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A Case Report of Non-Surgical Duodenal Perforation Following ERCP

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Abstract
Post-ERCP duodenal perforations occur in only 0.1 to 0.6% of ERCP cases. Whether these occurrences are managed with or without surgery depends on several factors. We report the case of a woman who had a post-ERCP duodenal perforation that was conservatively managed with a fully covered self-expanding metal stent (FCSEMS) and antibiotics who did not require surgical management.

Keywords
ERCP (endoscopic retrograde cholangiopancreatography), duodenal perforation, biliary stent.

INTRODUCTION

The principal complications of ERCP are acute pancreatitis (3.5%), bleeding (1.3%), perforations (0.01% -2.1%) and cholangitis (<1%). (1, 2, 3). The risk of mortality from perforations ranges from 0.1% to 1%, (4, 5) but when diagnosis is delayed, the range increases to 8% to 23%. (5, 6) Treatment depends on several factors and may be medical including antibiotics, intravenous analgesia and non-oral feeding, or it can be surgical. We present the case of a patient with a duodenal perforation following ERCP type II. It was managed with a biliary stent and medical treatment, and the patient responded adequately.

CLINICAL CASE

The patient was a 54-year-old woman who had been diagnosed with recurrent choledocholithiasis. Diagnosis had been confirmed by nuclear magnetic resonance cholangiography which found a 14-millimeter calculus in the proximal bile duct (Figure 1). We performed ERCP, extensive papillotomy and extraction of the calculus with a Dormia basket. Trapping the calculus in the basket was a complex procedure due to the impaction of the calculus in the intrapapillary common bile duct. The final radiograph showed free air below the diaphragm (Figure 2). For this reason, contrast medium was irrigated into the papillary area, but

no extravasation was observed. Duodenal perforation was diagnosed, so we decided to insert a fully coated 80 x 10 mm self-expanding metal stent (SEMS) (Figures 3 and 4). Initiation of intravenous fluids was initiated and all oral ingestion suspended. Patient was given 3 g ampicillin/sulbactam intravenously every 6 hours for eight days and also received intravenous analgesia.

Figure 1. Magnetic resonance cholangiography. Calculus of 14 millimeters in the proximal bile duct (arrow).

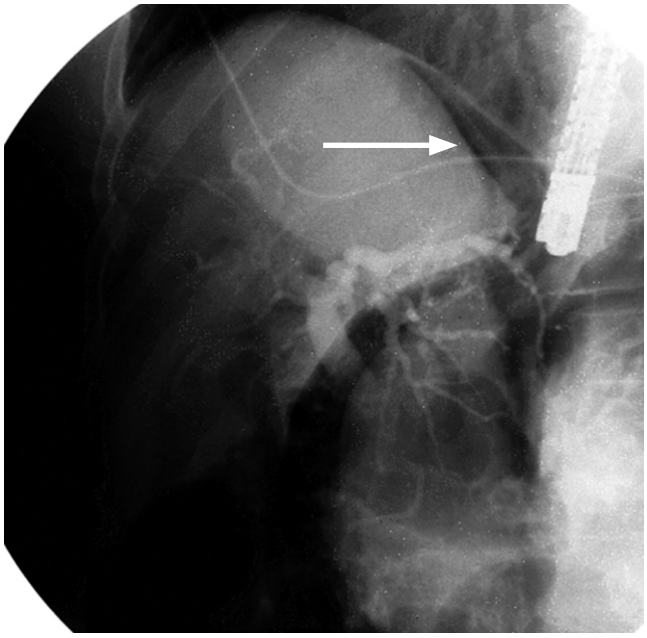

Figure 2. Free air below diaphragm (arrow) after extraction of the calculus.

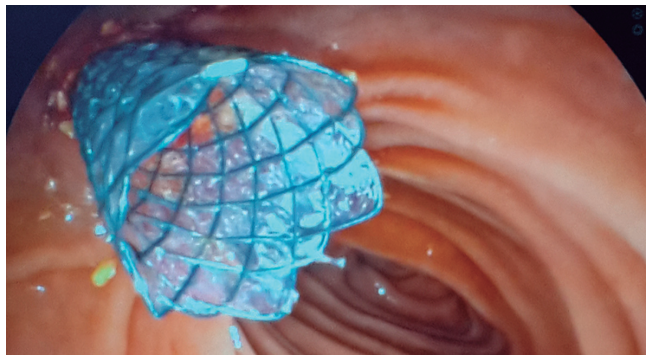

Figure 3. Endoscopic image of the biliary stent.

