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## Case Report

# Duodenal stump fistula managed with percutaneous drainage, percutaneous transcholecystic biliary diversion and transduodenal glue embolization - A case report <sup>☆</sup>

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## ABSTRACT

Duodenal stump insufficiency is an infrequent but potentially devastating complication of upper gastrointestinal surgery. In the era of image-guided interventions, duodenal stump insufficiency is usually treated rather conservatively or with percutaneous interventions than with surgery. Herein, we present a case of a postsurgical duodenal stump fistula successfully treated in a step-by-step manner with percutaneous drainage of a periduodenal abscess-fistula complex, percutaneous transcholecystic biliary drainage for partial biliary diversion and percutaneous transcatheter fistula embolization via the duodenum with n-butyl-cyanoacrylate.

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## Introduction

High-output duodenal fistula can occur as a result of a duodenal wall defect caused by gastroduodenal surgery with postsurgical suture or staple line dehiscence. In a meta-analysis of 42 studies, 48 percent of duodenal leaks were a result of surgical complication [1]. Duodenal stump fistula (DSF) may be complicated by abscess, peritonitis and sepsis as well as vascular complications including bleeding. Despite the impor-

tance of this potentially life-threatening condition, there is no generally accepted treatment for DSF, although Zarzour et al. have presented an algorithm for the management of persistent postoperative duodenal fistulae in 2008 [2]. Beyond initial conservative management, such as sepsis control and optimizing nutrition, subsequent treatment of stable patients with persistent leak may consist of surgical, endoscopic or percutaneous image-guided measures. A metaanalysis concerning DSF following gastrectomy suggested the “conservative approach” being the treatment of choice, eventually

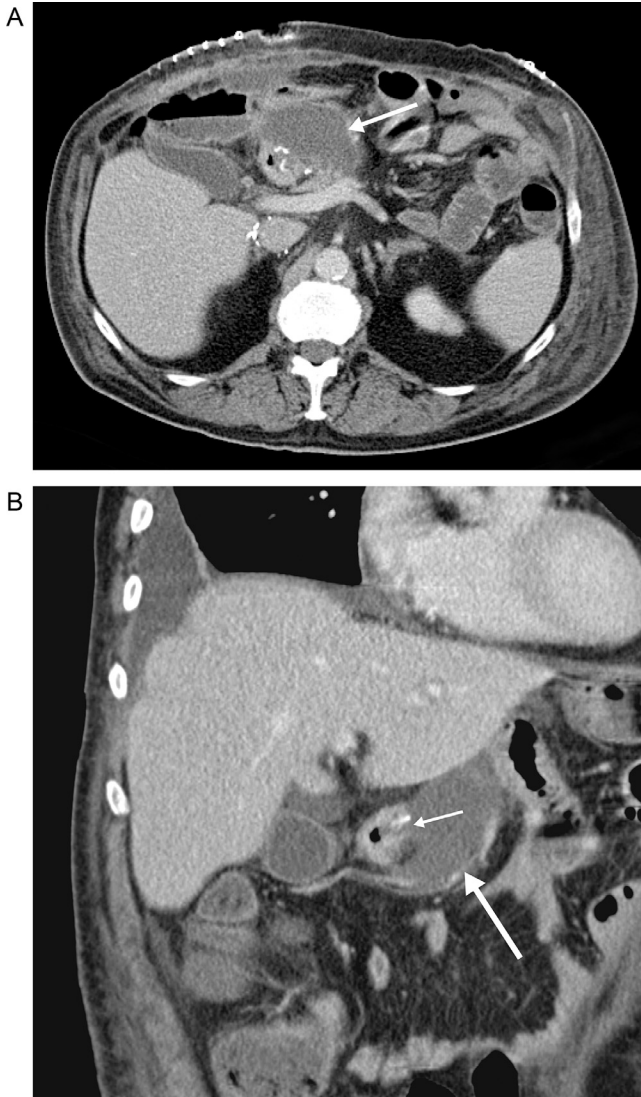
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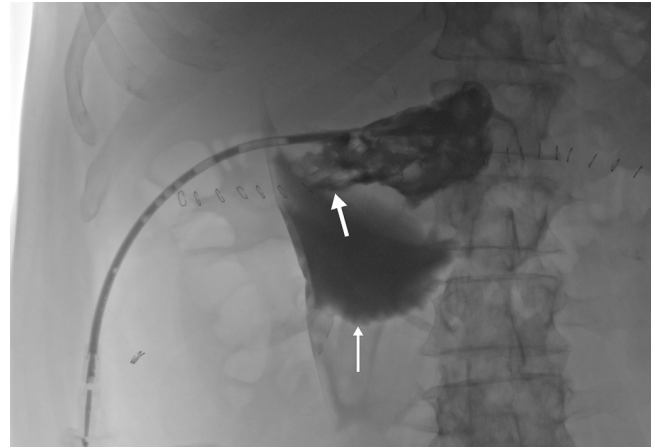


