

Validity of Predictive Markers for Post ERCP Pancreatitis Patients: A Single Centre Study

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Received: September 27, 2023; Accepted: January 25, 2024; Published online: January 28, 2024

Abstract: Endoscopic retrograde cholangiopancreatography (ERCP) is a proprietary procedure, endoscopic modality, and specialized procedure used to diagnose and treat disorders of the pancreatic and biliary systems. The incidence of reported post-ERCP complications varied among several studies including post ERCP pancreatitis (PEP), duodenal perforation, and cholangitis. In this study, the author would like to show certain intra procedural factors related to PEP incidence. This was a retrospective study of secondary data of patients undergoing ERCP procedures from 2017-2022 at Prof. Dr. R. D. Kandou Hospital, Manado. Length of procedure, cannulation on pancreatic duct, pancreatogram, double wire technique, and the use of certain common bile duct (CBD) stone retrieval techniques such as endoscopic papillary balloon dilatation (EPBD) were recorded and analyzed. The results showed that based on the analyzed data, the percentage of pancreas cannulation was 8%, pancreatogram 5%, double-wire technique 3%, and EPBD procedure 10%, Incidence rate of PEP in all ERCP procedures was 19%. Increased amylase/lipase enzymes were found in 13 of 24 patients (54%) who underwent cannulation; 8 of 16 patients (50%) who underwent pancreatogram; 4 of 9 patients (44%) who underwent double wire procedure; and 10 of 30 patients (33%) who underwent EPBD. This PEP could be caused by several risk factors during ERCP including cannulation, pancreatogram, double wire, and EPBD. Number of cannulation attempt could result in trauma to the ampulla. Pancreatogram could result in hydrostatic, chemical, and allergic injury. Any manipulation of the pancreas that caused trauma could trigger the incidence of PEP. Assessment of the occurrence of PEP was based on increases in lipase and amylase enzyme values by four times the normal value and tested 6 hours after procedure. We could reduce the incidence of PEP by providing prophylactic therapy before ERCP. In conclusion, PEP is the most common complication in ERCP procedures and can be risky in patients with high risk factors. In this study, factors that affecting the incidence of PEP are cannulation, pancreatogram, double wire and EPBD.

Keywords: endoscopic retrograde cholangiopancreatography; pancreatitis; complications

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is a proprietary procedure, endoscopic modality, and specialized procedure used to diagnose and treat disorders of the pancreatic and biliary systems. ERCP is commonly performed for the management and diagnosis of common bile duct stones, bile and pancreatic tumors, postoperative management, and perioperative bile complications.¹

The ERCP therapy remains one of the most complex endoscopic procedures in the non-surgical management of several pancreatic pathologies. Although considered safe, ERCP is one of the laparoscopic procedures with a high complication rate. Post-ERCP pancreatitis (PEP) is the most common complication of ERCP, with significant morbidity and mortality. In addition, endoscopic surgeons performing ERCP must have a thorough understanding of the patient and the procedure-related risk factors for the development of PEP.^{2,3}

The most commonly reported major complications of ERCP treatment are acute pancreatitis, bleeding, perforation, and cholangitis. The incidence of reported post-ERCP complications varied among several studies including 1-2% pancreatitis, 1-2 perforations and 1-5% cholangitis, in other studies post-ERCP complications have been reported, namely 5.4% pancreatitis and 2% bleeding. Potential complications that can arise from ERCP procedures such as pancreatitis are the most common cases and can develop in response to mechanical manipulation of papillae or contrast injection. The amount of contrast injected into the pancreatic duct should be carefully monitored. If pancreatitis occurs, it usually occurs within two to four hours after the procedure. The expected incidence of ERCP-induced pancreatitis is usually between 1-7%.⁴

Acute pancreatitis is an inflammatory condition of the pancreas that can cause local damage, systemic inflammatory response syndrome, and organ failure. It is more common in people over the age of 40 and is often associated with bile duct disease and alcoholism. The incidence of pancreatitis varies greatly from country to country and also from place to place in the same country. In Germany, the incidence of acute pancreatitis is about 17.5 cases per 100,000 population. In Finland, the incidence is 73.4 cases per 100,000 inhabitants. Similar incidents have also been reported in Australia. Based on the varied incidence of PEP, we conducted this study at one of the health centers in Manado, to determine the prevalence of pancreatitis sufferers after ERCP. It is also expected to be a reference for future studies involving patients with PEP.^{5,6}

METHODS

This was a descriptive study of secondary data using cohort data on patients undergoing ERCP measures from 2017-2022. Data were taken from the patient's medical record at Prof. Dr. R. D. Kandou Hospital, Manado. Inclusion criteria were patients who were over 18 years old and underwent ERCP procedures and had complete data. Meanwhile, exclusion criteria were patients who had pancreatic diseases such as pancreatic malignancy and pancreatitis before surgery, and patients who failed cannulation of ampulla of Vater. All data and information regarding the research subjects would be kept confidential. To maintain the confidentiality of patient identity, the patient data collection sheet used a code instead of the patient's full identity.

RESULTS

Based on the studies conducted, it was found that post-ERCP complications were more common in men than women with a ratio of 32 (57%) men, and 24 women (43%).

Table 1 showed that the age characteristics of patients who experienced the most post-ERCP complications was 18-65 years, as many as 42 patients (75%) of the total patients with complications.

