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Abstract

Introduction: Around the globe among the commonest performed surgeries the hepaticopancreatic and biliary surgeries are one of them. However these are still associated with serious infections. The presence of bacteria at the time of surgery predisposes to septic complications [1]. The reported incidence of bacteria in bile is extremely variable 8% - 42% [2]. Preventing postoperative infection is an essential factor in improving the results of surgical procedures and so several authors have been able to correlate the bacteria cultured from bile at operations with those subsequently causing wound infections and septicemia in postoperative period [3]. In order to cuttail the incidence of post-operative infections it’s routine to put every hepatobiliary surgery for routine bile culture at the time of surgery [4].

Materials and Methods
This study was a prospective study conducted in Department of Surgical Gastroenterology at Sher-i-Kashmir Institute of Medical Sciences from September 2016 to September 2018. A total of 50 patients were included in study. A thorough general physical examination was made. Baseline blood investigations and Radiological investigations were done.

Cultures: Intraoperative bile was taken from common bile duct before any surgical intervention using a sterile disposable syringe. About 5ml of bile was collected in sterile 10ml syringe and was sent to microbiology department immediately for aerobic and anaerobic cultures.

Aims and Objectives
To study the bile culture results in major hepatopancreatic and biliary surgeries and to look for microorganism involved and their antibiotic sensitivity pattern.

Inclusion criteria
- Patients undergoing major hepatopancreatic and biliary surgeries done electively with consent.
Majority of patients included were periampullary carcinoma patients including carcinoma of head of pancreas, cholangiocarcinoma.

Hepatic resection surgeries for oriental cholangiohepatitis, hepatocellular carcinoma, liver metastasis.

Repair procedures related to bile duct injury.

Surgeries related to biliary stone disease like cholangolithiasis and cholangial cyst.

Any patient with previous stent placed qualifying other inclusion criteria were also included.

Exclusion criteria

Emergency operation performed for cholangitis and sepsis syndrome.

Simple cholecystectomy.

Any Hepatopancreatic and biliary malignancy already on neoadjuvant treatment.

Immunocompromised patients.

Results

Age distribution: The most common age group in our study included middle aged patients i.e. 35-44 years of age. The youngest being 15 years of age and eldest being 65 years of age.

Table 1: Type of frequency

| Age (Years) | Frequency |
|-------------|-----------|
| 15-24       | 5         |
| 25-34       | 8         |
| 35-44       | 15        |
| 45-54       | 10        |
| 55-64       | 5         |
| ≥ 65        | 7         |
| Total       | 50        |

Fig 1: Showing age distribution

2. Gender distribution: The percentage of females was slightly more than males.

Table 2: Gender distribution

| Gender | Frequency |
|--------|-----------|
| Male   | 21        |
| Female | 29        |
| Total  | 50        |

3. Clinical symptoms at presentation: The patients were evaluated and studied for various symptoms. The most common disease in study group was periampullary carcinoma, presented as jaundice and pain abdomen. 19% of patients were asymptomatic were diagnosed incidentally on imaging.

Table 3: Clinical symptoms at presentation

| Clinical symptoms | Frequency |
|-------------------|-----------|
| Pain abdomen      | 11        |
| Jaundice and Pruritus | 19      |
| Pain abdomen, jaundice and pruritus | 10 |
| Asymptomatic      | 10        |
| Total             | 50        |

4. Distribution of study patients as per diagnosis: The most common presenting disease was periampullary carcinoma in the study group present in 26 of patients. Cholangolithiasis was diagnosed in 7 patients, oriental cholangiohepatitis (OCH) in 3 patients, cholangiochol cyst (CDC) in 3 of patients, common bile duct injury (CBD) in 3, chronic calcific pancreatitis and extra hepatic biliary obstruction (CCP and EHBO) in 7 of patients and unciante process mass in 1 of patients.

Table 4: Distribution of study patients as per diagnosis

| Diagnosis            | Frequency |
|----------------------|-----------|
| Periampullary Carcinoma | 12        |
| Carcinoma head of pancreas | 14    |
| Cholangiocarcinoma    | 7         |
| Cholangolithiasis      | 3         |
| OCH                   | 3         |
| CDC                   | 3         |
| CBD Injury            | 3         |
| CCP and EHBO          | 7         |
| Uncinate process mass | 1         |
| Total                 | 50        |

5. Surgical procedure: The patients diagnosed as periampullary carcinoma underwent pylorus preserving pancreateicoistoduodenectomy. The patients diagnosed as cholangolithiasis underwent cholecystectomy with common bile duct exploration. The patients diagnosed as oriental cholangiohepatitis underwent cholecystectomy with left lateral segmentectomy. The patients diagnosed as cholangiochol cyst underwent excision of cyst with Roux-en-y hepaticojejunostomy. The patients diagnosed as common bile duct injury underwent Roux-en-y hepaticojejunostomy. The patients diagnosed as chronic calcific pancreatitis underwent Frey’s procedure.

