

# Bacteriological Profile of Pancreatic Juice in Patients with Chronic Pancreatitis

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## ABSTRACT

**Context** Information regarding the association of bacteria in the pancreatic fluid in patients with chronic pancreatitis is limited. **Objective** This study was designed to analyze the prevalence of bacteria in pancreatic juice in patients with chronic pancreatitis and the association of positive pancreatic fluid culture with pre-operative and post-operative parameters. **Methods** All patients with chronic pancreatitis who underwent operation from November 2011 to October 2013 were prospectively included in the study. Intra-operatively pancreatic duct fluid was collected and sent for culture sensitivity in all patients. The bacteriology of the fluid was analyzed and was correlated with preoperative, intraoperative and postoperative parameters. **Results** A total of 26 patients were analyzed. Two patients underwent endoscopic retrograde cholangio-pancreatography (ERCP) preoperatively. Bacteria was present in pancreatic duct fluid in 11(42%) patients. Both patients who underwent ERCP had positive cultures. Most common organism observed was *Escherichia coli* (6/11, 55%) followed by *Klebsiella pneumoniae* (3/11, 27%). Five patients with positive culture developed wound infection. Bacteria isolated from the wound were similar to pancreatic fluid. **Conclusion** Bacteria is commonly present in the pancreatic juice in patients with chronic pancreatitis and its presence may have an effect on the post-operative infections following operations. Based on the pancreatic fluid culture results appropriate antibiotic can be given to the patients who will develop septic complications following surgery. Role of bacteria in the pathogenesis of the chronic calcific pancreatitis needs to be investigated in future studies.

## INTRODUCTION

The pancreatic fluid is considered to be sterile in patients with chronic pancreatitis without prior endoscopic and percutaneous intervention. A previous study showed that 64% of patients with chronic calcific pancreatitis who had not received any preoperative interventions had positive ductal fluid cultures [1]. The significance of bacteria in pancreatic fluid in patients with chronic pancreatitis is not known. We designed this study to prospectively assess the prevalence of culture positivity in pancreatic ductal fluid in patients with chronic pancreatitis and its association with the pre-operative and post-operative parameters.

## PATIENTS AND METHODS

The study was conducted from November 2011 to October 2013 in the Department of Surgical Gastroenterology, Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), India. Patients with chronic pancreatitis who underwent surgical procedures were included in the study. Details of the patients (history,

clinical examination, diagnostic work up, intraoperative findings and postoperative events) were entered prospectively in a database. Patients with total leukocyte count of more than 11,000/mm<sup>3</sup> or less than 4,000/mm<sup>3</sup>, patients who received antibiotics four weeks preceding surgery and patients with definite extra pancreatic focus of infection were excluded from the study. A minimum 2 ml of pancreatic ductal fluid was aspirated using a 22 G needle during the operative step of duct identification, taking care to avoid contamination with blood. In cases where sufficient sample was not obtained, intravenous secretin 0.2 µg/kg was given and sample was aspirated five minutes after injection. The sample was immediately sent for bacterial culture in the department of microbiology. There the sample was first subjected for gram staining and the specimen was further subjected to the culture media. The culture media used were blood agar (nutrient media) which grows both gram negative and positive bacteria and Mckonkeys agar which grows only gram negative organism. These samples were further subjected to two tests, biochemical tests for species identification and antibiotic testing for sensitivity-resistance pattern. The post-operative course of the patient was carefully recorded with special emphasis on infectious complications like wound infection, anastomotic leak, postoperative sepsis and postoperative blood/central line positive culture.

## STATISTICS

Statistical analysis was done to determine the association of pancreatic ductal fluid culture positivity with preoperative and postoperative parameters. Frequencies were reported

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as mean ± SD. Univariate analysis was performed using Pearson chi-square test for categorical variables and the Student t-test for continuous variables. The data was analyzed using the statistical software package (SPSS 16.0 version for Windows). A p-value of less than 0.05 was considered statistically significant.

**RESULTS**

Twenty six patients were included in the study. There were 21 (81%) males and 5 (19%) females. The median age was 41 (13-60) years. Fourteen (54%) patients were alcoholic. All patients except one had calcifications in the pancreas. Eight (31%) patients had diabetes, and 5 (19%) had steatorrhea. The mean ( ± SD) diameter of the pancreatic duct was 8.35( ± 2.81). Frey’s procedure was performed in 24 patients, Beger’s procedure in one patient and Whipple’s procedure in one patient. Two patients underwent ERCP and pancreatic duct stenting preoperatively. All patients had histopathological evidence of chronic pancreatitis.

Pancreatic fluid culture was positive for bacteria in 11(42%) patients. Postoperatively drain fluid showed high amylase in 8 patients. Eleven patients developed wound infection. The pancreatic ductal fluid culture status and its relation with preoperative and the postoperative parameters were given in Table 1. Two patients who underwent ERCP had positive cultures. The pattern of the organisms in positive pancreatic duct fluid culture is summarized in Figure 1. Both wound culture and pancreatic fluid culture had grown Escherichia coli in two patients. Escherichia coli had grown in duct fluid as well as drain fluid in one patient.

**DISCUSSION**

We studied twenty six (26) patients of chronic pancreatitis and found that i ntraoperative pancreatic fluid culture was positive for bacteria is in 11 (42%) patients. Yellamali et al. [1] in a similar study of 40 patients of chronic calcific pancreatitis (CCP), had shown that the bacteria

was positive in 64% of patients of chronic pancreatitis who did not undergo any intervention (ERCP) prior to surgery. In their study, ERCP was done in 15 patients and bacterial positivity rate was 93%. Escherichia coli followed by Pseudomonas aeruginosa were the most frequent organisms. Most common organism grown in the study was Escherichia coli followed by Klebsiella pneumoniae. None of the preoperative, intraoperative and postoperative parameters was found to be associated with positive pancreatic fluid culture. The organisms in the intraoperative culture and the wound culture was similar in two patients that may signify the role of organisms in the duct fluid in wound infection.

