



## Case report

## Endoscopic retrieval of a migrated pancreatic stent stuck at both ends: A case report

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## ABSTRACT

**Background:** Endoscopic pancreatic stenting is an effective way to relieve the stricture of the pancreatic duct. However, proximal stent migration presents a threat to the patient and a challenge to the doctor. The limited space in the pancreatic duct often prevents the operation of suitable devices for stent removal.**Case presentation:** A 34-year-old man with painful chronic pancreatitis received endoscopic retrograde cholangiopancreatography (ERCP) and insertion of a pancreatic plastic stent, with 8.5 Fr in diameter and 12 cm in length. A year later, radiography revealed that the proximal end of the stent rested in the pancreatic tail while the distal end rested in the branch duct. Both balloon and rat-tooth forceps were used but failed to retrieve the stent. A week later, a second ERCP was performed. After dilation with a 10-mm balloon, a small amount of bleeding was noticed and a crack appeared in the wall of the branch duct. Consequently, the distal end of the stent was released. Then, rat-tooth forceps was used to grasp the distal end, and the stent was pulled out successfully.**Conclusions:** For a proximally migrated pancreatic stent stuck at both ends, a strategy of maximum dilation can be used cautiously to retrieve the stent.

## 1. Introduction

Endoscopic pancreatic stenting is used in a range of pancreatic disorders, such as chronic pancreatitis-induced pancreatic duct stenosis and pancreatic duct obstruction in advanced pancreatic cancer. Stent migration is a complication of stenting. According to the study, the percentage of pancreatic stents shifted distally was 7.5%, while the percentage displaced proximally was 5.2% [1]. In most cases of distal migration, stents would fall into the intestine and be excreted in feces. For proximal migration, however, the stent may cause injury to the pancreatic parenchyma and even perforation [2].

To remove a proximally displaced pancreatic stent, the operator would try a variety of removal procedures, and surgery is required when endoscopic interventions fail [3]. Biopsy forceps, snares, baskets, and balloons are common retrieval accessories [4, 5, 6, 7]. New strategies and procedures have emerged to increase the success rate of removing the migrated stent. In the following case, a specific proximal

migration happened, and the stent was successfully removed using a new strategy.

## 2. Case presentation

A 34-year-old man with painful chronic pancreatitis received endoscopic retrograde cholangiopancreatography (ERCP) and insertion of a pancreatic plastic stent, with 8.5 Fr in diameter and 12 cm in length (Figure 1). The patient revisited for removal of the pancreatic stent a year later. The computed tomography showed a migrated stent in the pancreatic duct. During ERCP, radiography revealed that the proximal end of the stent rested in the pancreatic tail while the distal end rested in a branch duct (Figure 2). In most cases of distal migration, stents would fall into the intestine and be excreted. For proximal migration, balloons, rat-tooth forceps, and snares are common endoscopic accessories for retrieval. However, in this case, the proximal migration occurred first, and then the distal migration occurred, resulting in the distal end

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entering a branch duct. Such a rare and difficult situation makes any endoscopic accessory useless.

Considering the stenosis of the pancreatic duct, a 6-mm balloon was used for dilation. After that, both balloon and rat-tooth forceps were used but failed to retrieve the stent. At the same time, the stent's too long size also made it impossible to grasp the stent with a snare. A week later, a second ERCP was performed. After dilation with a 10-mm balloon, a small amount of bleeding was noticed and a crack appeared in the wall of the branch duct. Consequently, the distal end of the stent was released. Then, rat-tooth forceps was used to grasp the distal end of the stent (Figure 3), and the stent was pulled out successfully (Figure 4). After confirming that there was no persistent bleeding, a nasopancreatic tube was then inserted. At present, the patient has been discharged and is in stable condition. From this point of view, dilating the pancreatic duct with extreme care may be an effective way to remove the stent embedded in the branch.

### 3. Discussion

Stent displacement in the pancreatic duct is not rare, presenting a threat to the patient and a challenge to the doctor. Some displaced stents may cause tissue injury, resulting in bleeding and infection. We displayed a specific type of pancreatic stent migration and retrieval strategy in this case. The pancreatic stent was not only proximally migrated, but also distally embedded in a branch pancreatic duct, making endoscopic removal extremely difficult.

Matsumoto et al [8] divided the displacement of pancreatic stents into four types: Type A referring to the tip of the proximal stent being located in the normal main pancreatic duct (MPD); Type B referring to the stent being located across the MPD stricture; Type C referring to the stent being located further away from the MPD stricture; and Type D referring to the tip of the proximal stent being located in a branch duct. The case we reported appears to fit both Type C and Type D of displacement. For C-type, a balloon is typically used to enlarge the stenosis first, followed by either an indirect method, such as a balloon, or a direct method, such as rat-tooth forceps or a basket, to grip and remove the stent. The most difficult condition is D-type displacement. First, push the stent further into the pancreatic tail so that the distal end could return to the MPD, and

then remove the stent with indirect or direct means [8]. The procedure mentioned above to remove the D-type displacement stent, however, does not apply to the scenario we discussed. In this case, the stent cannot be pushed further since it has reached the end of the pancreatic duct, preventing the distal end of the stent from being released from the branch duct. As a result, a 10-mm balloon dilator was used to enlarge the duct, and the side wall of the branch duct was disrupted. The misplaced stent could then be removed with rat-tooth forceps after this procedure.

