International Surgery Journal
Kishore RVR et al. Int Surg J. 2020 Feb;7(2):385-388
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20200292

Original Research Article

An observational study on peritoneal fluid bacteriology in cases of gastrointestinal perforations, antibiotic management and outcome in tertiary care center

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Received: 27 November 2019
Revised: 06 January 2020
Accepted: 07 January 2020

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ABSTRACT

Background: Perforative peritonitis is one of the most common surgical emergencies in India. Perforation of the intestines results in the potential for bacterial contamination resulting in peritonitis.
Methods: A total of 65 patients (January 2018 to Dec 2018) who presented with features of perforative peritonitis admitted to various surgical units of PES institute of medical sciences, Kuppam were included in this study. The following study was conducted to analyze bacteriology of peritoneal fluid, to assess antibiotic sensitivity pattern, to assess its impact on morbidity, mortality pattern in these cases.
Results: Males outnumbered females with a ratio of 4.9:1. The most common site of perforation was pre-pyloric part of stomach (35.3%), followed by an appendix (33.8%). Peritoneal fluid was negative for culture (21.5%) in the majority of cases. Culture was positive for *E. coli* in 27.6% of cases and *Klebsiella* in 18.4% of cases, respectively. Majority of the isolated strains were sensitive to cephalosporins, quinolones, aminoglycosides. Most common postoperative complications were wound infection, respiratory complications, death.
Conclusions: Studies have shown that delay in management and treatment will affect the prognosis. Empiric antimicrobial therapy is initiated and changed accordingly with peritoneal fluid culture sensitivity reports. This may reduce the incidence of postoperative complications, morbidity, and mortality.

Keywords: Antibiotic, Complication, Microorganism, Peritonitis

INTRODUCTION

Perforative peritonitis is one of the most common surgical emergencies in India.[1]

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 resulting in peritonitis. Perforative peritonitis is a frequently encountered surgical emergency in tropical countries like India, most commonly affecting young men as compared to the studies in the West where the mean age is between 45 and 60 years.[2] The perforations of proximal gastrointestinal tract were six times as common as perforations of distal gastrointestinal tract as has been noted in earlier studies from India which is in sharp contrast to studies from countries like United States, Greece, and Japan which revealed that distal GIT perforations were more common.[3-5] In a study conducted on 352 patients in India, the Gastroduodenal perforations constituted about 51%, small bowel about 29%, appendicular perforations about 17%.[6] In a study conducted by Capoor et al on 47 cases, 32% of cases

were positive for *E. coli* (sensitive to amikacin, cephalosporins, meropenem), 7% were positive for *K. pneumonia* (sensitive to cefaperazone-sulbactum, piperacillin-tazobactum), 20% were positive for *C. freundii* (sensitive to meropenem, piperacillintazobactum), 8% due to *Enterobacter* species and 8% due to *S. typhi* (sensitive to amikacin, cephalosporins).[7] Whereas, Ramakrishnaiah from India studied 352 cases and microbes isolated predominantly are *E. coli* and *Klebsiella*. These main isolates were predominantly sensitive to amikacin, ceftazidime and chloramphenicol. The overall morbidity and mortality rates were 52% and 16.5% respectively.[8]

Objectives of the study was to analyze the microbiological profile of peritoneal fluid in cases of gastrointestinal perforations and to describe its management, outcome in these cases.

METHODS

All the patients admitted in department of general surgery, PES institute of medical sciences and research center, Kuppam with provisional diagnosis of perforative peritonitis from January 2018 to December 2018 were included in the study.

Inclusion criteria

Patients of all age groups and both sexes who attended OPD and emergency department in PES institute of medical sciences and research center, Kuppam with history and clinical picture suggestive of perforative peritonitis and taken up for surgery were included in the study.