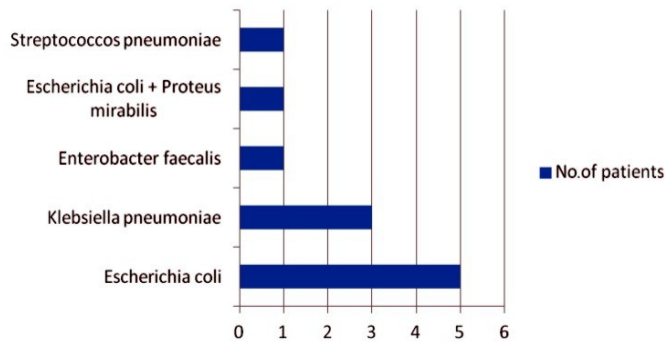
In addition the sensitivity pattern of the organism isolated from the wound and the drain fluid was similar to that of the pancreatic fluid. Post-operative septic complication delays recovery and often increases length of hospital stay. In order to prevent it, antibiotic therapy can be modified based upon the intraoperative culture. This concept is routinely practiced in the biliary tract surgery [2, 3]. The pancreatic fluid bacteria may have a role in postoperative septic complications and the perioperative antibiotic strategy can be modified based upon the intraoperative culture. Infection occurs in 30-40% patients with acute pancreatitis. Gregg JA [4] studied the bacteriology of the pancreatic fluid, obtained by endoscopic cannulation, in patients

with acute pancreatitis. He showed that 11 of 35 patients had positive bacterial culture, organisms mostly polymicrobial (Escherichia coli, Klebsiella and pseudomonas). Their findings were similar to the results in patients with chronic pancreatitis. Like normal intestinal flora pancreatic fluid can harbour a flora of polymicrobial bacteria. Significance of these bacteria may related to the pathophysiology of the patients with pancreatic diseases (acute and chronic pancreatitis). Emerging evidence have shown H pylori to be

**Table 1.** Relationship of pancreatic fluid culture results with preoperative and postoperative parameters in patients with chronic pancreatitis.

Parameters	Culture positive	Culture negative	Significance (p value)
Total leukocyte count (cells/μL) (mean ± SD)	7855.55 ± 890.40	7693.85 ± 1159.33	0.693
S amylase(units/L) (mean ± SD)	51.45 ± 34.43	199.27 ± 320.74	0.143
S albumin(mg/dL) (mean ± SD)	3.40 ± 0.64	3.25 ± 0.63	0.569
Blood sugar before operation(mg/dL) (mean ± SD)	104.27 ± 18.92	98.93 ± 18.12	0.473
Pancreatic duct diameter(mm) (mean ± SD)	9.00 ± 2.44	7.87 ± 3.04	0.321
Acute or chronic pancreatitis	4(57%)	3(43%)	0.452
Wound infection	5(44%)	6(54%)	0.675
High amylase in drain	4(50%)	4(50%)	0.451
Pseudocyst	4(1%)	9(70%)	0.075
Diabetes	5(62%)	3(37%)	0.233
Alcohol intake	5(35%)	9(64%)	0.081

**Figure 1.** Bacteria in pancreatic fluid in patients with chronic pancreatitis.



associated in patients of autoimmune pancreatitis. Though the mechanism remains unclear, molecular mimicry was proposed to be the cause [5]. Bacteriologic analysis of the intraoperative smear and the aspirates in patients with acute pancreatitis undergoing necrosectomy, reveal gram negative bacteria from the intestine, mostly *Escherichia coli* and *Klebsiella pneumoniae*. Conventional view is that acute necrotising pancreatitis there is transmigration of intestinal bacteria into the necrotic pancreatic tissue. The normal pancreatic flora in the pancreatic fluid can be the culprit organism in the evolution of the infected pancreatic necrosis and systemic septic manifestations associated with acute pancreatitis. Like bacteria there are recent studies regarding the role viruses in the pathogenesis of the pancreatic diseases. Hassan *et al.* [6] had shown pancreatic adenocarcinoma can be associated with chronic hepatitis B virus infection. Hepatitis B surface antigen had been detected the pancreatic fluid and pancreatic acinar cells in patients with chronic hepatitis B infection [7].

Pathogenesis of chronic pancreatitis remains unclear. There have been several hypothesis proposed for the diseases, one of them elucidates that chronic pancreatitis results from plugging of the pancreatic duct [5, 8]. They elucidate that increased lithogenicity of pancreatic fluid results in the formation of proteinaceous aggregates that precipitate and obstruct the pancreatic ductules [9, 10]. There are abundant studies in scientific literature to suggest the role of bacteria in lithogenicity of the bile [11-13], but significance of the bacteria in the pathophysiology of intrapancreatic stones in chronic calcific pancreatitis is not well documented in the scientific literature. To define an association future studies in a large group of patients are necessary.

**CONCLUSION**

Bacteria is commonly present in the pancreatic juice in patients with chronic pancreatitis and its presence may

have an effect on the post-operative infections following operations. Based on the pancreatic fluid culture results appropriate antibiotic can be given to the patients who will develop septic complications following the surgery. Role of bacteria in the pathogenesis of the chronic calcific pancreatitis needs to be investigated in future studies.

**Conflict of Interest**

Authors declare that they have no conflict of interest to disclose.

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