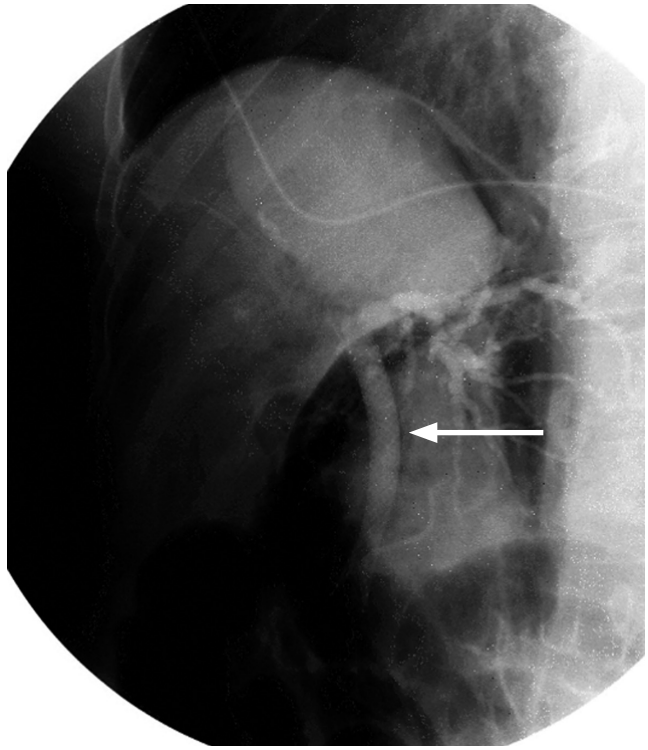

Figure 4. Radiological image of the biliary stent (arrow).

A CT scan of the abdomen showed the biliary stent with free air to the right of the liver, kidney and duodenum, but without extravasation of the contrast medium (Figures 5 and 6). The patient was assessed by the general surgery service, and it was decided to follow the established method of management. In the immediate postoperative period, the patient manifested mild upper abdominal pain with no signs of peritoneal irritation and no clinical signs of systemic inflammatory response. During the first four days, the patient had leukocytosis and neutrophilia, but these were normalized by the fifth day (Table 1). On the third day, total parenteral nutrition was initiated. It was suspended on the seventh day because of oral tolerance. The patient was

discharged on the eighth day and the SEMS was withdrawn at 12 weeks without complications.

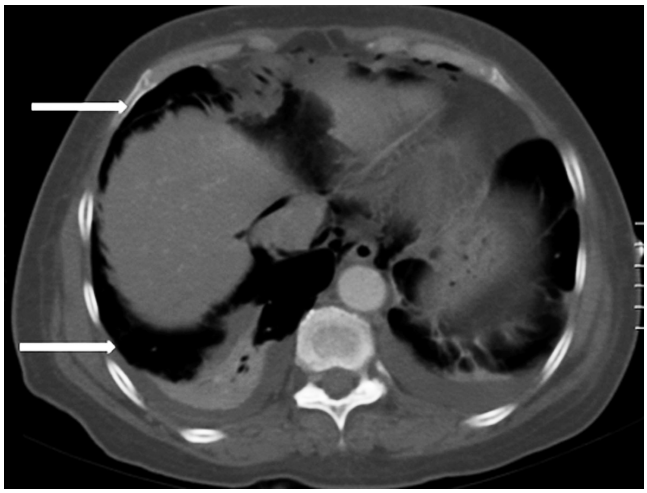

Figure 5. CT scan in which free air is observed in the perihepatic area (arrows).

Figure 6. CT scan showing free air to the right of the kidney (arrowhead) and the metallic stent (arrow).

DISCUSSION

In 1999, Howard introduced one of the first classifications of perforations following ERCP. (7) Currently, Stapfer's classification is used most frequently. (8) It is based on the mechanism and anatomical location of the perforation and directs treatment towards surgery or non-surgical management.

