



**“A CLINICAL STUDY ON GASTROINTESTINAL PERFORATIONS – CULTURE AND SENSITIVITY OF MICROBIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN NARAYANA MEDICAL COLLEGE AND HOSPITAL, NELLORE”**

<b>Dr P Madhava</b>	Department of General Surgery, Narayana medical college and hospital, Nellore.
<b>Dr K Suhas Chaitanya</b>	Department of General Surgery, Narayana medical college and hospital, Nellore.
<b>Dr Sreenath Reddy</b>	Department of General Surgery, Narayana medical college and hospital, Nellore.

**ABSTRACT**

**Aims and objectives:** To analyse the microbiological profile and antibiotic sensitivity pattern of peritoneal fluid culture in cases of gastrointestinal perforations. **Materials And Methods:** Patients admitted with Gastrointestinal Perforation in NMCH, Nellore in Department of Surgery from May 2022 to May 2023 were included in this study. 66 patients were studied during this period. **Inclusion Criteria:** Patients of all age groups and both sexes with history and clinical picture suggestive of gastrointestinal perforation (both non traumatic & blunt trauma) and taken up for surgery. **Exclusion Criteria:** Patients with provisional diagnosis of gastrointestinal perforation due to penetrating trauma abdomen and also immunocompromised patients. **Results:** 66 patients were studied. The most common site of perforation was the First part of Duodenum (63.64%), followed by gastric (16.67%) and Appendix (13.64%). Peritoneal Fluid was negative for culture (34.85%) in the majority of cases; culture was positive for E.coli in 30.30% of cases and Klebsiella in 10.61% of cases, respectively. The majority of the isolated strains were sensitive to Cephalosporins, Quinolones, Aminoglycosides. The majority of strains of Proteus, on the other hand, were sensitive to Imipenem, Piperacillin but were resistant to Ampicillin, Aminoglycosides. **Conclusion:** E. coli was the commonest organism isolated from peritonitis due to Gastrointestinal perforation. The majority of the isolated strains were sensitive to Cephalosporins, Quinolones, Aminoglycosides except proteus which is sensitive to imipenem, piperacillin.

**KEYWORDS :****INTRODUCTION:**

Perforative peritonitis is one of the most common surgical emergencies in India. Gastrointestinal perforations include gastroduodenal, small bowel, appendicular, and colorectal perforations. Perforation of the intestines results in the potential for bacterial contamination of the abdominal cavity (a condition known as peritonitis). Perforative peritonitis is a frequently encountered surgical emergency in tropical countries like India, most commonly affecting young men in the prime of life as compared to the studies in the West where the mean age is between 45 and 60 years. 2

In the majority of cases, the presentation to the hospital is late with well-established generalized peritonitis with purulent/fecal contamination and varying degree of septicemia. In this study, we will be studying commonest organisms and their antibiotic sensitivity in peritonitis due to Gastro-intestinal perforation.

The knowledge of microbial profile and sensitivity of peritoneal fluid culture will help in initiation of empirical antibiotic therapy in Peptic Ulcer Perforation in NMCH, Nellore.

**AIMS AND OBJECTIVES:**

To analyse the microbiological profile and antibiotic sensitivity pattern of peritoneal fluid culture in cases of gastrointestinal perforations.

**MATERIALS AND METHODS:**

This will be an observational study was conducted in the Department of Surgery and Microbiology, NMCH, Nellore.

The study included 66 patients presenting with perforation peritonitis from May 2022 to May 2023

**Inclusion Criteria:**

Patients of all age groups and both sexes with history and clinical picture suggestive of gastrointestinal perforation (both non traumatic & blunt trauma) and taken up for surgery

**Exclusion Criteria:**

Patients with provisional diagnosis of gastrointestinal perforation due to penetrating trauma abdomen and also immune compromised patients.

After thorough history and general physical examination, patient suspected to have perforation peritonitis underwent imaging with x ray abdomen supine and chest posteroanterior erect film with both domes of diaphragm to confirm the diagnosis. CT abdomen was done as per the merit of the case. Routine laboratory investigations including hemogram, random blood sugar, renal function tests, arterial blood gas analysis etc. as per patient requirements were done.

Preoperatively broad-spectrum antibiotic therapy (cefperazone+ sulbactam and metronidazole, single dose, intravenous) was initiated and patients were taken up for emergency exploratory laparotomy through a vertical midline incision.

At laparotomy, as soon as the peritoneum was opened, peritoneal fluid (10ml) was obtained for microbiological culture and sensitivity and intraoperative findings was noted in relation to site of perforation.

**Collection Of Culture and Transport:**

Culture is collected immediately after opening the peritoneum. Culture sample is collected under sterile and all aseptic precautions. Peritoneal fluid sample (10 ml) was collected with disposable needle and plastic syringe during surgery. It has to be stored in refrigerator at 6C. It is transported from OT to Microbiology department at room temperature, should not be kept at room temperature for more than 1 hour.

**Processing:**

1<sup>st</sup> day: Microbiology and Culture inoculation.