Table 5: Surgical procedure

| Surgical Procedure                  | Frequency |
|-------------------------------------|-----------|
| PPPD                                | 25        |
| Cholecystectomy with CBD exploration| 8         |
| Cholecystectomy with left lateral segmentectomy | 3 |
| Excision of cyst with Roux-en-y HJ  | 4         |
| Frey’s procedure                    | 7         |
| Total                               | 50        |

6. Interoperative bile culture: The intraoperative bile culture was found to be positive in 62% of patients in our study group.

Table 6: Showing interoperative bile culture in study patients

| Bile Culture | Frequency | Percentage |
|--------------|-----------|------------|
| Positive     | 31        | 62%        |
| Negative     | 19        | 38%        |
| Total        | 50        | 100%       |

7. Bile culture results: The patients with common bile duct stent had more of bactibilia. This is in concordance with previous studies.
Table 7: Showing bile culture results in patients with preoperative intervention

| Type of intervention | Bile Culture Positive | Bile Culture Negative |
|----------------------|-----------------------|-----------------------|
|                      | %age                  | %age                  |
| ERCP                 | 63.4                  | 36.6                  |
| CBD Stent            | 88.0                  | 12.0                  |
| PTBD                 | 72.7                  | 27.3                  |

8-Microorganism involved in positive bile culture- The most common microorganisms found in bile were E coli and klebsiella, 33.9% of patients. The polymicrobial infection was commonest.

Table 8: Microorganism involved in positive bile culture

| Organism Involved                          | Frequency |
|--------------------------------------------|-----------|
| E coli and K. Pneumonia                    | 21        |
| E coli and Enterococcus faecalis           | 13        |
| Enterococcus faecalis and K. oxytocia      | 16        |
| *P. aerogenosa* and E coli                 | 5         |
| E coli                                     | 7         |

9-Microorganism cultured from stent in study patients- various organisms were isolated from stents the most common among was *E. Coli*.

Table 9: Microorganism cultured from stent in study patients

| Organism Involved                          | Frequency | Percentage |
|--------------------------------------------|-----------|------------|
| E coli and K. Pneumonia                    | 6         | 24.0       |
| E coli and Enterococcus faecalis           | 7         | 28.0       |
| K. Oxytocia and E coli                     | 5         | 20.0       |
| E coli                                     | 2         | 8.0        |
| *P. aerogenosa* and E coli                 | 5         | 25.0       |
| Total                                      | 25        | 100        |

10. Antibiotic sensitivity pattern of microorganism

Table 10: Antibiotic sensitivity pattern of microorganism

| Organism                      | Sensitivity            | No. | %age |
|-------------------------------|------------------------|-----|------|
| *E. coli*                     | Polymixin B            | 55  | 88.7 |
|                               | Amikacin               | 54  | 87.1 |
|                               | Gentamycin             | 50  | 80.6 |
|                               | Tigecycline            | 49  | 79.0 |
|                               | Imipenem               | 43  | 69.4 |
| *K. Pneumonia*                | Piperacillin and Tazobactam | 59 | 95.2 |
|                               | Amikacin               | 56  | 90.3 |
|                               | Ceftriaxone            | 55  | 88.7 |
|                               | Imipenem               | 53  | 85.5 |
|                               | Meropenem              | 54  | 87.1 |
| *Enterococcus faecalis*       | Ampicillin             | 59  | 95.2 |
|                               | Ampicillin and sulbactam | 60 | 96.8 |
|                               | Piperacillin and Tazobactam | 53 | 85.5 |
|                               | Ticarcillin            | 57  | 91.9 |
|                               | Vancomycin             | 53  | 85.5 |
| *P. aerogenosa*               | Polymixin B            | 62  | 100  |

11. Resistance pattern of microorganism

Table 11: Resistance pattern of microorganism:

| Organism                      | Resistance            | Frequency | Percentage |
|-------------------------------|-----------------------|-----------|------------|
| *E. coli*                     | Piperacillin and Tazobactam | 59 | 95.2 |
|                               | Levofloxacin          | 55        | 88.7       |
|                               | Cefoperazone          | 60        | 96.8       |
|                               | Tetracycline          | 57        | 91.9       |
|                               | Ciprofloxacin         | 53        | 85.5       |
|                               | Ampicillin and sulbactam | 60 | 96.8 |
|                               | Tetracycline          | 53        | 85.5       |
| *K. Pneumonia*                | Levofloxacin          | 61        | 98.4       |
| *Enterococcus faecalis*       | All                   | -         | -          |
| *P. aerogenosa*               | All                   | -         | -          |
Discussion

