

## Management of Post ERCP Perforation

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### EXTRACT

One of the most fearful complications from ERCP is perforation. The incidence is varies from 0.08-0.57%<sup>(1,2)</sup>. Unlike other ERCP related complications such as pancreatitis, infection and bleeding, risk of perforation from ERCP can be predicted by risk from patient, technique and endoscopists themselves. The gold standard of treatment in the past is mainly surgery. Unfortunately, morbidity and mortality from this mode of treatment are unacceptably high. Many of those patients may be too risky from surgical intervention. Recently, non-surgical approach mainly endoscopic treatment has been proposed for management of post ERCP complication. Early diagnosis and prompt management is the only factor to prevent patient from high risk surgical procedure.

This article will describe mechanism and technique for non-surgical management of ERCP related perforation.

**Key words :** ERCP, perforation, management

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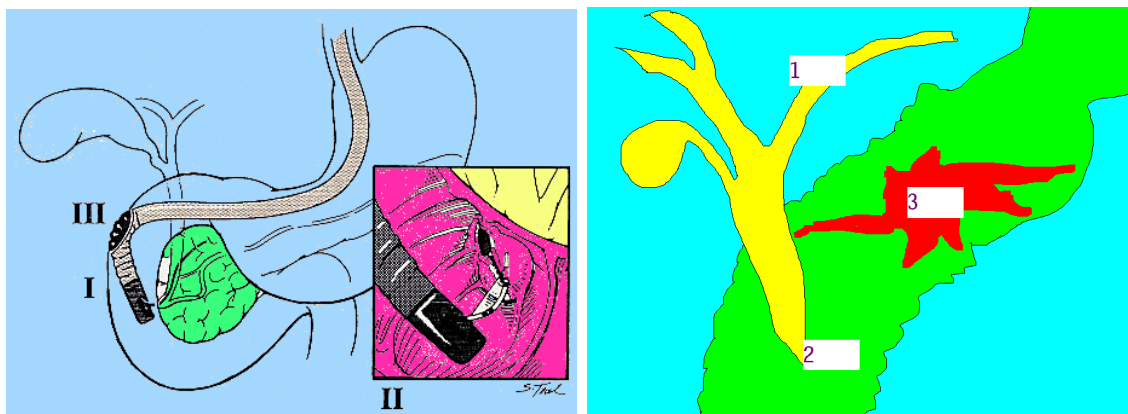
### CLASSIFICATION

There are 3 types of ERCP related perforation. They are classified according to mechanism and site of perforation. (Figure 1)

**1) Guidewire related perforation** The main site of this type of perforation is mainly bile duct which could be extra or intrahepatic ducts. Even gallbladder perforation may be the site. The size of perforation is usually very small and may be as tiny as a pinhole. Therefore, a lot of time, patient may be asymptomatic since there is a high rate of spontaneous closure of the perforation. The risk of this type of perforation may

increase with a very stiff guidewire and intermittent fluoroscopic monitoring during accessory devices exchange. The straight wire may cause more perforation than j-tip wire.

With the new rapid exchange system (Microvasive, Natick MA, USA) and fusion system (Wilson Cook, Winston-Salem, NJ, USA), the risk from this perforation may be even less since both systems require a monorail technique that preclude the risk of direct push from the device onto the guidewire. Lastly, difficult stenting by large caliber stent especially one with introducer will contain a higher risk of perforation than a small stent.



**Figure 1** Site of ERCP related perforation

- 1) guidewire perforation
- 2) Sphincterotomy perforation
- 3) Scope induced perforation

Clinical presentations of this type of perforation are mainly related to bile leakage such as biloma, bile peritonitis. Some patients may develop subcapsular hematoma of the liver. One of the rarest complications is hemobilia if that guidewire create bilio-vascular fistula.

**2) Periampullary or post sphincterotomy related complication** This is the most common type of post ERCP perforation. All endoscopists who performing ERCP need to know how to diagnose and manage this problem very well since early diagnosis and treatment is the only key factor that will bring the lowest rate of morbidity and mortality. Patient with poor ampullary land mark and periampullary diverticulum are at risk. Other factors are precut technique<sup>(3)</sup>, deep and long sphincterotomy. Practically, the endoscopist should be able to detect perforation right away if he or she sees an interposing fat from retroperitoneum while performing sphincterotomy. If perforation is not detected during the procedure, patient may present later with abdominal pain and distension. Frequently, bile peritonitis and biloma are the only findings. Laboratory investigations will reveal leukocytosis and elevation of amylase and lipase. The explanation for high serum amylase and lipase is retroperitoneal re-absorption of pancreatic secretion from second part of the duodenum<sup>(4)</sup>. Acute abdominal films may show free air but a lot of time this study may not be sensitive enough to detect the perforation. (Figure 2) CT scan of the abdomen is the gold standard for diagnosis of this perforation (Figure 3). It will reveal retroperitoneal free air. In addition, majority of patient will have

right perirenal air. If the diagnosis is delayed, fluid collection and sign of mesenteric inflammation can be seen.