Currently, there is a paucity of literatures covering similar cases, however some of these strategies are instructive. Jung et al [9] reported a case in which the distal end of a single pigtail stent entered the branch duct following proximal migration. The operator positioned a snare along the guidewire up to the distal tip of the stent. The snare was then gently retracted to capture the stent. Ishigaki et al [10] removed a proximally migrated pancreatic stent using a similar technique. The straight stent we used, however, did not have a clear curling structure like the two single pigtail stents mentioned above, and it was challenging to catch the stent body with a snare. Rerknimitr et al [11] described a case of a single pigtail stent that was proximally migrated and whose distal end was crimped inside the main pancreatic duct rather than entering the branch duct. The stent was grasped and retrieved by the operator using a Caesar grasping tripod. However, not all patients are able to endoscopically remove proximally displaced stents with distal incarceration. Gonzalez et al [3] reported a patient who failed to remove the proximally migrated pancreatic stent after 4 ERCPs. The patient finally underwent a central pancreatectomy with pancreaticogastrostomy because the distal end of the stent entered the ventral pancreatic duct. It is worth mentioning that if a stent fractures, the proximal broken part is likely to be displaced proximally. Jagielski et al [12] reported a case of multiple ruptures in a pancreatic stent. The three stent fragments remaining in the pancreatic duct were successfully removed using a basket and rat-tooth forceps. A retrospective study also revealed that endoscopy is an effective means of removing proximally displaced fractured stents [13]. Therefore, for pancreatic stents with proximal migration, adequate evaluation is essential. Surgery is occasionally a better choice for stents that are difficult to remove via endoscopy.

With the development of direct vision scopes, it is possible to remove the pancreatic stent with D-type displacement under direct vision.



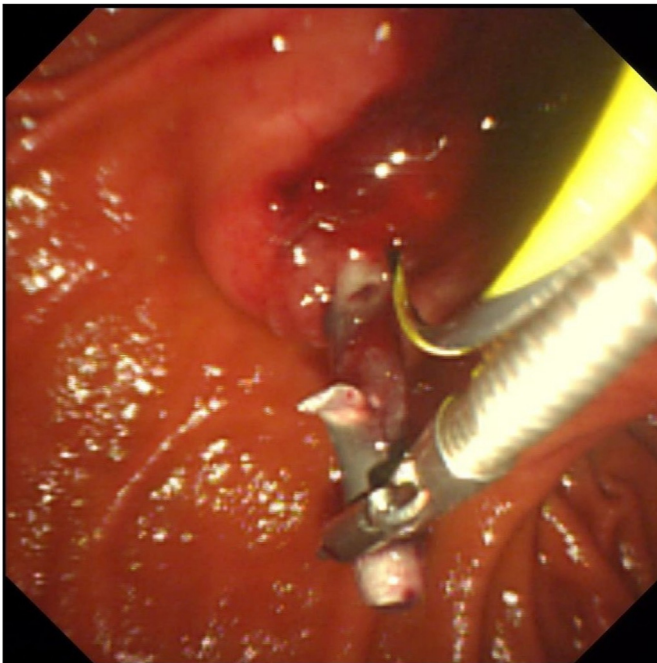
**Figure 1.** A plastic stent, with 8.5 Fr in diameter and 12 cm in length, was inserted in pancreatic ductal.



**Figure 2.** Radiography revealed that the proximal end of the stent rested in the pancreatic tail while the distal end rested in the branch of the pancreatic duct.



**Figure 3.** A rat-tooth forceps was inserted into the pancreatic duct to remove the pancreatic plastic stent.



**Figure 4.** The distal end of the migrated pancreatic stent was pulled out successfully.

Kantsevov et al [14] used the SpyGlass to observe displaced single pigtail stent within the pancreatic duct. The SpyBite forceps was then used to pull the stent from the branch into the main pancreatic duct. In addition to D-type displacement, Spyglass and other direct vision scopes can also be used to remove the stents with other types of displacement [15, 16]. However, for patients with stenosis, it is challenging for direct vision scopes to enter the pancreatic duct for relevant operations before dilating the pancreatic duct.

Notably, balloon dilation of the pancreatic duct may result in unanticipated complications, such as bleeding, infection, or postoperative

pancreatitis [17]. Even though our method can solve the problem, the patient's condition should be carefully evaluated and the patient's vital signs should be closely watched after the procedure.

