



ANALYSIS OF RISK FACTORS, FREQUENCY OF COMPLICATIONS POST ERCP- A PROSPECTIVE STUDY

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Abstract

ERCP is well established therapeutic modality for pancreatic and biliary ductal system. We have conducted this study to find various complications and risk factors for these complications. This study was conducted in order to find these risk factors and try to correct it, so that the rate of complications can be minimized.

Aims: 1) To study the various post ERCP complications. 2) To analyze the rate of the various Post ERCP complications. 3) To study the predictors or risk factors for these complications.

Settings and Design: Prospective study done at a tertiary care hospital.

Methods and Material: Single centre prospective study of one and half year, 60 patients with varied pancreaticobiliary diseases requiring ERCP for their management and those fitting into the inclusion criteria were included in the study.

Results : Complication rate of our study is 16.67%. The complications found were pancreatitis (6.67%), cholangitis (5%) , hemorrhage (1.67%) and perforation(1.67%) . In analysis of risk factors, significant correlation was found between the procedure related variables.

Conclusion : Pancreatitis, Cholangitis, hemorrhage and perforation were the major complications. Procedure related variables were found to be the risk factors for complications.

Key Words: ERCP, Complications.



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Introduction

ERCP is an imaging and therapeutic modality for pancreatic and biliary ductal system, where we do direct contrast study of pancreatobiliary tree. It is useful in the diagnosis and treatment of diseases involving the pancreatic and bile duct, such as stones, benign and

malignant strictures and developmental anomalies. ERCP examinations performed purely for diagnostic purpose has declined significantly. Endoscopic retrograde cholangiopancreatography (ERCP) has evolved from primarily a diagnostic procedure into primarily a therapeutic procedure. However, it remains a very accurate diagnostic tool where all of the non-invasive tests have been inconclusive. Whereas therapeutic ERCP continues to change the world of pancreatobiliary medicine.

For endoscopists to accurately assess the clinical appropriateness of ERCP, it is important to have thorough understanding of the potential complications of this procedure. Although successful ERCP has replaced surgery as a treatment option for some difficult pancreatobiliary diseases, we have also seen problems and complications arising as a result of endoscopic treatment. This study is to prospectively analyze cases admitted in our hospital with varied pancreatobiliary diseases requiring ERCP for their management, and the rate of various complication in these patients post procedure and the risk factors leading to these complications and their age and sex distribution.

Materials and Methods

It is a single centre prospective study of one and half year, where 60 cases of patients with varied pancreatobiliary diseases requiring ERCP for their management & those fitting into the inclusion criteria were included in the study. The study was carried out in tertiary medical hospital. . Inclusion Criteria: Obstructive Jaundice (Stone ,stricture, malignancy, worms or foreign body), Suspected Sphincter of Oddi dysfunction, Gall stone Pancreatitis, Post cholecystectomy Jaundice, Bile duct injury (traumatic/ post cholecystectomy/extrahepatic biliary radical surgery), Age >15 or <80.

Exclusion criteria: Acute alcoholic pancreatitis , Previous pancreatoduodenectomy, Coagulation disorder, History of allergy to contrast , hemodynamically unstable patient for ERCP procedure, Pregnancy. The study was initiated after obtaining approval from the Institutional Ethics Committee.

Study Procedure : Patients with various pancreatobiliary diseases advised ERCP, presented to ERCP room at 9:00 am after 12 hrs fasting and remained fasting 24 hrs post procedure. Before ERCP all patients informed consent was taken. Patient evaluated pre-procedure, complete history noted and patients were examined. Patients were selected on the basis of inclusion and exclusion criteria. History of past ERCP noted. Pre-procedure investigations were recorded. All procedures were performed by experienced endoscopist and few by junior endoscopist using a standard therapeutic endoscope.