- Type I: Duodenal perforation in the lateral or medial wall caused by the duodenoscope. This type is usually large, occurs far from the ampulla of Vater, and requires surgical treatment.
- Type II: Periampullary perforation caused by sphincterotomy. This type is usually small, leakage of contrast medium is minimal or zero, there are no collections of liquids, and surgery is less frequently required. The diagnosis can be confirmed by CT scan or X-ray of the upper digestive tract.
- Type III: Perforation of the bile duct caused by the guidewire or instrumentation with a Dormia basket. These are generally are small lesions that do not produce collections and can be observed rather than treated.
- Type IV: Perforations due to sustained air compression. These are micro-perforations caused by the presence of retroperitoneal air and do not require surgical treatment.

Table 1. Evolution of white blood cell count

Days after ERCP	Leukocytes/μL and neutrophils
1	Leukocytes: 12,270: neutrophils: 82%
2	Leukocytes: 14,900: neutrophils: 80%
3	Leukocytes: 15 100: neutrophils: 81%
4	Leucocytes: 10,500: neutrophils: 79%
5	Leukocytes: 8,820: neutrophils: 65%

Other mechanisms that have been implicated in perforations include excessive advancement of the guidewire which has perforated the liver, use of extractor balloons or dilators, and stent migration. (9) Patient-related risk factors include a history of Billroth II gastrectomy while factors related to technique include the degree of experience of the endoscopist, and difficultly of cannulation, precut and sphincterotomy. (5, 10)

The diagnosis of a perforation can be done during ERCP. If it is done later, the prognosis may be worse. During the procedure, a great deal of attention must be paid to factors that raise suspicions of perforation. It is important to carefully examine the papilla and the duodenal wall. Retroperitoneal perforation can cause subcutaneous emphysema. Alterations in of the renal shade and irregular radiopaque areas seen in fluoroscopy are other indications. A CT scan can confirm the presence of pneumoperitoneum or collections. (11).

There is consensus regarding the treatment of Type III and IV perforations, especially when they are caused by the guidewire. It is considered that they tend to close early and do not need stent placement, but do require clinical and radiological follow-up (10).

Some authors recommend early surgical treatment of Type II perforations, (12) but several recent studies suggest conservative treatment even in cases of retroperitoneal perforations. This consists of the placement of nasal-biliary drainage or a biliary stent, suspension of oral feeding and liquids,

administration of broad spectrum antibiotics, parenteral nutrition and strict clinical observation for 48 hours with CT scans to evaluate the appearance of collections. (10, 11, 13)

In a manner similar to post-ERCP pancreatitis, Type I perforations can manifest as abdominal pain and vomiting. Some groups advocate surgical treatment with placement of a T-tube in the common bile duct, duodenostomy, duodenal diverticulization or pyloric exclusion. (9, 15) Other authors, including the Guidelines of the European Society of Gastrointestinal Endoscopy (ESGE), recommend evaluating the mechanism, extent of injury, and time elapsed at the time of diagnosis to define whether conservative treatment, including the use of clips, or surgical management is indicated. (7, 14, 16)

A study of 372 patients by Peñaloza et al. performed at the Hospital San José in Bogotá, Colombia found a post-ERCP incidence of perforations of 1.3%. (17) A series of four post-ERCP perforations by Gómez et al. at Hospital El Tunal in Bogotá reported successful medical management with hemoclips and band ligation in two of the patients. (18)

In our case, the Type II perforation was not caused directly by a papillotomy since post-papillotomy radiological images do not show free air, rather it occurred during the difficult extraction of the impacted calculus in the intra-papillary common bile duct. During forced pulling of the basket, a tear occurred which increased the length of the papillotomy and caused perforation. This was confirmed by the presence of free air below the diaphragm in the post-extraction image of the calculus. Because this was diagnosed during the endoscopic procedure, and since there was no leakage of the irrigated medium onto the papilla, management with the completely covered SEMS had the dual purpose of avoiding extravasation of bile into the retroperitoneum and of sealing the perforation upon expansion of the stent.

CONCLUSIONS

Conservative management with biliary stents is possible in some cases of Type II duodenal perforations following ERCP. Several factors must be taken into account. They include early, preferably immediate, diagnosis, lesion size and availability of the necessary elements to resolve the complication. In addition, stenting should always be performed with close clinical follow-up in conjunction with a surgeon.

Declaration of Conflicts of Interest

The authors declare that they have no conflicts of interest.

