Research Article

Pattern of Microbiology Cultures of Biliary Stents in Patients Undergoing Pancreaticoduodenectomy

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Abstract

OBJECTIVE: The objective of the study was to see the organisms growth from culture sensitivities of stents retrieved during pancreaticoduodenectomies, and efficacy of routinely used antibiotics.

METHODS: The study was conducted at Shaukat Khanum memorial cancer hospital and research center (SKMCH) from Dec 2014 to May 2018. This is a retrospective case series. Total number of patients included were 81. All patients who underwent pancreaticoduodenectomies and were stented preoperatively were included in the study. The patterns of microbial growth and their sensitivities to various antibiotics were recorded.

RESULTS: From Dec 2014 to May 2018 a total of 122 patients underwent pancreaticoduodenectomy. The 98 patients were stented preoperatively. Stents were retrieved in 81 patients. Cultures were followed for all patients. The 23 patients had growth of ecoli, 6 showed klebsiella while 47(58%) patients had poly-microbial growth patterns. Ecoli was again found to be most prevalent in polymicrobial presentation forms, followed by enterococcus and klebsiella. Antibiotic sensitivities were assessed. 84% of ecoli grown were resistant to cephalosporins (first line recommended antibiotic for Whipple procedure). There was 38% resistance to piperacillin-tazobactum and 15% resistance to carbapenems. Likewise for the poly-microbial group, 90% resistance to cephalosporins, 47% to piperacillin-tazobactum and only 21% resistance to carbapenems.Wound infections were seen in 40 patients which were correlated with stent tips microorganisms.

CONCLUSION: Stents are colonized with poly-microbial infections. Ecoli and enterococcus are the most common organisms. Piperacillin-tazobactum and carbapenems group showed promising results. The standard recommended antibiotics (cephalosporins) showed a very high number of resistance in our population group.

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Keywords | Biliary culture, Pancreaticoduodenectomy, Preoperative stenting, Stent cultures, Whipple procedure.

Introduction

Pancreatic cancer is one of the most aggressive malignancies. It accounts for 3% of new cancer cases annually and is the fourth leading cause of deaths due to malignancy in the west. Pancreatic cancer has a poor prognosis with 5 year survival <5%, despite active surgical treatment. With newer moda-

lities of treatment, outcomes of pancreatic cancer still remain poor and has changed very little in the last three decades. Surgery is the mainstay of treatment but adjuvant chemotherapy is essential for long term survival. Pancreaticoduodenectomy (PD)-Whipple procedure is the procedure of choice for patients having periampullary malignant lesions.

A lot of patients undergoing PD have been stented preoperatively to relieve biliary obstruction. This stenting has been shown to be associated with higher incidence of postoperative infective complication and its use is still under debate. Reports began to appear in 1990's suggesting that preoperative biliary stents lead to increased surgical site infections(SSIs), specifically wound infections and intra abdominal abscesses. For these reasons the use of preoperative biliary stents remains controversial, with conflicting data in many prospective and retrospective series.[1-7]

The purpose of this study was to evaluate the spectrum of microorganisms grown on stents retrieved from patients undergoing PD and to the see the efficacy of various available antibiotics.

Methods

Our study is a retrospective case series. After taking exemption from the hospital's Institutional Review Board, patients data was retrieved from the hospital information system. This is a prospectively maintained patient's surgical database. From Dec 2014 to May 2018 all patients who underwent whipple procedure (Pancreticoduodenectomy; PD) were studied. Patients who weren't stented preoperatively were excluded. Patients who had an unresectable tumors and (or) in whom a stent couldn't be retrieved were also excluded from the study. In all those patients where stents were retrieved, they were sent for cultures and sensitivities. Stent tips were sent to microbiology lab in strict aseptic measures. There was no specific special culture medium for transport, rather they were sent in simple sterile containers. The patterns of microbial growth and there sensitivities to various antibiotics were recorded. Patients were followed for the development of surgical site infection(SSIs). Wound cultures were correlated with cultures obtained from stents through descriptive frequencies and cross tabbing. All patients demographics were recorded. Data was collected in a specifically designed pro forma and entered and analyzed in SPSS version 21.0.

Results

From Dec 2014 to May 2018 a total of 122 patients underwent pancreaticoduodenectomy. 98 patients were stented preoperatively. Stents were retrieved during surgery in 81 patients. Cultures were followed for all patients. 58% of stents were found to be colonized with multiple organisms and it was observed that Ecoli was found to be the most common organism. It was seen in 58 out of 81 patients (Figure-1), but in only 23 cases it was found alone (Fig-2), whereas,in remainder 35 patients, it was found to be seen with other organisms (polymicrobial pattern) (Fig-3). Enterococcus followed Ecoli, which interestingly was found more prevalent in conjunction with other organisms, 29 out of 30 times(Fig-3), only once enterococcus was found to be solely infesting the culture tip. Klebsiella was the third most common organism cultured. (Figure-1). In our series Pseudomonas was the only organism which was never found in isolation and whenever it happened to infect the tips, it was seen to be present with other organisms.