All the ERCP's were performed under conscious sedation with midazolam. Hyoscine butyl bromide injection was used for relaxation of bowel smooth muscles. During the entire procedure arterial oxygen saturation and heart rate was monitored by using pulse oximeter. Cannulation of CBD was first attempted by a sphincterotome. First attempt was made to selectively cannulate the CBD by sphincterotome with a hydrophilic guide wire. Total five attempts were made. If the technique failed, a precut access papillotomy was attempted; after which if catheterization of CBD was possible then the procedure was completed with a standard sphincterotome. All the endoscopic sphincterotomies were performed via a hydrophilic guide wire to achieve controlled cutting and avoid the "zipper cut" phenomenon. All the endoscopic sphincterotomies were done using blended current (cut 45 w, coagulation 30 w). The length of endoscopic sphincterotomy depends on the indication : small (15 mins) for plastic stent placement, or as large (50 mins) for choledocholithiasis. Data related to the procedure comprises of : Difficult cannulation, Type of sphincter access (needle knife papillotomy, sphincterotomy), Whether stent was placed, Whether stones were extracted, Complications during the procedure. Post procedure patients were admitted for at least 24 hrs post procedure for observation and stay may extend depending on the clinical scenario. Patient evaluated 24 hrs post procedure, clinically and examined for evidence of any post ERCP complications. Hemoglobin, serum amylase and lipase levels and liver function tests were assessed. Post procedure x ray abdomen erect and chest with both domes of diaphragm is done, and computerized tomography of abdomen and pelvis or MRCP done as per clinical scenario. Patient evaluated again serially post procedure for evidence of any post ERCP complications then after 72 hrs, after 7 days, after 30 days. During every evaluation patient examined clinically and haemoglobin, serum amylase and lipase levels, and liver function test were assessed.

Statistical analysis :

The statistical analysis was done by using 2 x 2 tables wherever applicable. Chi square test with Yates correction and Fischer's exact test were used to analyze the categorical data. Whereas student t test was used for continuous variables. A 'p' value of <0.05 was taken as significant.

Results

Out of 60 patients who underwent ERCP,38 were females and 22 were males. The maximum number of patients included in the study were in the age group of 41-60 yrs (45%) with mean age being 49.03 yrs (SD= 14.95). The patients were in the range of 16-80 yrs of age. Around

50 % patients were of choledocholithiasis (Table I). There were 19 cases i.e (31.67%) of patients in our study who already were suffering from comorbidities, 6 were known hypertensive, 4 had history of tuberculosis, 2 had history of ischaemic heart disease, 1 was both diabetic and hypertensive, 5 had other comorbidities. Almost 65% of the procedures in this study were performed by the senior endoscopist and remaining 35% of the procedures were performed by the junior. 60 cases were analysed for 30 days for post ERCP complications after undergoing ERCP procedure for various indications. The complication rate of ERCP in our study is 16.67%, among which pancreatitis is the most common complication with a rate of 6.67% followed by cholangitis which is 5%. Only 1 case(1.67%) suffered retro-duodenal perforation post ERCP, 1 case(1.67%) had hemorrhage post ERCP for which the patient had to be explored to control the hemorrhage. And 1(1.67%) patient with obstructive jaundice due to pancreatic head carcinoma died from cardiopulmonary complication post ERCP (Table II). Patient related complications and Procedure related complications were studied.(Table III). On statistical analysis no significant difference was found between the patient related factors increasing risk for post ERCP complications except for the history of pancreatitis which was statistically more frequent in patients with complications.

On statistical analysis , procedure related factors related to over all post ERCP complications, Difficult cannulation, Failed clearance of CBD, Pancreatic duct cannulation, procedures like lithotripsy/dilators, Stent placement and cholangiogram found to be significantly related to post ERCP complications. Where as Precut, Balloon sweeps and basket sweeps were not related significantly to post ERCP complications.

Following factors seemed to be significantly associated for Pancreatitis occurring post ERCP [Table IV]: a) Difficult cannulation

- b) Use of mechanical lithotripter and dilators
- c) Pancreatic duct cannulation

Following patient and procedure related factors significantly associated for occurring Cholangitis post ERCP:

- a) History of previous ERCP
- b) History of fever pre procedure
- c) Failed clearance of CBD

Other patient related factors like history of diabetes , preprocedure pain, patient with deep jaundice and procedure related factors like precut, difficult cannulation, basket sweeps,

balloon sweeps, cholangiogram, stent placement and procedures like lithotripsy or dilators were not found to be significantly related for causing post ERCP Cholangitis [Table V].