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REFERENCES

1. Anderson M, Fisher L, Jain R, et al. Complications of ERCP. ASGE Guidelines. Gastrointest Endosc. 2012:75:467-73. Doi: https://doi.org/10.1016/j.gie.2011.07.010
2. Cotton PB, Garrow DA, Gallagher J, et al. Risk factors for complications after ERCP: a multivariate analysis of 11,497 procedures over 12 years. Gastrointest Endosc. 2009;70:80-8. Doi: https://doi.org/10.1016/j.gie.2008.10.039
3. Tavusbay C, Alper E, Gökova M, et al. Management of perforation after endoscopic retrograde cholangiopancreatography. Ulus Travma Acil Cerrahi Derg. 2016;22(5):441-8. Doi: https://doi.org/10.5505/tjtes.2016.42247
4. Christensen M, Matzen P, Schulze S, et al. Complications of ERCP: a prospective study. Gastrointest Endosc. 2004;60(5):721-31. Doi: https://doi.org/10.1016/S0016-5107(04)02169-8
5. O'Neil N. Management of duodenal perforation post-endoscopic retrograde cholangiopancreatography. When and whom to operate and what factors determine the outcome? A review article. Journal of the Pancreas. 2011;13(1):18-25.
6. Krishna RP, Singh RK, Behari A, et al. Post endoscopic retrograde cholangiopancreaticography perforation managed by surgery or percutaneous drainage. Surg Today. 2011;41:660-6. Doi: https://doi.org/10.1007/s00595-009-4331-z
7. Howard TJ, Tan T, Lehman GA, et al. Classification and management of perforations complicating endoscopic sphincterotomy. Surgery. 1999;126:658-65. Doi: https://doi.org/10.1016/S0039-6060(99)70119-4
8. Stapfer M, Selby RR, Stain SC, et al. Management of duodenal perforation after endoscopic retrograde cholangiopancreatography and sphincterotomy. Ann Surg. 2000;232:191-8. Doi: https://doi.org/10.1097/00000658-200008000-00007
9. Kumbhari V, Sinha A, Reddy A, et al. An Algorithm for the management of ERCP-related perforations. Gastrointest Endosc. 2016;83:934-43. Doi: https://doi.org/10.1016/j.gie.2015.09.039
10. Wu H, Dixon E, May G, et al. Management of perforation after endoscopic retrograde cholangiopancreatography (ERCP): a population-based review. HPB. 2006;8:393-9. Doi: https://doi.org/10.1080/13651820600700617
11. Li G, Chen Y, Zhou X, el al. Early Management experience of perforation after ERCP. Clinical Study Gastroenterology Research and Practice. 2012;657418:1-6. Doi: https://doi.org/10.1155/2012/657418
12. Booth FV, Doerr RJ, Khalafi RS, et al. Surgical management of complications of endoscopic sphincterotomy with precut papillotomy. Am J Surg. 1990;159:132-5. Doi: https://doi.org/10.1016/S0002-9610(05)80618-X
13. Ozgonul A, Cece H, Sogut O, et al. Pneumoperitoneum, pneumoretroperitoneum and bilateral pneumothorax caused by ERCP. Journal of the Pakistan Medical Association. 2010;60:60-1.
14. Harvey JP. Pneumopericardium, pneumomediastinum, pneumoretroperitoneum and surgical emphysema secon-

dary to a duodenal perforation postendoscopic retrograde cholangiopancreatography. BMJ Case Rep. 2015. Doi: https://doi.org/10.1136/bcr-2015-209920
15. Turner R, Steffen C, Boyd P. Endoscopic duodenal perforation: surgical strategies in a regional center. World Journal of Emergency Surgery. 2014;9:11. Doi: https://doi.org/10.1186/1749-7922-9-11
16. Paspatis GA, Dumonceau JM, Barthet M, et al Diagnosis and management of iatrogenic endoscopic perforations: European Society of Gastrointestinal Endoscopy (ESGE) Positions Statement. Endoscopy. 2014;46(8):693-711. Doi: https://doi.org/10.1055/s-0034-1377531
17. Peñaloza-Ramírez A, Leal-Buitrago C, Rodríguez-Hernández A. Adverse events of ERCP at San José Hospital of Bogotá (Colombia). Rev Esp Enferm Dig. 2009;101:837-49.
18. Gómez MA, Viveros DA. Perforaciones en la CPRE: una complicación para tener en cuenta. Rev Col Gastroenterol. 2014;29:174-8.