Table 2 showed that of 337 patients undergoing ERCP, 39 patients lost follow-up and were included in the exclusion criteria, leaving 298 patients in the study. Of the 298 patients who underwent ERCP, 56 patients (13%) had elevated amylase and lipase enzymes post-ERCP.

Table 1. Age characteristics of patients experiencing post-ERCP complications

| Age (years) | Total |
|-------------|-------|
| <18 | 0 |
| 18-65 | 42 |
| 66-79 | 14 |
| 80-99 | 0 |

Table 2. Data on patients undergoing ERCP and had increased post-ERCP amylase/lipase enzymes

| Total ERCP patients | Increased amylase/lipase enzyme | Missing follow-up |
|---------------------|---------------------------------|-------------------|
| 337 patients | 56 patients (18%) | 39 patients |

Table 3 showed that there were 36 patients who underwent cannulation (12%), with 20 of 36 patients (55%) experienced increased amylase/lipase enzymes. In addition, pancreatogram was also performed on 27 patients (9%) with the results of 16 patients (59%) experienced increased amylase/lipase enzyme. In the double wire technique performed on 19 patients, 11 patients (58%) experienced increased amylase/lipase enzyme. In EPBD procedure, nine out of 17 patients experienced increased amylase/lipase (52%). The total cannulation of all patient data was 36/298 (12%) patients, pancreatogram 27/298 (9%) patients, double wire technique 19/298 (6%) patients, and EPBD 17/298 (5%) patients.

Table 3. Cannulation, pancreatogram, double-wire, and EPBD techniques in patients who underwent ERCP as well as amylase and lipase laboratory results

| Procedure Amylase/ lipase level | Cannulation | | Pancreatogram | | Double wire technique | | EPBD | |
|---------------------------------------|-------------|----------------|---------------|----------------|-----------------------|----------------|----------|----------------|
| | Increase | No increase | Increase | No increase | Increase | No increase | Increase | No increase |
| Sum | 20 | 16 | 16 | 9 | 11 | 8 | 9 | 8 |
| Total | 36 (12%) | | 27 (9%) | | 19 (6%) | | 17 (3%) | |

DISCUSSION

This study involved 298 patients who experienced complications after undergoing ERCP at Prof. Dr. R. D. Kandou Manado Hospital from 2017 to 2022. Demographic analysis of patients was carried out to obtain patient characteristics such as sex and age of most patients. From the study conducted it was found that male patients were 57% more likely to experience post-ERCP complications than female patients. The same results were also reported by Iorgulescu et al⁷ in a study conducted at Bucharest Hospital, Rome. Based on study data, post-ERCP complications were most prevalent in patients aged 18-65 years; this age determination used age classification according to WHO.⁸

Of the 337 patients who underwent ERCP, 39 patients lost follow-up due to long treatment time, the patient's unwillingness to undergo amylase and lipase enzyme examination, and loss of contact with patients. The total number of patients who met the inclusion criteria was 298 patients; 56 out of 298 patients (18%) reported elevated levels of amylase and lipase enzymes which also showed manifestations of pancreatitis, as one of the common complications in post-ERCP patients. These results are also in line with studies conducted by Vandervoort et al.⁹ Based on their study, 11.2% of post-ERCP patients experienced complications, of which pancreatitis played an important role (7.2%) and indeed became the most common complication. Post-ERCP complications are defined as obvious side effects associated with ERCP that require hospitalization or re-treatment of previously discharged patients. It also includes pancreatitis (onset of new abdominal pain and fourfold increase in serum amylase and/or lipase 24 hours after the procedure), bleeding (clinical evidence of bleeding with a decrease in hemoglobin greater than 2 g/dL, the need for endoscopy or other methods to obtain hemostasis), cholangitis (fever, chills,

elevated liver enzymes, and/or positive blood culture within 48 hours after the procedure), and cholecystitis (clinical and radiographic evidence of an inflamed gallbladder).¹⁰

Based on this study, it was found that the most action performed in post-ERCP patients was cannulation (12%) with a prevalence of more increased amylase-lipase enzymes (20 out of 36 patients had an increase in amylase/lipase enzymes). This was followed by pancreatogram (9%), and double wire technique (6%). A similar percentage was reported by Vandervoort et al⁹ with cannulation (11%) as one of the most frequent procedures performed in post-ERCP patients. Wire-guided biliary cannulation (WGC) is recommended to reduce the risk of PEP and facilitates biliary cannulation using radioopaque guide wires, passing through the end of a sphincter or catheter that allows access to the bile ducts.¹¹ Guidewire is believed to reduce traumatic damage to papillae and pancreatic ducts or prevent hydrostatic pressure associated with the contrast media injection, thus helping to prevent PEP.^{12,13} Due to the multifactorial mechanism of PEP identification, PEP prophylaxis may fail if it targets only one causal factor. A combination of interventions may be more effective with appropriate patient selection, prophylactic management, pharmacological agents, and procedural techniques. However, more research is needed to ascertain the preventive effects of each of these intervention methods in preventing PEP. Further research should focus on meta-analyses to obtain the cohort effect and account for heterogeneity, inaccuracy, and risk of publication bias.¹⁴

CONCLUSION

Post-ERCP pancreatitis (PEP) is the most common complication in ERCP procedures and can be risky in patients with high risk factors. Due to its multifactorial pathophysiology, PEP prevention should be assessed in various aspects through evaluation of patient-related risk factors, pharmacological prophylactic agents, and procedural techniques.

Conflict of Interest

There is no conflict of interest in this study.

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