Discussion

Last 2 decades have seen significant advances in ERCP which has facilitated the cannulation of desired duct, and controlled cutting of ampullary sphincter, minimizing the trauma to the major papilla. The incidence of post- ERCP complications however has not changed during last ten years ^[1,2].

Therefore, identifying patient and procedure related risk factors for post ERCP complications has a significant impact on clinical practice helping in appropriate technical measure to reduce the likelihood of post-ERCP complications. Moreover the assessment of risk factors allowed better identification of patients who might be candidates for immediate discharge after therapeutic ERCP and might reduce the financial cost of the procedure.

We have in total, studied 60 patients who have undergone ERCP for various pancreato-biliary conditions for 30 days following the procedure. We had more number of female patients in our study. Maximum number of patients included in the study were in the age group of 41-60 years (45%) ,with the mean age of patients being 49.03 years(range=16-80 years). Choledocholithiasis was the main indication for therapeutic ERCP in our study (50%), followed by USG suggestive of dilated CBD(35%).Neoplastic etiology causing obstructive jaundice is the next common indication. Whereas gall stone pancreatitis, Acute cholangitis and post cholecystectomy bile leak were the less common indications for ERCP in our study (Table III). P. Katsinelos et al ^[3] also had choledocholithiasis as the main indication for majority of the patients in his study.

About 31.67% of patients included in our study were already suffering from other comorbidities.P. Katsinelos et al ^[3] study also had included 46.3% of patients having co morbid associated disease.

Among the 60 cases included in our study, 8.33% patients were known alcoholic.

About 65% of procedures were performed by senior endoscopist and rest 35 % were performed by junior endoscopist. However this factor of endoscopist experience was not related with increasing risk for post ERCP complications. P. Katsinelos did a study for post ERCP complications by including cases performed by a single senior endoscopist^[3] ..

The prevalence of overall post ERCP complications in our study is 16.67%, which is higher compared to previous studies which ranged from 4% to 15.9% ^[3,4,5,6,7,8,9,10,11,12].

Analysis of time to presentation of complication shows that maximum number of times the complication present within 72 hrs.

Studies by Freeman et al ^[12] found no significant increase in risk among young patients or in women, we also have similar findings.

Presence of comorbidities were not significantly related to over all post ERCP complications in our study, this finding is similar to study done by P. Katsinelos et al ^[3]. The multivariate analysis of Cheng et al ^[8] shows participation of trainee significantly related with post ERCP complications, whereas the active presence of junior operator did not appear to significantly affect outcome in our study.

Technical variables are of obvious importance as procedure related factors in over all post ERCP complication. Surprisingly, in our study, we found that pre-cut sphincterotomy was not a risk factor for overall post ERCP complications, in spite of the fact that most studies and meta- analysis recorded it as an independent risk factor for post ERCP complication^[3,12].

Difficult cannulation, Pancreatic duct cannulation and failed clearance of CBD in the present study was a significant risk factor for overall complications, a finding not different with previous studies. Stent placement (plastic/metallic),injecting dye in pancreatobiliary system and therapeutic procedures like using dilators and lithotripter were found to be significantly related to overall post ERCP complications. Technical variables like use of basket sweeps and balloon sweeps were not found to have any relation with increasing risk for post ERCP complication in our study.

Pancreatitis is the most feared complication after ERCP, with reported frequencies that generally range from 1% to 7%^[6,7,9,12,13,14,16,17,18,19]. However, several higher figures were reported^[3,8,19]. Our pancreatitis rate was 6.67%, We used the widely accepted consensus definition for pancreatitis^[20], which is a clinical illness associated with serum amylase or lipase at least 3 times normal at more than 24 hours after the procedure and requiring hospitalization or prolonging initial admission more than 1 day.

The rate of post-ERCP cholangitis is 1% or less. ^[7,15,17] as per previous studies. However the rate of post ERCP cholangitis in our study is 5%. The patients presenting with post ERCP cholangitis in our study also had history of ERCP done previously suggestive of incomplete drainage of biliary system at first setting and increased risk was also found to be significantly related with pre procedure presence of fever.