Exclusion criteria

Patients with provisional diagnosis of peritonitis due to penetrating trauma abdomen and also immune-compromised patients were excluded,

Any patients presenting with clinical picture suggestive of perforative peritonitis (severe pain abdomen, vomiting, rigidity and absent bowel sounds) was advised for an X-ray chest PA view and X-ray erect abdomen AP view. If, in these X-ray films free air is noticed under diaphragm then diagnosis of perforative peritonitis was made. Patients were resuscitated and posted for laparotomy.

The peritoneal fluid was then cultured, antibiotic sensitivity pattern of the isolates was identified. The patients were followed in the postoperative period complications if any were noted. The data obtained was compiled, tabulated, analysed using Standard statistical method, conclusions were be drawn with respect to the aim of the study.

RESULTS

A total of 65 patients of gastrointestinal perforations (that were within exclusion and inclusion criteria) were studied from January 2018 to December 2018.

The youngest patient was 17 years (appendicular perforation) and oldest was 55 year (D1 perforation). Most of the patients belonged to 35-45 years age group.

The study comprised of 54 (83.1%) male patients and 11 (16.9%) female patients. The ratio was 4.9:1 (Figure 1).

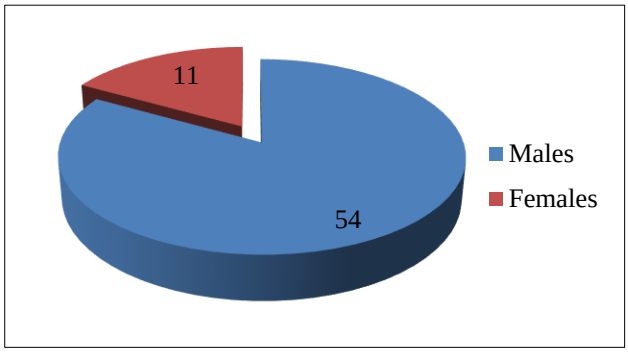

Figure 1: Sex incidence.

Most common site of perforation was pre-pyloric part of stomach (35.3 %), followed by appendix (33.8%) (Table 1).

Table 1: Site of perforation.

Site	Number	Percentage (%)
Stomach	23	35.3
Duodenum	17	26.1
Jejunum	2	0.03
Ileum	1	0.01
Appendix	22	33.8
Colon	0	0
Rectum	0	0

Table 2: Microorganism isolated.

Microorganism	Number of cases	Percentage (%)
No growth	14	21.5
E. coli	18	27.6
Klebsiella	12	18.4
Pseudomonas	9	13.8
Staphylococcus	8	12.3
Proteus	3	0.04
Acinetobacter	1	0.01%

The peritoneal fluid culture from 64.7% of patients were positive for cultures, of which the most common microbe isolated was *E. coli* (27.6 %). Around 18.4% of cultures were positive for *Klebsiella* (Table 2). *Pseudomonas* was

isolated from 13.8 % of cultures, *Staphylococcus* from 12.3% of patients. *Proteus*, *Acinetobacter* accounted for 0.04%, 0.01% respectively. The peritoneal fluid cultures were negative in 21.5 % of patients.

Isolates of *E. coli* were sensitive to ampicillin (54.2%), aminoglycosides (62.7%), cephalosporins (52.2%), quinolones (50.8%), linezolid (55.9%), piperacillin (76.2%), imipenem (88.1 %) (Table 3). Majority of isolates of *Acinetobacter* were sensitive to piperacillin (75 %), imipenem (88.1%). The sensitivity of *Pseudomonas*, *Streptococcus* to quinolones was less 29.5%, 29.4% respectively.

Around 53.8% of patients who underwent surgery had uneventful recovery. Most common complication noted was surgical site Infection (20%) (Table 4). Death, Anastomotic leak, wound dehiscence accounted for 1.5 %, 3.0%, 12.0 % respectively, 6.1 % of patients had respiratory problems in the post op period.

Table 3: Antibiotic sensitivity pattern of bacteria.