2<sup>nd</sup> day: If growth is present then organisms are identified by performing biochemical tests followed by Antibiotic sensitivity.

3<sup>rd</sup> day: Results of organism isolated and its antibiotic sensitivity are ready.

**OBSERVATIONS:**

**Table 1: Age Distribution**

Age group (years)	Frequency	Percentage
15-25	7	10.61
26-35	17	25.76
36-45	15	22.73
46-55	14	21.21
56+	13	19.7
Total	66	100

Interpretation: A total of 66 patients of gastrointestinal perforations were studied from May 2022 to May 2023. The youngest patient was 15 years (Appendicular perforation and the oldest was 79 (Ileal perforation). Most of the patients belonged to the 26-35 years age group followed by 36-45 yrs. The mean age was 37.75 years.

**Table 2: Sex Distribution**

Sex	Frequency	Percentage
Male	54	10.61
Female	12	25.76
Total	66	22.73

Males outnumbered the females with a ratio of 4.5:1

**Table 3: Anatomical Site Of Perforation**

Anatomical Site Of Perforation	Frequency	Percentage
Gastric Perforation	11	16.67
Duodenal Perforation	42	63.64
Jejunum	1	1.52
Ileum	3	4.55
Appendix	9	13.64
Colon	0	0
Rectum	0	0
Total	66	100

Most of the perforations in my study were found in the First part of Duodenum (63.64%), followed by gastric (anterior wall of stomach) (16.67%).

**Table 4: Organisms Isolated From Peritoneal Fluid Culture**

Organisms	No of cases	Percentage
Klebsiella	7	10.61
E coli	20	30.30
Enterococcus	3	4.55
Acinetobacter	3	4.55
Streptococcus	3	4.55
Proteus	1	1.52
Staphylococcus	6	9.09
Sterile	23	34.85
Others	66	100

Interpretation: The Peritoneal fluid cultures from 65.15% of patients were positive for cultures, of which the most common microbe isolated was E coli (30.30 %), and 10.61% of cultures were positive for klebsiella. Staphylococcus was from 9.09 % of cultures, Acinetobacter, Enterococcus, Streptococcus accounted for 4.55 each. Proteus was isolated from 1.52 %. The peritoneal fluid cultures were negative in 34.85 % of patients.

**Table 5: Antibiotic Sensitivity Pattern**

Microbe	Ampicillin (%)	Aminoglycoside	Cephalosporins	Macrolides	Quinolones	Linezolid	Piperacillin zaxobactam	Imipenem + Cilastatin
E coli (n=20)	75	52.5	52	45	48.75	65	85	50

Enterococcus (n=3)	100	50	53.34	33.33	58.36	33.33	66.67	66.67
Acinetobacter (n=3)	66.67	33.33	46.66	66.67	66.67	66.67	66.67	33.33
Klebsiella (n=7)	100	21.43	45.71	42.87	67.86	42.86	28.27	71.43
Proteus (n=1)	100	100	100	100	100	100	100	100
Staphylococcus (n=6)	83.33	25	36.67	66.67	66.67	66.67	83.33	50
Streptococcus (n=3)	100	66.67	73.34	33.33	50	66.67	66.67	66.67

Interpretation: The isolates of E coli were sensitive to ampicillin (75%), aminoglycosides (52.5%), Cephalosporins (52 %), Quinolones (48.75%), linezolid (65%) Piperacillin (85%), Imipenem (50%). The majority of cases of Acinetobacter were sensitive to Piperacillin (66.7 %), Imipenem (66.67). The antibiotic sensitivity pattern of Enterococcus was almost the same for the antibiotics Piperacillin (66.67%) and Imipenem (66.67%). The Sensitivity of Streptococcus to Quinolones and macrolides was less, i.e., 50 %, 33.33%, respectively.

**DISCUSSION:**

1. Site of Perforation in Different Studies: The most common site of perforation was seen to be at the gastroduodenal region because most patients had a predisposing acid peptic disease. The highest incidence of the acid peptic disease is thought to be an unnecessary use of NSAIDs and improper timing of meals in most patients. Also, the incidence of H.pylori infection is a major cause. In recent times, the discovery of PPIs and other antacids has reduced the incidence of perforations due to acid peptic disease. In this study, we had 80.3% of patients having a perforation in the gastroduodenal region, which was comparable to the studies by Jhobta et al. (65.7%).

The next common site was the appendix. The incidence of appendicular perforations in my study was 13.6 %, which was comparable with a study by Khan et al., who stated that 11.1% of his patients had a perforation in the appendix. The least amount of appendicular perforations was reported by Yadav et al., who had only three patients of 77 (3.5%) who had appendicular perforations. Jhobta et al. had 12%, Afridi et al. had 5%, Khan et al. had 11.1%.

Large bowel perforations, which also included the caecum, were not common due to benign causes. Rectal perforations were not studied by most of them. Only Afridi et al. gave rectal perforations in his study, where he showed only one of his subjects having a rectal perforation. None of the patients in this study had a rectal perforation.

