

Secondary iatrogenic duodenum perforation: a rare complication

Alperen Özdoğan¹, Oğuzhan Fatih Ay¹, İsmayil Yılmaz¹

Department of General Surgery, University of Health Sciences Turkey, Bursa Yüksek İhtisas Training and Research Hospital, Bursa, Turkey

ABSTRACT

The incidence of perforations resulting from Endoscopic Retrograde Cholangiography (ERCP) is observed to be less than 1%. In this case report, we aim to present our unique experience as a mechanism, which is even more uncommon. A 68-year-old male with an ASA score of 2 was prediagnosed with a distal common bile duct tumor. ERCP was performed for therapeutic and diagnostic purposes and a 9-F 10 cm plastic stent was placed to relieve obstruction. The patient, who had the sudden onset of abdominal pain within the initial 24-hour period following the procedure, underwent surgical intervention subsequent to a computed tomography assessment. In the third portion of the duodenum, an approximately 4 mm perforation originating from the stent was observed during the examination. It was repaired with a 3.0 prolene suture, followed by omentopexy. He was discharged uneventfully on the eighth day. Although duodenal perforation due to the placement of a plastic biliary stent with ERCP is a very uncommon complication, the patient's clinical and imaging findings are essential for treatment planning.

Keywords: Endoscopic retrograde cholangiography, biliary stent, duodenum, perforation, complication

Since 1968, Endoscopic Retrograde Cholangiopancreatography (ERCP) has been widely adopted in the diagnosis and treatment of pancreatic and biliary tract pathologies [1, 2]. ERCP is performed for a variety of reasons, including suspected biliary obstruction, pancreatic duct and biliary tract diseases, imaging studies revealing a pancreatic mass, idiopathic pancreatitis, benign or malignant stenosis, fistula, and postoperative biliary fistula [3].

While ERCP is generally considered a safe procedure, it is not devoid of potential complications. The most frequently observed post-procedural complications include bleeding and pancreatitis. However, the occurrence of perforations, although less common at a rate of less than 1%, is a significant concern. The

majority of these perforations are attributed to therapeutic interventions such as sphincterotomy, dilatation of strictures, or complications related to stenting [4, 5].

In this case report, we will assess our management of duodenal perforation secondary to stent, which is an extremely uncommon complication of ERCP.

CASE PRESENTATION

A 68-year-old male with an ASA score of 2, a body mass index of 25.42, and the Eastern Cooperative Oncology Group score of 1 was prediagnosed with mechanical icterus and a distal common bile duct tumor. He was admitted after granting permission for addi-

Corresponding author: Alperen Özdoğan, MD.,
Phone: +90 224 295 50 00, E-mail: alperenozdogan@gmail.com

How to cite this article: Özdoğan A, Ay OF, Yılmaz İ. Secondary iatrogenic duodenum perforation: a rare complication. Eur Res J. 2024;10(2):241-244. doi: 10.18621/eurj.1356093



This is an open access article distributed under the terms of [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/)

Received: September 6, 2023
Accepted: November 11, 2023
Published Online: December 31, 2023

Copyright © 2023 by [Prusa Medical Publishing](http://dergipark.org.tr/eurj)
Available at <http://dergipark.org.tr/eurj>



tional examination and treatment, as well as data sharing for academic purposes.

ERCP was performed for therapeutic and diagnostic purposes on the distal stenosis, and a 9-F 10 cm plastic stent was placed to relieve obstruction. There were no complications during the procedure. 24 hours after the procedure, the patient's vital signs were as follows: blood pressure 100/70 mm Hg, heart rate 128 bpm, body temperature 36.1 °C, blood oxygen level 92, and respiratory rate 16 breaths per minute. The physical examination revealed defense in all four quadrants and rebound in the bilateral lower quadrants. White blood cell count was 19.74 10⁹/L, hemoglobin level was 9.6 g/mL, alanine aminotransferase level was 122 U/L, aspartate aminotransferase level was 164 U/L, and total bilirubin level was 3.68 g/mL. The remaining laboratory parameters were all normal. Intra-abdominal lower quadrants exhibited a hyperdense appearance and free fluid densities thought to be due to the contrast agent on abdominal computed tomography with oral and intravenous contrast. When contrast material extralumination (Figs. 1 and 2) was observed, the decision to perform surgery was made.

In the third portion of the duodenum, an approximately 4 mm perforation originating from the stent was observed during the examination. It was repaired with a 3.0 prolene suture, followed by omentopexy. (Fig. 3) After surgery, the patient was transferred to the intensive care unit as an extubated patient, and on the first postoperative day, respiratory complications were treated medically. (Clavien-Dindo type 2). On the second day following the surgical procedure, a percutaneous biliary drainage catheter was utilized in order to establish biliary drainage for the patient. This inter-

vention became necessary due to the occurrence of perforation caused by the stent, which eventually led to its removal. Patient monitored with nasogastric tube in the early postoperative period, whose oral intake was resumed on the fifth postoperative day, was discharged without incident on the eighth day.