**Fig. 1 – Contrast-enhanced CT. (A) Axial CT-scan before treatment with fluid collection (arrow) medial to the stapled duodenal stump, another small fluid collection just behind the abdominal wall and adjacent small wound-defect. (B) Oblique coronal reconstruction of the right upper abdomen demonstrating a 4×6 cm fluid collection (large arrow) with fistulous communication (small arrow) to the duodenal stump.**

combined with percutaneous drainage. Surgical treatments should be reserved for severe cases or when conservative approaches fail [3].

### Case report

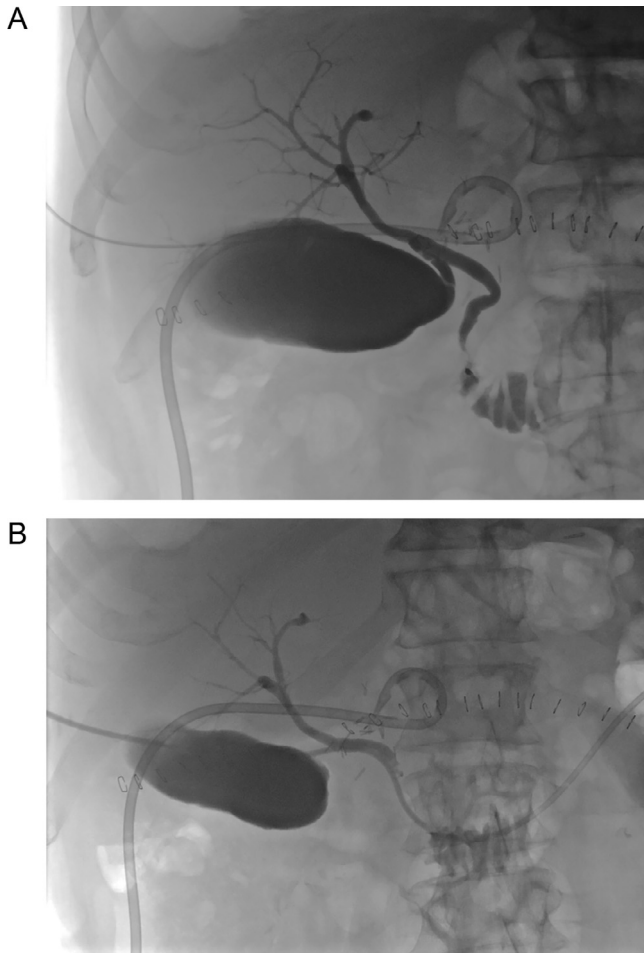
A 68-year-old man underwent transhiatal extended gastrectomy after neoadjuvant chemotherapy for adenocarcinoma of the esophagogastric junction type II/III (ypT3, ypN0 (0/35),



**Fig. 2 – Tubogram via 14F abscess drain showing periduodenal fluid collection with contrast-media spillage mainly into, but also around the dissected duodenum. Large arrow indicates fistula, small arrow indicates inferior duodenal flexure.**