2. Microorganisms Isolated in Different Studies: The most common organism isolated from peritoneal fluid in my study was E coli (30.3 %), which was also the most common organism in the study by Ramakrishnaiah et al. (34.46%).

The next common organism was Klebsiella (10.6 %), which was comparable to the study by Ramakrishnaiah et al. (18.29%). Proteus (1.52 %) was the least cultured organism in my study, but in the study by Ramakrishnaiah, it was Acinetobacter (5.53%).

3. Antibiotic Sensitivity Pattern: The isolates of E coli were sensitive to Ampicillin (75%), Aminoglycosides 52.50%, Cephalosporins (52%), Quinolones (48.75%), Linezolid (65%), Piperacillin (85%), Imipenem (50%).

The majority of isolates of Acinetobacter were sensitive to

Piperacillin (66.67%), Imipenem (66.67%). The antibiotic sensitivity pattern of *Proteus* was almost the same for all the antibiotics. The Sensitivity of *E.coli*, *Streptococcus* to Quinolones was less 48.75%, 50 %, respectively.

Most of the isolates of *E coli* were sensitive to commonly used antibiotics like Ampicillin (75%), Aminoglycosides (52.50%), Cephalosporins (52%), Quinolones (48.75%). The sensitivity rates were still better for Piperacillin (85%).

The antibiotic sensitivity pattern for *Enterococcus* for Ampicillin (100%), Aminoglycosides (50%), cephalosporins (53.34%), Quinolones (58.36%), Piperacillin (66.67%) was almost similar to that of *E coli*.

The isolates of *Klebsiella* were sensitive to Ampicillin (100 %), Cephalosporins (46.67%), Quinolones (67.86%), Piperacillin (28.57%), linezolid (42.86%). Around 71.43% of isolates of *Klebsiella* were sensitive to Imipenem.

The antibiotic sensitivity pattern for *Staphylococcus* for Ampicillin (83.33%), Aminoglycosides (25%), Cephalosporins (36.67%), Quinolones (66.67%), Piperacillin (83.33%) was almost similar to that of *E coli*, *Enterococcus*.

The antibiotic sensitivity pattern for *Streptococcus* for Ampicillin (100%), Aminoglycosides (66.67%), Imipenem (66.67%), Piperacillin (66.67%) was almost similar to that of *E coli*, *Enterococcus*. But, most of them were sensitive to Cephalosporins (73.34%).

#### CONCLUSION:

The present study was carried out on patients with Peritonitis. The most common site of perforation was the First part of Duodenum (63.64%), followed by gastric (16.67%) and Appendix (13.64 %).

Peritoneal Fluid was negative for culture (34.85%) in the majority of cases; culture was positive for *E.coli* in 30.30% of cases and *Klebsiella* in 10.61 % of cases, respectively.

The antibiotic sensitivity pattern for *E coli*, *Enterococcus*, *Streptococcus*, *Staphylococcus*, was almost the same. The majority of the isolated strains were sensitive to Cephalosporins, Quinolones, Aminoglycosides.

The majority of strains of *Proteus*, on the other hand, were sensitive to Imipenem, Piperacillin but were resistant to Ampicillin, Aminoglycosides.

The bacteria that were most commonly isolated from patients with complications were *E.Coli*, followed by *Klebsiella*.

#### REFERENCES:

1. Kemparaj T, Khadri S: Gastrointestinal Perforations — our Experience. The Internet Journal of Surgery. 2010; 28 (2):1-5.
2. Tripathi MD, Nagar AM, Srivastava RD, PartapVK. Peritonitis - a study of factors contributing to mortality. Indian J Surg. 1993; 55: 342-9.
3. Washington BC, Villalba MR, Lauter CB. Cefamandole-erythromycin-heparin peritoneal irrigation. An adjunct to the surgical treatment of diffuse bacterial peritonitis. Surgery. 1983; 94(5):76-81.
4. Nomikos IN, Katsouyanni K, Papaioannou AN. Washing with or without chloramphenicol in the treatment of peritonitis. A prospective clinical trial. Surgery. 1986; 99: 20-25.
5. Shinagawa N, Muramoto M, Sakurai S, Fukui T, Hon K, Taniguchi M, Mashita K, Mizuno A, Yura J. A bacteriological study of perforated duodenal ulcer. Jap J Surg. 1991; 21: 17.
6. Khanna AK, Mishra MK: Typhoid perforation of the gut. Postgraduate Medical Journal. 1984, 60: 523.
7. Noon GP, Beall AC, Jorden GL: Clinical evaluation of peritoneal irrigation with antibiotic solution. Surgery. 1967: 67: 73.
8. Ramakrishnaiah VP, Chandrakasan C, Dharanipragadha K, Sistla S, Krishnamachari S. Community-acquired secondary bacterial peritonitis in a tertiary hospital of south India. Trop Gastroenterology. 2012 Oct-Dec. 33(4):75-81.
9. Dale M, Mosdell, Don MM, Anna Voltura, David EP, Melvin WT, Robert LM, Brian GM, Donald EF. Ann. Surg. 1991; 214(5):545.