DISCUSSION

The prevalence of duodenal perforation caused by ERCP ranges from 0.09 to 1.67 percent. [5-7] If it is observed during the procedure, it may be preferred to close it with a clip; however, the patient's clinic may prefer surgical intervention after the procedure [5, 8]. In our patient, the perforation developed after the procedure, and based on the patient's physical examination and vital signs, surgical intervention was preferred.

Perforations caused by ERCP are classified as type 1 lateral or medial duodenal wall perforation, type 2 injury around the ampulla vateri, type 3 distal bile duct injury, and type 4 only free air.[4, 9] Type 1 perforations are typically treated surgically, whereas types 3 and 4 are typically managed conservatively. There is no agreement regarding type 2 perforations [10, 11]. We think that our patient had type 1 perforation, but it was caused by stent migration rather than endoscope manipulations.

Migration is observed in 6% of ERCP stent applications, the duodenum is most commonly affected, and perforation is observed in less than 1% of cases [5, 12]. Ida Bagus [5] surgically managed the late-term 5 mm perforation of a patient who had a plastic stent

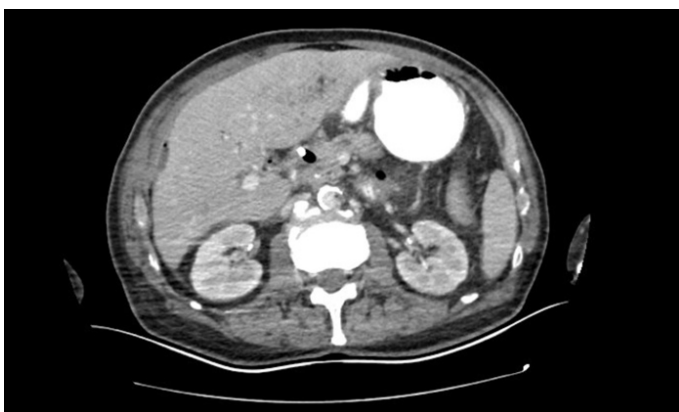


Fig. 1. Preduodenal free air densities.



Fig. 2. Contrast material extralumination.

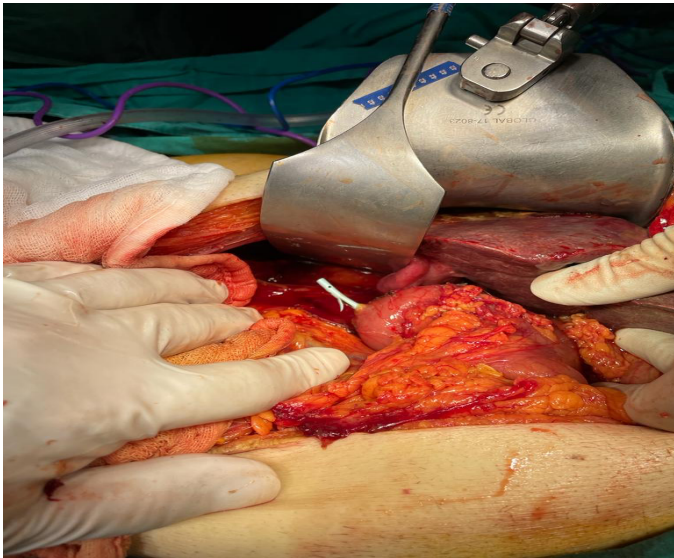


Fig. 3. View of perforated duodenum caused by stent.

placed with ERCP due to malignant biliary obstruction, similar to our experience in the literature. His surgery included primary duodenal closure, cholecystoenteric bypass, pyloric exclusion, gastroenterostomy, and braun anastomosis [5]. We suppose that the difference with our surgical approach is due to the fact that their patients were operated at a later period and we applied the principle of damage control surgery based on the hemodynamic status of our patient.

Benign biliary stenosis, long stent and proximal biliary stricture are considered as risk factors for ERCP stent migration [13, 14]. For stent migration risk factor analysis in Yuan et al.'s case series [12], etiology, stricture location, stent diameter, stent length, how far the stent length extends beyond the proximal end of the biliary stenosis, how far the stent is from the papilla, the distal end of the stent, and the body end of the stent were considered. The angle with respect to the center was measured. As risk factors for stent migration into the duodenum, benign biliary stenosis and placement of the stent with a length >2 cm from the proximal end of the biliary stenosis were evaluated [12]. For the distal common bile duct stenosis in our case report, a plastic stent with a diameter of 3.3 mm, a length of 9 cm, a length of >2 cm outside the papilla, and an angle of >30° was used. Contrary to published data, perforation has developed in malignant stenosis, and as emphasized by Yuan et al. [12], the stent is >2 cm above the stenosis' proximal end.

For successful outcomes in duodenal perforations caused by ERCP, a prompt diagnosis and effective treatment are crucial [5]. In our case, the diagnosis was made within 12 hours, and the patient was successfully discharged.