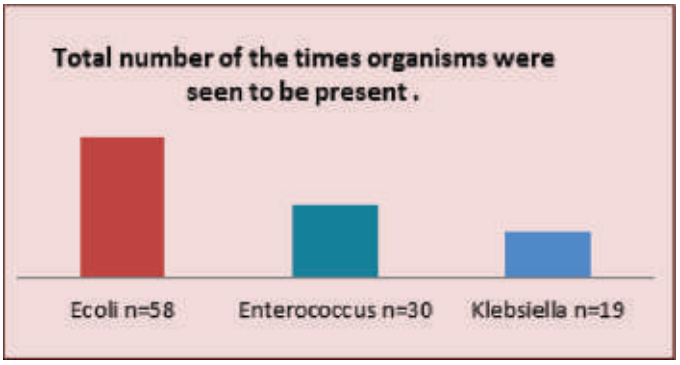

Figure-1 : *Most Commonly Found Organisms*

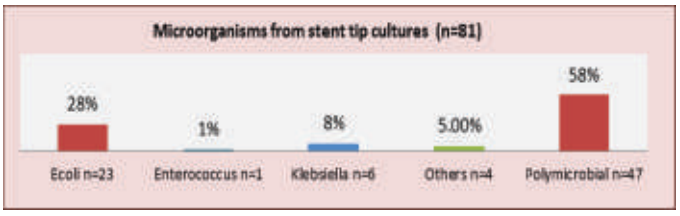

Fig-2 : *Stent Tips Growths.*

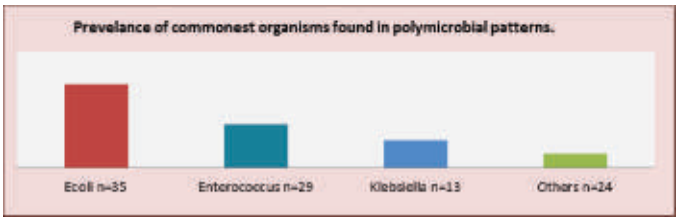

Figure-3: *Micro-Organisms Retrieved from Stent Tip Cultures with Polymicrobial Growth Patterns.*

When assessed for antibiotic sensitivities it was found that 84% of ecoli grown were resistant to cephalosporins (a first line recommended antibiotic for Whipple Procedure). There was 38% resistance to piperacillin-tazobactum and 15% resistance to imipenem (carbapenem group), based on the results obtained from culture studies from stents. Therefore, majority of the times (85%), these were sensitive to carbapenems, and showed even more sensitivities with more escalated groups of antibiotics like linezolid. For enterococcus there was 97% resistance to cephalosporins, 64% to piperacillin-tazobactumand only 23% resistance to imipenem. For klebsiella 84% resistance to cephalosporins, 27% to piperacillin-tazobactumand only 5% resistance to imipenem. For the polymicrobial group there was 90% resistance to cephalosporins, 47% to piperacillin - tazobactumand only 21% resistance to imipenem (Figure 2). All antibiotics had to be subsequently changed according to the sensitivities obtained.

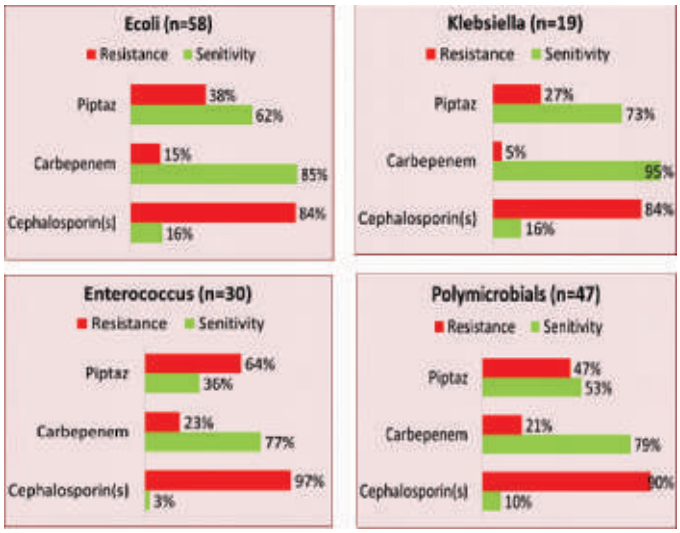

Figure 2: *Patterns of Antibiotic Resistance of Various Organisms*

Surgical site infections (SSIs) were seen in 40 patients. Ecoli was the most common organism retrieved followed by poly-microbial growth. When assessed for correlation with stent tips growth, 75% ecoli growths were traced back to be seen in stent tips as well. All 7 patients with multiple organisms growth in cultures of wounds were found to have polymicrobial growth patterns on stent tips. Similar cent percent results were seen for enterococcus. This concordance was not eminent in case of klebsiella, where only a 33% co relation between stent tips growth and culture wounds growth was seen.