Microbes	Antibiotics (%)						
	Ampicillin	Aminoglycosides	Cephalosporins	Quinolones	Linezolid	Piperacillin + Tazobactum	Imipenam + Cilastin
E. coli	54.23	62.7	52.2	50.8	55.9	76.2	88.1
Klebsiella	36.8	55.2	42.1	40.7	47.3	47.3	63.1
Pseudomonas	36.3	36.3	43.6	29.5	36.3	81.8	63.6
Staphylococcus	53.8	69.2	50.7	57.6	53.8	61.5	53.8
Proteus	62.5	43.7	52.5	56.2	50	75	62.5
Acinetobacter	25	37.5	35	50	50	75	83.3

Table 4: Complications.

Complications	Frequency	Percentage (%)
No complication	35	53.8
Wound infection	13	20.0
Respiratory complication	4	6.1
Anastomotic leak	2	3.0
Abdominal collection	2	3.0
Dehiscence	8	12.0
Death	1	1.5

DISCUSSION

The maximum incidence occurred in 35-45 years of age group. The mean age in this study was 41.3 years, which was comparable to that of Afridi et al who reported the mean age to be 40.5 years.[10]

Males outnumbered females with a ratio 4.9:1. The highest male preponderance was noticed by Jhobta et al, where the ratio of male to female was 5.2:1, which was nearing this study in which the ratio was 4.9:1.[9]

The most common site of perforation was seen to be at the gastro-duodenal region (61.4%) 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. In this study, we had 61.4 % of patients having a perforation in the gastro-duodenal region, which was comparable to the studies by Jhobta et al (65.7%).[9]

The incidence of appendicular perforations in my study was 33.8%, which was very high when compared with a study by Khan et al who stated that 11.1% of his patients had a perforation in the appendix. Jhobta et al had 12%, Afridi et al had 5%.[9,10] 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.[10] None of the patients in this study had a rectal perforation.

The peritoneal fluid culture from 64.7% of patients were positive for cultures, of which the most common microbe isolated was *E. coli* (27.6 %), which was also the most common organism in the study by Ramakrishnaiah et al (34.46%).[6] Around 18.4% of cultures were positive for *Klebsiella* which was comparable to the study by Ramakrishnaiah et al (18.29%).[6] Acinetobacter (0.04%) was the least cultured organism in my study, which was comparable to the study by Ramakrishnaiah et al (5.3%).[6]

The antibiotic sensitivity pattern for *E. coli*, *Staphylococcus* was almost the same. Majority of the isolated strains were sensitive to cephalosporins, quinolones, aminoglycosides. Majority of strains of *Pseudomonas* and *Proteus* on other hand were sensitive to imipenem, piperacillin but were resistant to ampicillin, aminoglycosides.

The most common postoperative complications were wound infection, wound dehiscence, respiratory complications. The most common mode of presentation of a complication in all the studies was a simple surgical site infection to major wound dehiscence. The present study had 20% of the patients who had SSIs, which was the most common postoperative complication. This was comparable to the other three studies, wherein Jhobta et al recorded 25% of his patients presenting with an SSI,

Afridi et al 42%.[9,10] Respiratory infection and distress were also commonly seen in the postoperative period, which was the third most common form of post-operative morbidity in this study.

This study had a mortality rate of 1.5 %, which was less comparable to the other studies, i.e. Jhobta et al reported a mortality of 10%, which was quite close to that of Afridi et al (10.6%).

CONCLUSION

Perforative peritonitis is one of the common surgical emergencies in India. Studies have shown that delay in management and treatment will affect the prognosis. Empiric antimicrobial therapy is initiated and changed accordingly with peritoneal fluid culture sensitivity reports. My study also showed that morbidity and mortality was high with *Pseudomonas*, *Acinetobacter* and *Klebsiella*. Change of antibiotics to higher spectrum is particularly important in case of these microbes which were not sensitive to commonly used antibiotics in my study. This may reduce the incidence of post-operative complications, morbidity and mortality.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kishore RVR, Ashwin K, Kumar SBV. An observational study on peritoneal fluid bacteriology in cases of gastrointestinal perforations, antibiotic management and outcome in tertiary care center. Int Surg J 2020;7:385-8.