

CASE SERIES

# Pneumoretroperitoneum secondary to duodenal perforation after endoscopic retrograde cholangiopancreatography

Jaime Ruiz-Tovar, MD  
Eduardo Lobo, MD, PhD  
Alfonso Sanjuanbenito, MD  
Enrique Martínez-Molina, MD, PhD

From the Department of Surgery, University Hospital Ramón y Cajal, Madrid, Spain

**Correspondence to:**  
Dr. J. Ruiz-Tovar  
Department of Surgery  
University Hospital Ramon y Cajal  
Crta Colmenar Km 9,100  
28034 - Madrid (Spain)  
jruiztovar@gmail.com

**E**ndoscopic retrograde cholangiopancreatography (ERCP) is an invasive procedure performed to diagnose and treat pancreatic and biliary diseases. In about 5%–10% of patients it causes adverse events. Pancreatitis is the most common complication, but duodenal perforation, hemorrhage and cholangitis are less frequent.<sup>1</sup> Duodenal perforation is an infrequent complication of ERCP, usually associated with sphincterotomy. Clinical manifestations are similar to those that appear in pancreatitis (i.e., abdominal pain, fever and leukocytosis). Computed tomography (CT) is the best method for the diagnosis of duodenal perforation, detecting retroperitoneal air or liquid. Management of this complication must be initially conservative, but if the patient does not improve after a brief period, surgical intervention is mandatory. Duodenal perforation is associated with a high mortality rate, therefore early diagnosis is important. We present 4 cases of pneumoretroperitoneum after ERCP.

## CASE 1

A 24-year-old woman, who had undergone laparoscopic cholecystectomy 3 months previously, received a diagnosis of choledocholithiasis. We performed an ERCP with sphincterotomy, and 2 hours later the patient presented with intense, acute pain radiating throughout the abdomen. A CT scan revealed a little pneumoretroperitoneum with air dissecting hepatic hilum (Fig. 1). We opted for conservative management (bowel rest, nasogastric suction, hydration and antibiotics) because of the clinical stability of the patient. After 24 hours, a repeat CT scan did not reveal any change; we decided to continue with the same treatment. The patient recovered uneventfully.

## CASE 2

A 73-year-old man underwent an ERCP with sphincterotomy for extraction of an impacted stone in the choledochus. Six hours later he presented with intense abdominal pain, fever and low blood pressure. A CT scan revealed pneumoretroperitoneum. Because of the septic status, we performed an exploratory laparotomy and found a perforated diverticulum in the posterior side of the duodenum. We closed the perforation, placed a Kehr drain in the biliary tree and performed a jejunostomy.

Seven days later, the patient presented with sepsis. A CT scan showed a great retroperitoneal collection, and we performed surgery to drain this collection. New intra-abdominal collections developed and were percutaneously drained. Two months later, the patient was discharged with no sequelae.



**Fig. 1.** Pneumoretroperitoneum with air dissecting hepatic hilum.

**CASE 3**

A 64-year-old man with choledocholithiasis underwent an ERCP with sphincterotomy to remove all the choledochal stones. Four hours later the patient presented with intense abdominal pain. A CT scan revealed pneumoretroperitoneum. We began conservative management with 1 g of ertapenem per day, administered intravenously. The patient had an uneventful recovery.

**CASE 4**

A 55-year-old woman underwent a therapeutic ERCP to extract impacted stones in the choledochal duct. Twelve hours later the patient reported generalized abdominal pain. A CT scan revealed mild pneumoretroperitoneum. We obtained a new CT scan 48 hours later, discarding fluid abdominal collections. Conservative management was instated. The patient recovered uneventfully and was discharged after 7 days of antibiotic therapy.