cM0, L0, V0, Pn0, R0). Esophagojejunostomy and jejunojunostomy was used for reconstruction (Roux-en-Y). One week later a computed tomography (CT) was requested due to elevated inflammatory markers (WBC 13.3/nL, CRP 19.1 mg/dL) and outflow of intestinal juice through the abdominal wall wound. CT revealed the expected insufficiency of the duodenal stump with adjacent fluid collections (Fig. 1A and B). An 8,3F drainage catheter was placed under CT-guidance. In the following days quantities of drained fluid increased and 8,3F drain was up-sized to a 14F drain. Subsequent tubogram confirmed the detected DSF (Fig. 2). As drain-outflow remained high, additional percutaneous transhepatic biliary drainage (PTBD) for “biliary diversion” was requested. On postoperative day 14 PTBD-attempt was aborted due to very small intrahepatic bile ducts. Instead, we performed percutaneous transcholecystic biliary drainage (PTCBD): Under CT-guidance gallbladder was punctured with transhepatic access and under fluoroscopy a 0.035 inch wire was inserted through the gallbladder into the duodenum, followed by insertion of a long 8F peel-away sheath and an 8F internal-external biliary drain (Fig. 3A and B). Patient was discharged 9 days later in a good general condition with both PTCBD and abscess drain in situ. On planned hospital readmission 3 weeks later, the 14F abscess drain had been accidentally removed by the patient. Duodenography with a coaxial catheter-microcatheter system via PTCBD-access revealed a short residual duodenal fistula (Fig. 4A-C). This was embolized with about 2 mL of a 1:1 mixture of lipiodol and n-butyl-cyanoacrylate, the PTCBD was replaced and patient was discharged again. One month later a control-CT showed no more fluid collection surrounding the duodenal stump and the PTCBD was finally removed. Another control-CT after 2 months showed no recurrence of the DSF (Fig. 5).

Altogether a period of 65 days was needed for DSF-treatment, of which, however, in-hospital stay was 18 days only.



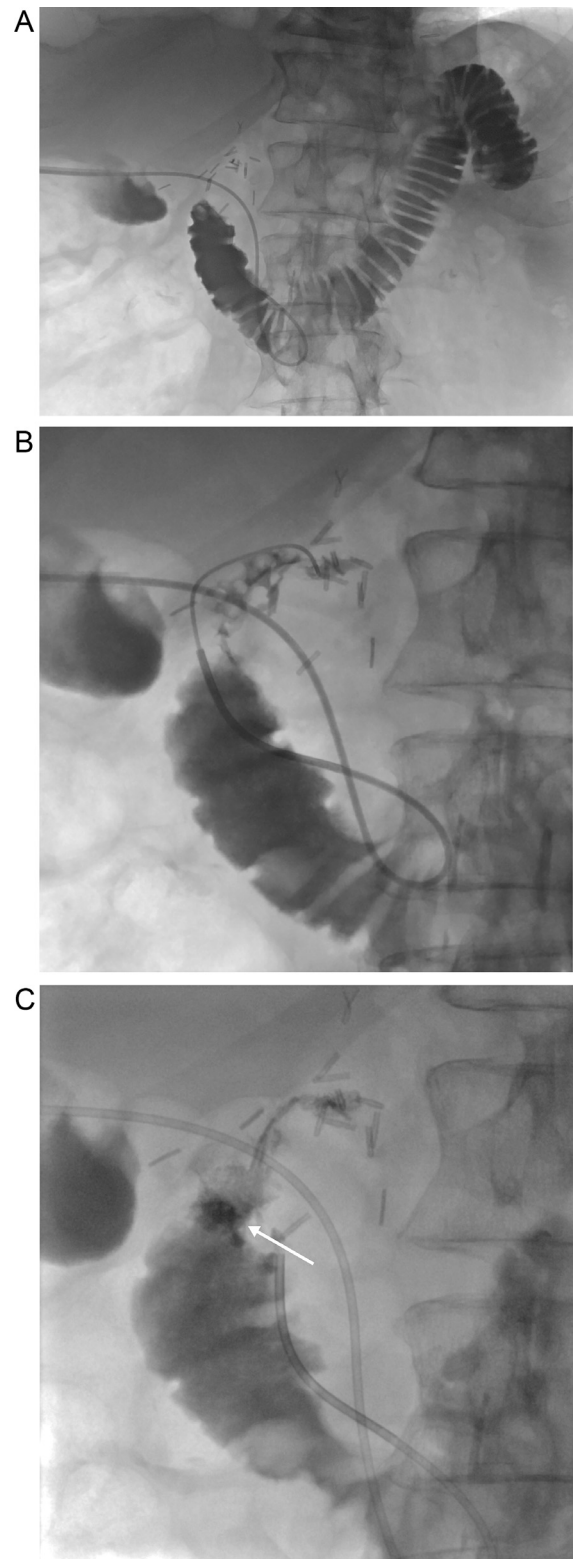
**Fig. 3 – Transcholecystic cholangiography and biliary diversion. (A) Contrast-injection through sheath of an AccuStick-introducer (Boston Scientific, Marlborough, USA) in gallbladder. Note tortuous cystic duct and very small intrahepatic bile ducts. Percutaneous 14F abscess drain in situ. (B) 8F transcholecystic biliary drainage (Münchener-PTBD, Peter Pflugbeil GmbH, München, Germany) successfully transcholecystic inserted and 14F abscess drainage in situ.**