#### 4. Conclusions

In this case, the key to removing the stent was to expose one of the ends. Our method of using a 10-mm balloon dilator to tear the branch pancreatic duct and expose the end of the stent can be used carefully to solve problems like these.

#### Declarations

##### Author contribution statement

All authors listed have significantly contributed to the investigation, development and writing of this article.

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##### Data availability statement

No data was used for the research described in the article.

##### Declaration of interest's statement

The authors declare no conflict of interest.

##### Additional information

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#### References

- [1] J.F. Johanson, M.J. Schmalz, J.E. Geenen, Incidence and risk factors for biliary and pancreatic stent migration, *Gastrointest. Endosc.* 38 (3) (1992) 341–346.
- [2] W.D. Leung, K.R. Parashette, J.P. Molleston, S. Sherman, Pancreatic stent migration into the portal vein causing portal vein thrombosis: a rare complication of a prophylactic pancreatic stent, *Pancreatol.* 12 (5) (2012) 463–465.
- [3] F. Gonzalez, M.G. Mesleh, F.J. Lukens, M.B. Wallace, H.J. Asbun, J.A. Stauffer, Laparoscopic central pancreatectomy and pancreaticogastrostomy for the management of a proximally migrated pancreatic stent, *Jop* 14 (3) (2013) 273–276.
- [4] S.L. Shah, E. Dawod, M. Kahaleh, Endoscopic removal of a proximally migrated pancreatic stent, *Endoscopy* 50 (4) (2018) E90.
- [5] Y.S. Liao, Q. Zhao, Y. Fan, J. Wu, Proximal migration of a 5 French pancreatic stent during bile stone extraction: a successful retrieval using mini-snare, *Niger. J. Clin. Pract.* 17 (3) (2014) 384–386.
- [6] T. Sano, S. Miura, A. Katanuma, Endoscopic retrieval device for proximally migrated pancreatic and biliary stent: wire-guided spiral basket catheter, *Dig. Endosc.* 32 (7) (2020) e147–e149.
- [7] Y.Q. He, J.H. Wang, S. Tang, G. Gao, J.Q. Sheng, Balloon extraction for the endoscopic removal of proximally migrated pancreatic stent, *Endoscopy* 46 (1) (2014) E186–E187.
- [8] K. Matsumoto, A. Katanuma, H. Maguchi, Endoscopic removal technique of migrated pancreatic plastic stents, *J. Hepato-Biliary-Pancreat. Sci.* 21 (6) (2014) E34–E40.
- [9] Y. Jung, T. Lee, S.-H. Park, H. Choi, S.-W. Cha, J. Moon, et al., Delayed removal of a deeply migrated pigtail pancreatic stent in a normal pancreatic duct, *Endoscopy* 47 (S 01) (2015) E106–E108.
- [10] K. Ishigaki, T. Hamada, H. Isayama, H. Kogure, Y. Nakai, T. Wada, et al., Endoscopic removal of a proximally migrated pancreatic stent using a gooseneck snare, *Endoscopy* 46 (S 01) (2014) E283–E284.
- [11] R. Rerknimitr, W. Phuangsombat, P. Naprasert, Endoscopic removal of proximally migrated pancreatic stent by a grasping tripod, *Endoscopy* 39 (1) (2007) E42.

- [12] M. Jagielski, M. Smoczyński, K. Adrych, Endoscopic treatment of a broken pancreatic stent, *Pol. Arch. Intern. Med.* 124 (7–8) (2014) 429–430.
- [13] M. Jagielski, M. Smoczyński, A. Jabłońska, K. Adrych, Endoscopic treatment of intraductal pancreatic stent fragmentation, *Dig. Endosc.* 29 (7) (2017) 798–805.
- [14] S.V. Kantsevov, E.A. Frolova, P.J. Thuluvath, Successful removal of the proximally migrated pancreatic winged stent by using the SpyGlass visualization system, *Gastrointest. Endosc.* 72 (2) (2010) 454–455.
- [15] A. Maydeo, A. Kwek, S. Bhandari, M. Bapat, P. Mathew, SpyGlass pancreatoscopy-guided cannulation and retrieval of a deeply migrated pancreatic duct stent, *Endoscopy* 43 (2) (2011) E137–E138.
- [16] C. Gomes, R. Pinho, L. Proença, E. Afecto, J. Correia, J. Carvalho, Endoscopic retrieval of a proximally migrated pancreatic stent through SpyGlass pancreatoscopy, *Clin. Res. Hepatol. Gastroenterol* 45 (5) (2021), 101707.
- [17] S. Arata, T. Takada, K. Hirata, M. Yoshida, T. Mayumi, M. Hirota, et al., Post-ERCP pancreatitis, *J. Hepato-Biliary-Pancreatic Sci.* 17 (1) (2009) 70–78.