

# A prospective evaluation of prevalence of microbial flora and significance of intraoperative Peritoneal culture of fungus in perforation Peritonitis

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## Abstract

**Objective:** To study the prevalence of intraabdominal flora and significance of intraoperative peritoneal fluid culture of fungus in patients with perforation peritonitis. **Study design:** Prospective study. **Methods:** In this study, we analyzed 91 patients of gastrointestinal perforation admitted during the period from January 2011 to July 2012 in Department of Surgery. Any patient undergoing exploratory laparotomy for gastrointestinal perforation above 5 years was included. Intraoperative abdominal fluid samples were collected and cultured. **Results:** Ninety one patients of gastrointestinal perforation were studied. The mean presenting age was 35.21+ 12.87 years. Gastro duodenal perforation was the commonest (48.35%), 34.07% were having ileal perforation, 6.59% were having appendicular perforation, 5.49% were having jejunal and 5.49% had large bowel perforation. Out of 91 patients, 79 (86.8%) patients showed growth of either bacteria or fungus and in 12 (13.2%) patient's culture was sterile. Gram positive cocci was found in 46.1%, E.Coli in 40.65%, Klebsiella in 14.28%, Enterobacter in 1.098% and Pseudomonas in 1.089% of patients. Fungal growth was seen in 48.3% of patients. Patients with fungal positive culture had superficial surgical site infection in 77.27%, deep surgical site infection 59.09% and residual abscesses formation in 27.27% of cases. Patient with no growth of fungus have superficial site infection in 40%, deep surgical site infection in 25.71% and residual abscess formation in 5.71%. **Conclusion:** Positive peritoneal fungal co-infection is a bad prognostic factor and a significant risk factor for adverse outcome in perforation peritonitis.

**Keywords:** Perforation Peritonitis, Fungus.

## Introduction

Peritonitis is inflammation of peritoneum and peritoneal cavity and is most commonly due to localized or generalized infection. Perforation peritonitis is the most common surgical emergency in India. The management of peritonitis continues to have high morbidity and mortality inspite of improved surgical techniques and antibiotics [1]. Until recently the leading pathogens associated with secondary peritonitis were gram negative and anaerobic bacteria. Fungal infection has become more common in recent years especially in critically ill patients in intensive care [2]. Higher

incidence of fungal isolates has been reported in gastroduodenal perforations [3]. In this study, we took intraoperative cultures of gastrointestinal perforation peritonitis patients and studied the prevalence of microflora of intraoperative peritoneal aspiration.

## Aims and Objectives

The study was undertaken to study the prevalence of intraabdominal flora in patients with gastrointestinal perforation.

To study the significance of intraoperative peritoneal fluid culture of fungus and establish the indications for treatment in patients with perforation peritonitis.

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## Material and Methods

In this study, we analyzed 91 patients of gastrointestinal perforation admitted during the period from January 2011 to July 2012 in Department of Surgery in our medical college situated in backward area. Any patient undergoing exploratory laparotomy for gastrointestinal perforation above 5 years was included. Patients who presented with primary peritonitis or perforation due to trauma were excluded.

**Microbiological Sampling:** The intraoperative samples of abdominal fluid were collected during laparotomy in sterile container using all sterile precautions and samples were immediately transferred to microbiology laboratory. In case of delay, samples were kept at 4<sup>o</sup> C till the time of transfer. In microbiology laboratory culture were performed after (1) Direct smear examination (2) Gram staining of peritoneal fluid.

For bacterial culture sample were inoculated on blood agar and MacConkey agar plates and were incubated at

37°C for 24 hours. For fungal cultures the specimen were inoculated on Sabouraud dextrose agar and were examined after 48 hours of incubation. Any bacterial growth appearing on blood or MacConkey agar medium was studied for colony characters. Bacterial smear made for the colony was gram stained and bacterial motility was examined. Final identification of bacteria was made after doing biochemical tests. (1) Catalase (2) Indole (3) Methyl red (4) Voges Proskauer (5) Citrate Utilization (6) Oxidase (7) Urease.