**3) Scope induced perforation** (Figure 1) The location of perforation is usually at the duodenal apex in normal anatomy. Patients with altered surgical anatomy such as post Billroth II, post Whipple and post Reux-en-Y surgery are at risk<sup>(5)</sup>. Perforation site is mainly at the anastomotic area of the afferent limb. Frozen duodenum from tumor encasing the ampullary area such as pancreatic cancer will increase risk from this type of perforation. A therapeutic scope is less flexible and larger than a diagnostic duodenoscope, thereby the elbow of the scope may push against the weak point of the bowel while attempting the scope downward and cause perforation. In addition, elderly patients with malnourish condition with thin bowel wall are also at increased risk.

### Management of Post ERCP Perforation

Generally, guidewire related perforation is benign and majority of patients is asymptomatic. If there is no evidence of further leakage of bile or peritonitis, no additional treatment is required. For patients with significant bile leak, further treatment with biliary decompression and drainage of bile collection is usually mandatory. Vigorous fluid replacement plus broad spectrum antibiotics administration is also necessary.

Early diagnosis of post sphincterotomy perforation is very important (Figure 4) since prompt management with biliary decompression by stenting or nasobiliary tube placement will decrease the risk of

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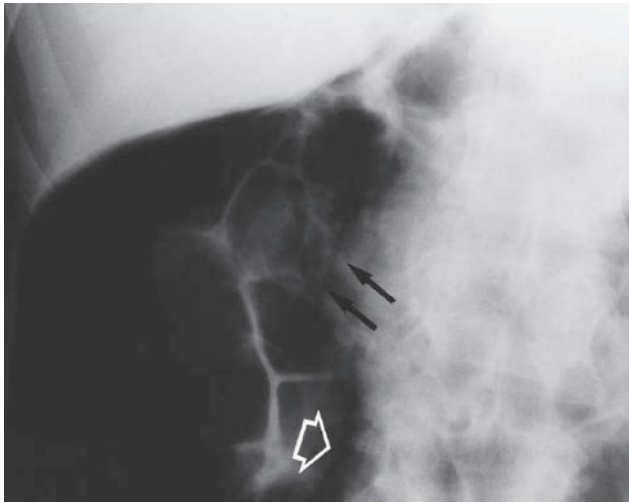


Figure 2 Free air by plain abdominal x-ray

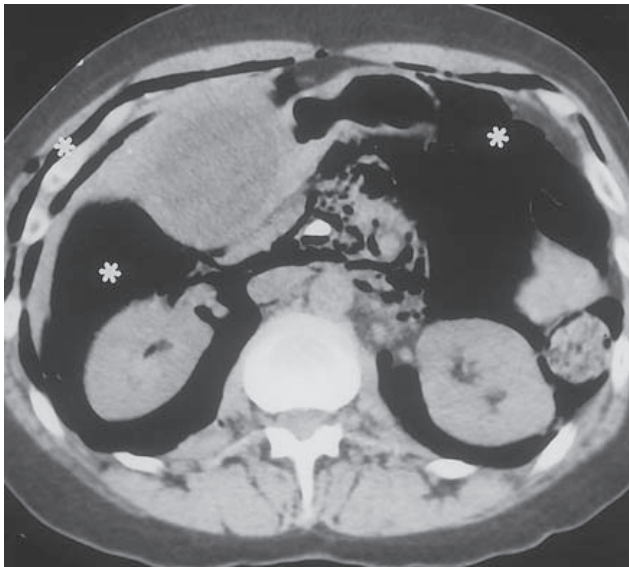


Figure 3 CT scan of the abdomen showed right perinephric and intraperitoneal air

undergoing for surgery<sup>(6-7)</sup>. In addition, duodenal decompression or at least gastric decompression is necessary especially in patient with biliary stent placement. If duodenal pressure is higher than biliary system, the chance of biliary stent to decompress and divert bile flow away from the perforation site will be decreased. Thus, whenever it is impossible to decompress the duodenum, nasobiliary tube placement is preferred. With this technique, the atmospheric pressure will allow bile to drain away from perforation site externally via nasobiliary tube. It has been noted that with non-surgical approach the chance of undergoing for surgery is very slim. Howard *et al.* reported from his series that only 10% of his patient needed to go for sur-

