Abstract / Povzetek predavanja

ERCP complications

Srdjan Djuranović
Faculty of Medicine, University of Belgrade, Serbia
Correspondence: srdjan.djuranovic.bg@gmail.com
Slovenian Journal of Gastroenterology / Gastroenterolog 2025; supplement 1: 116–118

Key words: ERCP, pancreatitis, perforation, learning curve, prevention

Endoscopic retrograde cholangiopancreatography (ERCP) encounters relatively high percentage of procedure related adverse events (AE). Most ERCP complications occur within 5 to 7 hours after the procedure and early recognition and beginning of therapy is crucial in precise management of these patients.

Post ERCP pancreatitis (PEP) is the most common and the most feared AE of ERCP, which occurs in approximately 10% of cases. Although typically mild, PEP is associated with mortality approximately in 1 in 500 patients. According to European Society of Gastrointestinal Endoscopy (ESGE) guideline on ERCP-related adverse events (2020.), post-ERCP pancreatitis is defined as new or worsened abdominal pain combined with > 3 times the normal value of amylase or lipase at more than 24 hours after ERCP and requirement of admission or prolongation of a planned admission. It is important to know that, in terms of establishing the diagnosis of PEP, CT imaging is recommended only in cases with diagnostic doubt!

Several mechanisms of PEP pathogenesis have been proposed: a) mechanical injury due to the use of cannula/guide wire; b) fluid pressure from the ductal injections; c) chemical injury from contrast; d) possible contamination by the gut flora; e) thermal and electrical injury; f) neuronal injury and g) the role of genetic predisposition?

The risk factors for PEP are classified in two groups: patient related (personal history of recurrent acute pancreatitis and/or PEP, suspected sphincter of Oddi dysfunction, young age and female gender, non-dilated bile ducts, absence of chronic pancreatitis, normal serum bilirubin, end stage renal disease) and procedure related (difficult cannulation, pancreatic or pre-cut sphincterotomy, multiple pancreatic duct injections/guidewire passes, balloon dilation of an intact biliary sphincter, failure to clear bile duct stones). Highest potential risk for PEP is in cases when the patient is a young woman with suspected choledocholithiasis, non-dilated common bile duct, with normal serum bilirubin and performed biliary sphincterotomy with no stone found/cleared (PEP up to 25%).

Different PEP prophylaxis strategies include pharmacologic interventions treating local pancreatic inflammation, decompression of pancreatic duct, attenuation of proteolytic enzyme activation, inhibitors of pancreatic secretion/zymogen activation and treating microcirculatory disturbances of the pancreas. Among these, ESGE only recommends routine rectal administration of 100mg of diclofenac or indomethacin immediately before ERCP in all patients without contraindications to nonsteroidal anti-inflammatory drugs (NSAIDs) administration. Besides that, ESGE recommends aggressive hydration with lactated Ringer's solution (3mL/kg/hour

during ERCP; 20mL/kg bolus after ERCP; 3mL/kg/hour for 8 hours after ERCP) only in patients with contraindication to NSAIDs. At the same time, American Society for Gastrointestinal Endoscopy (ASGE) guideline on post-ERCP pancreatitis prevention strategies (2023.) recommend periprocedural rectal NSAIDs and aggressive periprocedural and postprocedural intravenous hydration in all patients. Measures focused on treating the possible papillary edema and PD obstruction recommended by both societies (ESGE and ASGE) are very similar and defined as "clear benefit for all patients": a) guidewire cannulation (minimizing the risk of hydrostatic injury to the pancreas); b) early precut in cases with difficult cannulation and c) pancreatic stent (5 Fr, 5 cm) placement in patients with high PEP risk. According to some reports, it seems that "early" precut and pancreatic stent placement reduces the incidence of PEP and hyperamylasemia when compared to "late" precut and pancreatic stent placement.

In summary, the best strategies for PEP prevention are as follows: 1) right indications for ERCP with therapeutic intent; 2) rectal diclofenac or indomethacin immediately before ERCP; 3) aggressive periprocedural and postprocedural intravenous hydration with lactated Ringer's solution; 4) guidewire cannulation (preferably with "early" precut if necessary) and 5) "early" placement of pancreatic duct stents in high-risk patients. Over all, ERCP should be performed only in specialized, high-volume centers.