For identification of the fungal growth, fungal smear were examined in lactophenol cotton blue. Fungal growth showing budding yeast cells (candida) was subjected to germ tube test. For doing germ test, single yeast colony was inoculated in 1ml of human serum and incubated at 37°C for 2 hours.

Clinical outcome in fungus positive and fungus negative patients was compared on basis of surgical site infection, residual abscess, I.C.U. stay, hospital stay and mortality.

## Observations

Ninety one patients of gastrointestinal perforation were studied. The mean presenting age was 35.21+ 12.87 years. The maximum patients fell in age group of 26-35 years (38.46%).85.71% were male and 14.29% were female. In our study, only eight patients presented within 24 hours of onset of symptoms. Majority of patients (51.65%) presented within 2-3 days of onset of symptoms. 87.9% of patients had history of preoperative use of antibiotics. On general physical examination preoperatively, 86.81% had tachycardia, 39.56% had fever, and 26.37% had hypotension, 90.11% had tenderness and 85.71% had abdominal distension, 97.81% had abdominal guarding. 93.41% patients showed air under diaphragm on X-ray abdomen. Gastro duodenal perforation was the commonest (48.35%), 34.07% were having ileal perforation, 6.59% were having appendicular perforation, 5.49% were having jejunal and 5.49% had large bowel perforation.

Out of 91 patients, 79 (86.8%) patients showed growth of either bacteria or fungus and in 12 (13.2%) patient's culture was sterile. Only bacterial growth was obtained in 35(38.46%), both bacteria and fungus was obtained in 36(39.50%) patients and 8 (8.79%) patients had growth of fungus only (Table 1).

**Table- 1: Microbial flora according to site of perforation**

Perforation	E.Coli	Klebsiella	Gram +ve cocci	Fungi	Pseudomonas	Enterobacter
Gastroduodenal n = 44	20.4 %	6.8%	50.4%	70.4%	-	-
Small gut n = 36	61.1%	22.2%	38.8%	33.3%	-	-
Appendicular n = 6	50%	16.6%	33.3%	-	-	16.6%
Large gut n = 5	60%	20%	40%	20%	20%	-

Among bacterial culture, gram positive cocci was found in 46.1%, E.Coli in 40.65%, Klebsiella in 14.28%, Enterobacter in 1.098% and Pseudomonas in 1.089% of patients. Fungal growth was seen in 48.3% of patients. Out of 91 patients, 8 (8.79%) patients died. Out of 80 patients, in whom preoperatively antibiotics were used in 42 (52.5%) patients, growth of fungus was obtained.

Patient with fungal positive culture had superficial surgical site infection in 77.27%, deep surgical site infection 59.09% and residual abscesses formation in 27.27% of cases. Patient with no growth of fungus have superficial site infection in 40%, deep surgical site infection in 25.71% and residual abscess formation in 5.71% (Table 2).

**Table- 2: Post-operative complications**

Types of complications	No. of patients	Percentage
Superficial surgical site infection	48	52.75%
Deep surgical site infection	35	38.46%
Residual abscess	15	16.48%
LRTI ( crepts)	11	12.09%
Pleural effusion	13	14.29%
Faecal fistula	7	7.69%

So patients with fungal positive culture have high incidence of superficial surgical site infection and residual abscess formation compared to fungus negative culture and the p value is also statistically significant (Table 3).

**Table- 3: Relationship of fungal culture to surgical site infection and residual abscess**

Variables	Fungal positive		Fungal negative		p- value
	No.	%age	No.	%age	
S.S. infection	34	77.27	14	40.00	0.00766
D.S. infection	26	59.09	9	25.71	0.00871
Residual infection	12	27.27	2	5.71	0.03931

Patient with fungal positive culture have high incidence of I.C.U stay, hospital stay and mortality compared to fungal negative culture and the p value is also statistically significant (Table 4).