CONCLUSION

In conclusion, duodenal perforation caused by ERCP is a rare but potentially serious complication. The management of such perforations depends on several factors, including the type of perforation and the patient's clinical condition. Stent migration is a known risk factor for duodenal perforation, occurring in about 6% of ERCP stent applications, although perforation is relatively rare in these cases. Risk factors for stent migration include benign biliary stenosis, long stent length, and proximal biliary strictures. Prompt diagnosis and effective treatment are essential for successful outcomes in duodenal perforations caused by ERCP. In the case discussed here, the diagnosis was made within 12 hours, and surgical intervention was successfully performed based on the patient's condition. It is important for healthcare providers to be vigilant and consider risk factors when performing ERCP procedures, taking appropriate measures to minimize the risk of complications such as stent migration and duodenal perforation.

Informed Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying pictures or data.

Authors' Contribution

Study Conception: OFA; Study Design: AÖ; Supervision: İY; Funding: N/A; Materials: AÖ; Data Collection and/or Processing: AÖ; Statistical Analysis and/or Data Interpretation: OFA; Literature Review: OFA; Manuscript Preparation: AÖ and Critical Review: İY.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

Financing

The authors disclosed that they did not receive any grant during conduction or writing of this study.

REFERENCES

1. Alghsoon SA, Shaban KS, Khan AH, et al. A comparison of radiation exposure during endoscopic retrograde cholangiopancreatography (ERCP) by different fluoroscope techniques. *Innov Surg Interv Med.* 2020;1(1):9-14. doi: 10.36401/ISIM-20-02.
2. Mallery JS, Baron TH, Dominitz JA, et al. Complications of ERCP. *Gastrointest Endosc.* 2003;57(6):633-638. doi: 10.1053/ge.2003.v57.amge030576633.
3. Solomon S, Baillie J. 7 - Indications for and contraindications to ERCP. In: Baron TH, Kozarek RA, Carr-Locke DL, eds., *ERCP*. 3rd ed., Philadelphia: Elsevier; 2019: pp. 54-58.e51.
4. Talukdar R. Complications of ERCP. *Best Pract Res Clin Gastroenterol.* 2016;30(5):793-805. doi: 10.1016/j.bpg.2016.10.007.
5. Ida Bagus B. A rare clinical presentation of third part duodenal perforation due to post-endoscopic retrograde cholangiopancreatography stent migration on advanced stage peri-ampullary tumor. *JGH Open.* 2021;5(8):968-970. doi: 10.1002/jgh3.12608.
6. Mousa HM, Hefny AF, Abu-Zidan FM. Life-threatening duodenal perforation complicating endoscopic retrograde cholangiopancreatography: a case series. *Int J Surg Case Rep.* 2020;66:404-407. doi: 10.1016/j.ijscr.2020.01.001.
7. Langerth A, Isaksson B, Karlson BM, Urdzik J, Linder S. ERCP-related perforations: a population-based study of incidence, mortality, and risk factors. *Surg Endosc.* 2020;34(5):1939-1947. doi: 10.1007/s00464-019-06966-w.
8. Fujii Y, Matsumoto K, Miyamoto K, et al. Endoscopic treatment for duodenal perforation due to biliary stent dislocation: a case report and brief review of the literature. *Medicine (Baltimore).* 2022;101(48):e31868. doi: 10.1097/MD.00000000000031868.
9. Prachayakul V, Aswakul P. Endoscopic retrograde cholangiopancreatography-related perforation: Management and prevention. *World J Clin Cases.* 2014;2(10):522-527. doi: 10.12998/wjcc.v2.i10.522.
10. Bozbiyik O, Cetin B, Gumus T, Tekin F, Uguz A. Fully covered self-expandable metal stent for intraprocedural or late-diagnosed Type-II endoscopic retrograde cholangiopancreatography-related perforations. *BMC Gastroenterol.* 2022;22(1):385. doi: 10.1186/s12876-022-02466-9.
11. Kumbhari V, Sinha A, Reddy A, et al. Algorithm for the management of ERCP-related perforations. *Gastrointest Endosc.* 2016;83(5):934-943. doi: 10.1016/j.gie.2015.09.039.
12. Yuan XL, Ye LS, Liu Q, et al. Risk factors for distal migration of biliary plastic stents and related duodenal injury. *Surg Endosc.* 2020;34(4):1722-1728. doi: 10.1007/s00464-019-06957-x.
13. Johanson JF, Schmalz MJ, Geenen JE. Incidence and risk factors for biliary and pancreatic stent migration. *Gastrointest Endosc.* 1992;38(3):341-346. doi: 10.1016/s0016-5107(92)70429-5.
14. Arhan M, Odemiş B, Parlak E, Ertuğrul I, Başar O. Migration of biliary plastic stents: experience of a tertiary center. *Surg Endosc.* 2009;23(4):769-775. doi: 10.1007/s00464-008-0067-x.