Haemorrhage is primarily a complication related to sphincterotomy rather than diagnostic ERCP. A meta-analysis of 21 prospective trials shows the rate of haemorrhage as a

complication of ERCP as 1.3% [13]. Whereas in our study comprising of 60 cases had 1(1.67%) patient had post ERCP severe haemorrhage which was managed by operative measures.

Perforation rates with ERCP range from 0.1% to 0.6% [7,15,17,21]. In our study 1(1.67%) patient had retro duodenal perforation. This was a old female with periampullary malignancy and was done by junior endoscopist. Patient was managed conservatively.

The overall mortality rate after diagnostic ERCP is approximately 0.2% [15]. Death rate after therapeutic ERCP are twice as high (0.4%-0.5% in 2 large prospective studies) [15, 17]. One patient died post ERCP in our study.

Knowledge of potential ERCP complications, their expected frequency, and the risk factors for their occurrence may help to recognize and to minimize the incidence and severity of complications as well as proper selection of patients for appropriate intervention and being prepared to manage any adverse event that may arise. Thus early recognition and prompt intervention may minimize the morbidity and mortality associated with that complication and improve the overall quality of ERCP.

Conclusion

In conclusion, our study demonstrates the rate of Post ERCP Complications at our institute is 16.67%. History of pancreatitis was identified as the only patient related risk factor for the overall post ERCP Complications.

Pre-cut papillotomy was not found to increase the risk of post ERCP complication in our study. Difficult cannulation, Pancreatic duct cannulation and therapeutic procedure within biliary system like removing stone by lithotripsy or using Dilators increased the risk of post ERCP Pancreatitis.

Risk of cholangitis was found to increase in our study due to repeated ERCP and failed clearance of biliary system. Pre procedure fever is also a risk factor for cholangitis in our study. Injecting dye, performing precut and junior operator were found not to play a significant role in increasing the risk of post ERCP cholangitis.

Thus, the quality of ERCP at our institute can be further improved by proper patient selection, applying appropriate therapy, prompt identification of the complications and their risk factors and taking appropriate measure to reduce post ERCP mortality and morbidity.

Table I : Indications For Ercp

| SR.NO | INDICATIONS | CASES N=60 | PERCENTAGE |
|-------|-----------------------------------|---------------|------------|
| 1. | CHOLEDOCHOLITHIASIS | 30 | 50% |
| 2. | DILATED CBD ON USG | 21 | 35% |
| 3. | GALL STONE PANCREATITIS | 2 | 3.33% |
| 4. | ACUTE CHOLANGITIS | 2 | 3.33% |
| 5. | POST CHOLECYSTECTOMY BILE LEAK | 3 | 5% |
| 6. | NEOPLASIA | 7 | 11.67% |

Table ii : Frequency of Various Post Ercp Complications

| SR. NO | COMPLICATIONS | NUMBER(N=60) | PERCENTAGE |
|--------|---------------|--------------|------------|
| 1 | PANCREATITIS | 4 | 6.67% |
| 2 | CHOLANGITIS | 3 | 5% |
| 3 | PERFORATION | 1 | 1.67% |
| 4 | HAEMORRHAGE | 1 | 1.67% |
| 5 | OTHERS | | |
| 6 | DEATH | 1 | 1.67% |

Table Iii: Factors Related To Complications

A] Patient Related Factors Causing Complication:

| SR. NO. | CHARACTERISTICS | PATIENTS WITH COMPLICATIONS (N= 10) | PATIENTS WITHOUT COMPLICATIONS (N=50) | P VALUE |
|---------|----------------------------|---|--|------------|
| 1. | AGE | | 50.44YRS (SD=14.44YRS) | |
| 2. | FEMALE GENDER | 5 | 33 | 0.4744 |
| 3. | ALCOHOLIC | 2 | 3 | 0.1904 |
| 4. | COMORBIDITIES | 4 | 15 | 0.7111 |
| 5. | HISTORY OF PANCREATITIS | 3 | 1 | 0.0127 |
| 6. | PRE PROCEDURE PAIN | 7 | 31 | 0.7321 |
| 7. | JUNIOR OPERATOR | 2 | 20 | 0.2990 |