The study entitled Clinical Analysis of Intraoperative Bile in Hepatopancreatic and Biliary Surgeries was a prospective study conducted in Department of Surgical Gastroenterology at Sheri-kashmir Institute of Medical Sciences. The study was conducted from September 2016 to September 2018. A total of 50 patients were included in study. Mean age of the patients was 39±10.3 [TABLE-1, FIGURE-1]. Most of the patients presented with more than one symptom. The most common being jaundice with pruritus in 38%, Pain abdomen in 22% of patients, pain abdomen, jaundice and pruritus 21%. 19% of patients were asymptomatic, detected incidentally [TABLE-3]. Out of 50 patients periampullary carcinoma in the study group present in 26 of patients. Cholangiocarcinathiasis was diagnosed in 7 patients, oriental cholangiohepatitis (OCH) in 3of patients, cholangiocyst (CDC) in 3 of patients, common bile duct injury (CBD) in 3, chronic calcific pancreatitis and extra hepatic biliary obstruction (CCP and EHBO) in 7 of patients and uncinate process mass in 1 of patients [Table-4]. In our study out of 50 patients 62% had positive intraoperative bile culture. The most common organism found in our study was: E coli and k. pneumonia in 33.9%, E coli and Enterococcus faecalis 21%, The monomicrobial infection was due to E coli 11.3% [Table-8] Jethwa P, et al [5] conducted study on 331 patients undergoing hepato pancreatic and biliary surgery. The most common organism cultured in bile were Coliforms and Enterococcus. Saulius Grizas (2005) [6] studied etiology of bile infection and its association with postoperative complication following pancreaticoduodenectomy. They found 70% of patients had polymicrobial infection. The most common organism found was E coli that were found to be multidrug resistant [Table-10], showing resistance to most of the common antibiotics like Piperacillin, Tazobactam, levofloxacin, Cefoperazone, Tetracycline on the other hand pseudononas aerogenosa was found to be resistant to all broad spectrum antibiotics and sensitive to Polymixin-B only. K pneumonia was found to be sensitive to Piperacillin and Tazobactam, Amikacin, Ceftriaxone. Enterococcus faecalis was found to be sensitive to Piperacillin and Tazobactam, Ticarcillin, Vancomycin. Preoperative intervention and bile culture results: The preoperative biliary drainage was done to relieve obstruction in periampullary carcinoma and endoscopic retrograde cholangiography as diagnostic tool. In 41% ERCP was done 25% had stent and 11% had PTBD in place. Preoperative stented patients had 88% of bactibilia. This is in concordance with the study of Jethwa P et al [5]. In his study he f ound stented patients had 88% of bactibilia. This is in concordance with the following studies: Povoski et al (1999) [7], studied association of preoperative biliary drainage with postoperative outcome following Pancreaticoduodenectomy. They retrospectively analyzed 161 patients undergoing pancreaticoduodenectomy in whom intraoperative bile cultures were performed. Microorganisms were isolated from 58% of these intraoperative bile cultures, with 70% of them being polymicrobial. Hochwald SN et al (1999) [8] studied association of preoperative biliary stenting with postoperative complication. They found patients with stent had a significantly increased risk for bacterobilia (p=.001).

Conclusion

- In our study we have found middle aged females were mostly affected with hepatopancreatic and biliary diseases.
- The preoperative biliary stenting is associated with increased risk of bactibilia and bacteriobilia leads to increase in postoperative morbidity in pancreatic biliary surgeries. Thus preoperative biliary stenting should be done in selective patients.
- The preoperative intervention group should be considered potentially infected, requires careful operative technique to avoid spillage of bile on wound surfaces to decrease infection rates and morbidity.
- In intervention group judicious use of antibiotics may help to decrease postoperative morbidity. Patients with risk factors should receive prophylactic antibiotics covering endogenous gram negative organisms which should be modified in postoperative phase according to the results of antibiotic sensitivity patterns.
- Gram-negative bacilli predominate in biliary tree. The polymicrobial infection being the commonest. E coli and klebsiella predominated in bile. Similar microorganisms predominate in wound cultures and intraabdominal collections. E coli were found to be resistant to most of the commonest drugs.

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