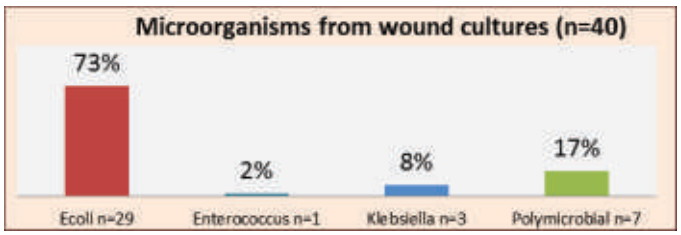

Figure 3: *Micro Organisms Growths from Cultures of Infected Wounds.*

Discussion

Our hospital is a referral center for cancer patients and receives patients from all corners of country as well as from neighborhood countries. Unfortunately, almost all the patients who are referred to hepatobiliary team here have already been stented before they undergo Pancreaticoduodenectomy (PD), either they had been already stented outside before coming to our hospital or they need stenting if they are not already, because of very high total bilirubin levels (>16mg/dl) or because of prolonged waiting time for surgery.

In such patients it is needed for the surgeon to know what kind of bacteria have colonized the stents and what kind of antibiotics should be given in the perioperative period.[8-13] A lot of studies advocate the use of extended spectrum antibiotics such as piperacillin-tazobactum as first line prophylactic antibiotic.[14] However there is no local data to support the use of extended spectrum antibiotics in patients undergoing PD procedure. The purpose of the study was to assess the different spectrum of organisms growth from stent tips, and, whether or not the routinely used groups of antibiotics as per the guidelines suffice for the most prevalent groups of organisms cultured from stent tips sent during the procedure. Majority of stent tips retrieved intraoperatively grew organisms that represented enteric source. The 58% of these had poly-microbial growth. This is similar to what has been reported by Sudo et al where they witnessed in their study that positive bile cultures had poly-microbial growth patterns in majority of cases.[15]

The most common organism that grew in cultures of our series was ecoli followed by enterococcus. This is different as compared to study conducted by Gavazzi et al and Hentzen et al, where enterococcus spp. were the most frequent bacterial isolates in bile.[12,16] Most of the organisms were found to be multidrug resistant. Cephalosporins are currently the recommended pro-

phylactic antibiotic for pancreaticoduodenectomy[17]. However our study suggests that this is not a very good idea. Almost 90 percent of the organisms were resistant to all kinds from various generations of cephalosporins. This means that we are putting our patients at increased risk of postoperative infective complications. Tanaka et al also found out in his study that using combination of Vancomycin and Piperacillin-tazobactum would result in better postoperative outcomes.[9]

Although studies have recommended the use of piperacillin-tazobactum as a prophylactic antibiotic for patients who have been stented preoperatively and also recommend to continue this antibiotic post operatively but in our series cultures showed some 44% resistance to Piperacillin-tazobactum. Some people also advocated use of gentamycin as prophylaxis,[12] however, one of the aims of our study was to see the effectiveness of only commonly prescribed drugs for PD, like cephalosporins, penecillins and carbapenems, therefore sensitivities with all groups of antibiotics were not noted, gentamycin and vancomycin of note.

We found that the most sensitive antibiotic was carbapenem group in our series with only 11% resistance. Though Barreto et al found in his study that even use of carbapenem as prophylaxis doesn't have any significant outcomes regarding post operative infective complications.[18] We cannot justify the use of the carbapenem group as a prophylactic antibiotic for patients who are stented and undergoing pancreaticoduodenectomy but we can for sure recommend that the use of cephalosporins as a prophylactic antibiotic in stented patients offers no advantage as it has no sensitivity to the already prevalent flora over there due to the presence of a stent. Stents are colonized with poly-microbial infections and need a stronger antibiotic to prevent any infective complications.

We would agree with the recommendation made by Donald et al in his study, where he recommends the use of piperacillin-tazobactum as prophylactic antibiotic[14]. We would recommend that there is a need of developing local guidelines for the flora prevalent in our part of the world and to come up with consensus regarding the safest use of prophylactic antibiotics for these patients. One of the limitations from our series is definitely asmaller patient number, but nevertheless, the results that we observed require taking heed if we are to treat patients effectively.

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