**DISCUSSION**

Applications of therapeutic ERCP include sphincterotomy, removal of common bile duct stones, lithotripsy, biliary drainage and stricture dilation. It is a technique with few contraindications, except severe cardiopulmonary disease and acute nonlithiasic pancreatitis.<sup>1</sup>

Endoscopic retrograde cholangiopancreatography is an endoscopist-dependent technique; the procedure becomes more effective and has lower associated complication rates with increased experience. The most recent studies, conducted nearly 10 years ago, reported complication rates around 1% in diagnostic procedures and 5% in therapeutic procedures, revealing increasing experience in the performance of ERCP.<sup>2</sup> Pancreatitis is the most frequent complication, appearing in up to 5% of diagnostic procedures and 10% of therapeutic ones. Duodenal perforation appears in 0.5%–2% of patients.<sup>3</sup> It usually occurs as a result of a sphincterotomy that extends beyond the intramural portion of the bile duct. Risk factors include deep incision outside the papilla, guide-wire perforation, nondilated ducts, Oddi sphincter disease, presence of peripapillar diverticula, patients with previous Billroth II surgery and long duration of surgery.<sup>4</sup> Clinical symptoms are similar to those of pancreatitis, including abdominal pain a few hours after the probe, fever, leukocytosis and elevation of amylase serum levels. Retroduodenal perforation is determined by the radiologic evidence of air or contrast in the retroperitoneal space, therefore CT is the most sensitive test.<sup>5</sup> The amount of air does not correlate with the severity of the complication or with the necessity of surgical treatment, because this only reflects the degree of manipulation after the perforation occurred. Up to 29% of asymptomatic patients can have retroperitoneal air revealed on a CT scan

performed 24 hours after ERCP, presumably related to air insufflation during endoscopy, suggesting that presence of retroperitoneal air in the absence of symptoms is not indicative of perforation; in such cases only observation is required.<sup>6</sup>

The management of perforation should be initially conservative and should include bowel rest, nasogastric suction, hydration and antibiotics. These patients must be carefully observed, because 20%–40% may require posterior surgical treatment. Surgery should be recommended for patients with persistent biliary obstruction, cholangitis, a septic status and those whose symptoms do not improve after a brief period of nonoperative management. The type of surgery depends on the clinicopathological condition, including repair of the perforation, drainage of the abscess or phlegmon, choledochojejunostomy and even pancreatoduodenectomy.<sup>7</sup>

A new CT scan is recommended after 48 hours to confirm that the leak is sealed and that there are no fluid collections. Repeat CT scans are suggested to monitor the patient until clinical recovery.<sup>5</sup>

The prognosis depends on early recognition and treatment of the perforation and the patient's comorbidities. Overall mortality is around 7%–16%, although in more recent series a decrease in mortality has been described, reflecting the benefits of conservative approach. In cases where medical treatment fails, there is a high mortality rate of 50% due to sepsis.<sup>7</sup>

**Competing interests:** None declared.

**Contributors:** Dr. Lobo designed the study. Dr. Ruiz-Tovar acquired the data, which Drs. Sanjuanbenito and Martínez-Molina analyzed. Dr. Ruiz-Tovar wrote the study, which Drs. Lobo, Sanjuanbenito and Martínez-Molina reviewed. All authors approved final publication.

**References**

1. Pannu HK, Fishman EK. Complications of endoscopic retrograde cholangiopancreatography: spectrum of abnormalities demonstrated with CT. *Radiographics* 2001;21:1441-53.
2. Loperfido S, Angelini G, Benedetti G, et al. Major early complications from diagnostic and therapeutic ERCP: a prospective multicenter study. *Gastrointest Endosc* 1998;48:1-10.
3. Vandervoort J, Soetikno RM, Tham TC, et al. Risk factors for complications after performance of ERCP. *Gastrointest Endosc* 2002;56:652-6.
4. Aliperti G. Complications related to diagnostic and therapeutic endoscopic retrograde cholangiopancreatography. *Gastrointest Endosc Clin N Am* 1996;6:379-407.
5. Petersen S, Henke G, Freitag M, et al. Management of hemorrhage and perforation following endoscopic sphincterotomy. *Zentralbl Chir* 2001;126:805-9.
6. Genzlinger JL, MacPhee MS, Fisher JK, et al. Significance of retroperitoneal air after endoscopic retrograde sphincterotomy. *Am J Gastroenterol* 1999;94:1267-70.
7. Stapfer M, Selby RR, Stain SC, et al. Management of duodenal perforation after endoscopic retrograde cholangiopancreatography and sphincterotomy. *Ann Surg* 2000;232:191-8.