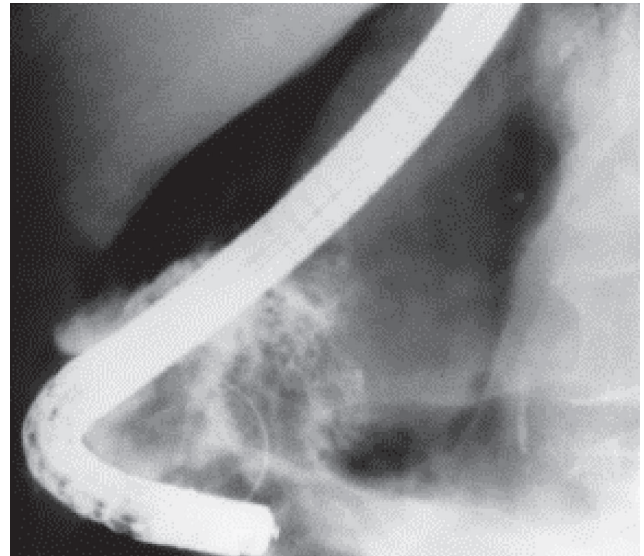


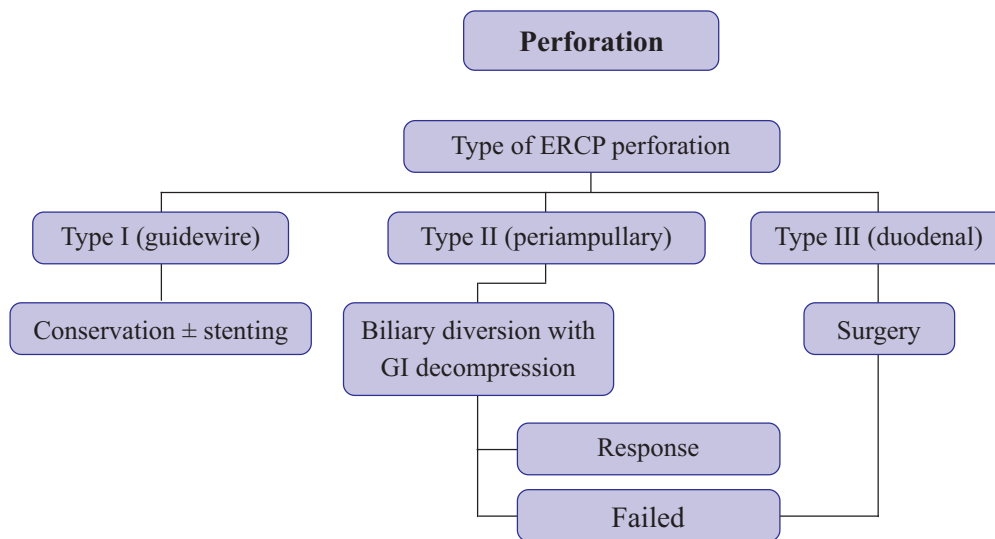
Figure 4 Extravasation of contrast outside bile duct lining during injection of contrast for cholangiogram

gery after failed the conservative treatment<sup>(7)</sup>. However, patient who is not improved after 72 hours of conservative treatment or deteriorates significantly, surgical approach is mandatory. Patient with suppurative collection from delayed diagnosis or failed endoscopic treatment may elect to undergo for surgery. If the patient is not a candidate for surgery due to poor general condition, percutaneous drainage may be a good alternative.

Unfortunately, all patients with scope related perforation have to go for surgical exploration and closure the hole because perforation size is usually large. Again a series from Indiana university confirmed that all patients with this perforation ultimately required operation<sup>(7)</sup>. New approach and becoming more interesting is endoscopic clip placement to close the gap<sup>(8)</sup>. Unlike other site of perforation that can be closed with an end view endoscope, the duodenoscope is required for almost all the cases. But mechanism of the duodenoscope is not as suited with the clipping device as end view scope, therefore the success rate may be lower.

### When Can We Resume ERCP?

It has been misunderstood for not to perform ERCP after the perforation. With recognition of a perforation, the procedure usually is aborted and further attempts at ERCP are thought to be precluded by the complication. A recent study published in Gastrointestinal Endoscopy last years showed that ERCP can be



**Algorithm 1** Management of ERCP related perforation

performed within 2 weeks after perforation<sup>(9)</sup>. From this study, duodenal perforation was recognized in 15 patients, therapeutic ERCP was repeated in all patients from 11 to 15 days after the perforation. Treatment was successfully completed in all patients without complication.

### SUMMARY

Post ERCP perforation is rare but it is important to understand the concept of perforation mechanism and treatment. Prompt diagnosis and treatment is the only way to avoid surgical intervention (Algorithm 1). Biliary decompression to divert bile flow is the mainstay of therapy. In situation of ileus, only biliary decompression by stenting may not be adequate. Thus duodenal decompression may be required. Generally, the outcome of non-surgical approach is excellent. Only a handful of patient would require surgery especially one who failed conservative treatment.

Unfortunately, the outcome of patient with scoped induced perforation is poor without having surgery. Therefore it is recommended that patients with this type of perforations always have to go for surgical intervention.

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