Other ERCP-related AEs have been defined as follows: Cholangitis (new onset temperature > 38 °C for more than 24 hours combined with cholestasis); Bleeding (hematemesis and/or melena or hemoglobin drop >2g/dL); Perforation (evidence of gas or luminal contents outside of the gastrointestinal tract as determined by imaging); and Cholecystitis (right upper quadrant signs of inflammation, systemic signs of inflammation; imaging findings characteristic of acute cholecystitis, without any suggestive clinical or imaging findings prior to ERCP).

Patients are at high risk for post-ERCP cholangitis when there is incomplete biliary drainage (including hilar obstruction and primary sclerosing cholangitis) and when cholangioscopy is performed. Some authors also consider patients older than 60 and patients who previously had ERCP procedure. Antibiotic prophylaxis before ERCP is recommended only in cases of anticipated incomplete biliary drainage, for severely immunocompromised patients, and when performing cholangioscopy. Treatment of patients with post ERCP cholangitis and cholecystitis should be done according to disease specific guidelines.

ESGE suggests that patients should be considered to be at increased risk for post-sphincterotomy bleeding if at least one of the following factors is present: a) anticoagulant intake; b) platelet count <50000/mm3; c) cirrhosis; d) dialysis for end-stage renal disease; e) intraprocedural bleeding; and f) low endoscopist experience. Post ERCP bleeding is treated by local injection of epinephrine (1:10000), possibly combined with thermal or mechanical therapy when injection alone fails. Temporary placement of a biliary fully covered self-expandable metal stent is an option after the failure of standard hemostatic modalities.

Risk factors for ERCP-related perforation are sphincter of Oddi dysfunction (SOD), female gender, older age, intramural injection of contrast, prolonged duration of the procedure, precut sphincterotomy and the low experience of the endoscopist. Four types of ERCP-related perforation are described according to Stapfer *et al.*: type I: Duodenal wall perforation (by the endoscope); type II: Periampullary perforation (by sphincterotomy/precut); type III: Biliary or pancreatic duct perforation (by intraductal instrumentation) and type IV: Retroperitoneal gas alone. In cases of post ERCP perforations local treatment should be aimed to the closure of the perforation site and to diverting bile from perforation site (through the scope or over the scope clips, or plastic or fully covered self-expanding metal stent). Surgical management includes repair

of the defect, drainage and duodenal diversion. The decision should be made on individual basis to determine optimal endoscopy or surgical strategy.

References

1. Dumonceau JM, Kapral C, Aabakken L, *et al.* ERCP-related adverse events: European Society of Gastrointestinal Endoscopy (ESGE) Guideline. Endoscopy. 2020;52(2):127-149.
2. Cotton PB, Eisen GM, Aabakken L *et al.* A lexicon for endoscopic adverse events: report of an ASGE workshop. Gastrointest Endosc 2010; 71: 446–454.
3. Buxbaum JL, Freeman M, Amateau SK, *et al.* American Society for Gastrointestinal Endoscopy guideline on post-ERCP pancreatitis prevention strategies: summary and recommendations. Gastrointest Endosc. 2023;97(2):153-162.
4. Akshintala VS, Boparai IS, Barakat MT, *et al.* Post Endoscopic Retrograde Cholangiopancreatography Pancreatitis: Novel Mechanisms and Prevention by Drugs. United European Gastroenterol J. 2025;13(1):78-85.
5. Stapfer M, Selby RR, Stain SC *et al.* Management of duodenal perforation after endoscopic retrograde cholangiopancreatography and sphincterotomy. Ann Surg 2000; 232: 191–198.
6. R. Akashi, T. Kiyozumi, T. Tanaka, *et al.* Mechanism of Pancreatitis Caused by ERCP. Gastrointestinal Endoscopy 2002;55(1): 50–54.
7. Tanikawa T, Miyake K, Kawada M, *et al.* Can early precut reduce post-endoscopic retrograde cholangiopancreatography pancreatitis in patients with difficult bile duct cannulation? World J Gastrointest Endosc. 2024;16(9):519-525.
8. Wang S, Bai B, Huang Q, *et al.* Real-world evidence comparing early and late pancreatic stent placement to prevent post-ERCP pancreatitis. Endosc Int Open. 2024;12(10):E1162-E1170.
9. Wu CCH, Lim SJM, Khor CJL. Endoscopic retrograde cholangiopancreatography-related complications: risk stratification, prevention, and management. Clin Endosc. 2023;56(4):433-445.
10. Paspatis GA, Arvanitakis M, Dumonceau JM, *et al.* Diagnosis and management of iatrogenic endoscopic perforations: European Society of Gastrointestinal Endoscopy (ESGE) Position Statement - Update 2020. Endoscopy. 2020;52(9):792-810.