B] Procedure Related Factors Related To Complication

| SR. NO. | PROCEDURE RELATED FACTORS | PATIENTS WITH COMPLICATIONS (N= 10) | PATIENTS WITHOUT COMPLICATIONS (N=50) | P VALUE |
|---------|--------------------------------|---|--|------------|
| 1. | PRECUT | 9 | 44 | 1.0000 |
| 2. | DIFFICULT CANNULATION | 7 | 16 | 0.0346 |
| 3. | BALLOON SWEEPS | 3 | 16 | 1.0000 |
| 4. | BASKET SWEEPS | 7 | 34 | 1.0000 |
| 5. | CHOLANGIOGRAM | 6 | 46 | 0.0209 |
| 6. | STENTS PLACED | 6 | 46 | 0.0209 |
| 7. | LITHOTRIPSY/ DILATOR | 4 | 3 | 0.0115 |
| 8. | PANCREATIC DUCT CANNULATION | 4 | 2 | 0.0054 |
| 9. | FAILED CLEARANCE | 10 | 12 | 0.0001 |

Table Iv : Risk Factors For Post Erecp Pancreatitis

| SR. NO. | RISK FACTORS | PANCREATITIS CASES (4) | UNCOMPLICATED CASES (50) | P VALUE |
|----------------|------------------------------|-------------------------------|---------------------------------|----------------|
| 1. | AGE | 51.25YRS SD=16.54 | 50.44YRS SD=14.44 | 0.9152 |
| 2. | FEMALE GENDER | 1 | 33 | 0.1379 |
| 3. | ALCOHOLIC | 0 | 3 | 1.0000 |
| 4. | HISTORY OF PANCREATITIS | 1 | 1 | 0.1440 |
| 5. | PREPROCEDURE PAIN | 3 | 31 | 1.0000 |
| 6. | JUNIOR OPERATOR | 1 | 20 | 1.0000 |
| 7. | PRECUT | 4 | 44 | 1.0000 |
| 8. | DIFFICULT CANNULATION | 4 | 16 | 0.0153 |
| 9. | BASKET SWEEPS | 4 | 34 | 0.3064 |
| 10. | BALLOON SWEEPS | 1 | 16 | 1.0000 |
| 11. | CHOLANGIOGRAM | 3 | 46 | 0.3300 |
| 12. | STENTS PLACED | 4 | 46 | 1.0000 |
| 13. | USE OF LITHOTRIPTER/ DILATOR | 3 | 3 | 0.0031 |
| 14. | PANCREATIC DUCT CANNULATION | 4 | 2 | 0.0001 |

Table V : Risk Factors For Cholangitis

| SR. NO. | RISK FACTORS FOR CHOLANGITIS | CHOLANGITIS CASES(3) | UNCOMPLICATED CASES(50) | ODDS RATIO | P VALUE |
|----------------|-------------------------------------|-----------------------------|--------------------------------|-------------------|----------------|
| 1. | AGE | 27YRS SD=9.84 | 50.44YRS SD=14.44 | | 0.0008 |
| 2. | HISTORY OF DIABETES | 1 | 1 | 24.5000 | 0.1110 |
| 3. | PRE PROCEDURE PAIN | 3 | 31 | 4.3333 | 0.5450 |
| 4. | ICTERUS | 2 | 31 | 1.2258 | 1.0000 |
| 5. | HISTORY OF PREVIOUS ERCP | 2 | 3 | 31.3333 | 0.0209 |
| 6. | JUNIOR OPERATOR | 2 | 20 | 3.0000 | 0.5633 |
| 7. | PRECUT | 3 | 44 | 1.0225 | 1.0000 |
| 8. | DIFFICULT CANNULATION | 0 | 16 | 0.2987 | 0.5451 |
| 9. | BASKET SWEEPS | 3 | 34 | 3.3478 | 0.5451 |
| 10. | BALLOON SWEEPS | 2 | 16 | 4.2500 | 0.2634 |
| 11. | CHOLANGIOGRAM | 3 | 46 | 0.6774 | 1.0000 |
| 12. | STENT PLACED | 2 | 46 | 0.1739 | 0.2617 |
| 13. | FAILED CLEARANCE OF CBD | 3 | 12 | 21.56 | 0.0194 |
| 14. | HISTORY OF FEVER | 2 | 1 | 98 | 0.0064 |

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