**Table 4: Relationship of Fungal Culture to ICU Stay, Hospital Stay and Mortality**

Variables	Fungal Positive		Fungal Negative		p-value
	No.	%age	No.	%age	
ICU STAY	18	40.91	5	14.29	0.00997
H. STAY	32	72.73	11	31.43	0.00705
Mortality	7	15.21	1	2.86	0.08638

## Discussion

Perforation peritonitis in our study is most commonly seen in young patients (35.21years) which corresponds to other indian study [4] but slightly less than previous studies from the west [5,6]. Male patients were more commonly affected by six times than female patients. Presenting symptoms were abdominal distension in 85.7%, tachycardia in 86.81% of patients. The commonest site of perforation in our study was gastroduodenal 48.35% as compared to west where distal gastrointestinal tract perforations are more common [ 4,7].

Our series showed that in case of gastroduodenal perforation, out of 44 patients, fungus growth was obtained in maximum number of 70.4% followed by gram positive cocci 50.4%, E. Coli 20.4% and Klebisella 6.8%. According to Ruitter and Shan fungus growth was obtained in 41% and 43.4% patients [ 3,8]. In our study, fungus growth was obtained in slightly more number of patients probably due to more use of preoperative antibiotics (87.9%) and late presentation of patients for the surgery. In patients with small gut perforation, E. coli was the most common organism seen in 61.1%, gram positive cocci in 38.8% patients,

fungus growth in 33.3% and Klebsiella in 22.2% patients. Similar results were seen in Ruiter et al study which showed gram negative bacteria in 46.3% of patients, gram positive cocci in 43.9% and fungus in 34.1% of patients. In patients with appendicular perforation, E. Coli was seen in 50% patients, gram positive cocci in 33.3% , Klebsiella in 16.6% and enterobacter in 16.6%. Similar results were found ruiter et al study in which gram negative was found in 77.8% and gram positive in 33.3%. No fungal growth was seen in appendicular perforations. In patients with large gut perforation, E.Coli growth was seen in 60% patients, gram positive cocci in 40% patients, Klebisella in 20%, Pseudomonas in 20% and fungus in 20%.

In our study, the most common complication was superficial surgical site infection seen in 52.75%, and deep surgical site infection in 38.46% residual abscess in 16.48%, lower respiratory tract infection in 12.09%, pleural effusion in 14.29% and faecal fistula in 7.69%. Mortality was 8.79% in our study. Similar results were seen in Stephen et al, Rajinder jhobta and Shaida Parveen [4,9,10].

Patients with fungal positive culture had superficial surgical site infection in 77.27%, deep surgical site infection in 59.09% and residual abscess formation in 27.27% of cases. Patients with no growth of fungus have superficial surgical site infection in 40%, deep surgical site infection in 25.71% and residual abscess formation in 5.71%. Shan et al shows superficial surgical site infection in 27% of patients, deep surgical site infection in 38.1% and residual abscess in 15.9% of fungus culture positive patients. Patients with fungal positive culture had ICU stay of more than 5 days in 40.91% of patients, hospital stay of more than 15 days in 72.73% of patients and mortality of 15.21%. Similar results were reported by studies done by Y-Shan et al, Adavit Parkash and Sandven et al [1,3,11].

## Conclusion

Gastroduodenal perforation is the major cause of perforation peritonitis followed by small gut perforation. E. Coli is the most common pathogen in small gut, appendix, large gut perforation peritonitis cases. Fungus (Candida) is the most common micro organism in gastric perforation. Patients with fungal positive culture had higher incidence of surgical site infection, residual abscess formation, longer ICU stay, longer hospital stay and higher mortality rates in comparison to fungal culture negative patients and

results were statistically significant. So we conclude that positive peritoneal fungal co-infection is a bad prognostic factor and a significant risk factor for adverse outcome in perforation peritonitis.

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