to age, derangement of physiological parameters like hypotension, delay in surgery and as perforation site becomes distal from duodenum to colon. Hence from my study it can be concluded that prompt resuscitation and early surgical intervention can reduce morbidity and mortality associated with peritonitis.

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**Conflict of Interest:** None

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