## Discussion

Management of DSF with high-output fistula beyond initial conservative measures remains controversial [1,3,4], although surgery for DSF has been shown to lead to poor outcome [5].

Although there is no clear definition of “high-output fistula” in this regard, our patient presented with DSF with leakage of intestinal juice through the abdominal wall wound and subsequent flow rates of several hundred milliliters of fluid over the percutaneous peritoneal drain.

Following CT-guided percutaneous drainage of the periduodenal fluid collection, however, additional efforts were needed in our patient, as the amount of drained fluid increased over the next days.



**Fig. 4 – Duodenography with transduodenal fistula embolization. (A) Contrast-injection through 5F Sidewinder catheter via PTCBD showing no fistula. (B) Contrast-injection through additional coaxial inserted 2,7F microcatheter showing microcatheter within the residual duodenal stump fistula before embolization with glue. (C) Histoacryl-cast in residual duodenal stump fistula (arrow).**



**Fig. 5 – Contrast-enhanced axial CT-scan after treatment showing regular duodenal stump (arrow).**

While the concept of “biliary diversion” originally refers to surgical procedures with different kinds of biliary anastomosis, nowadays it has also been implemented to interventional procedures where bile should be diverted from biliary anastomoses, bile leaks or fistulae. The simplest way of biliary diversion in this regard is PTBD since transoral duodenoscopy normally is fairly difficult after surgery with interrupted gastroduodenal continuity. Percutaneous internal-external biliary drainage significantly reduces the amount of bile juice in the duodenum and has the additional potential of drawing bile juice away from the duodenal stump via a long internal side placed towards the duodenojejunal junction. However, PTBD allows only partial biliary diversion. For total biliary diversion an additional occlusion balloon has to be placed in the bile main duct [6] and even total biliary diversion does not hinder pancreatic secretion into the duodenum.

PTBD in patients with nondilated bile ducts can be challenging and risky due to necessity of a potentially very central access. In certain conditions, the transcholecystic approach can be a less demanding alternative [7]. However, there is only one single case report published which describes the treatment of DSF with transcholecystic biliary diversion [8].

Another interventional treatment option of DSF is the insertion of a Foley-catheter into the duodenal lumen through the fistula via previously created percutaneous drainage [9], also named percutaneous Foley-catheter duodenostomy. This has been reported in a few small-volume series, not without serious complications, such as duodenal erosion and bleeding, and has therefore not gained widespread acceptance [10].

Apart from this, fistula embolization with injection of cyanoacrylic glue or other substances can be effective to treat nonhealing postsurgical enteric fistula [11,12]. It is performed either endoscopically [13], through a postsurgical or previously placed percutaneous drainage [11] or through an enterocutaneous fistula [14] and, to our knowledge, has not been reported through a transhepatic-transduodenal access.

The benefit of embolization of the DSF in the setting of our patient is unknown. We felt that there was potential benefit

and no relevant risk in embolizing the relatively small residual duodenal stump insufficiency.

To the best of our knowledge, management of DSF with a combination of percutaneous abscess drainage, percutaneous transcholecystic partial biliary diversion and transduodenal glue embolization has not been documented before and demonstrates a feasible and safe treatment option.

## Conclusion

The armamentarium of interventional radiologists for treatment of DSF consists of percutaneous abscess drainage, percutaneous transhepatic or transcholecystic biliary drainage for biliary diversion, with or without additional balloon occlusion, percutaneous Foley-catheter duodenostomy, and percutaneous fistula embolization with either external or transduodenal-internal fistula approach.

Abscess drainage combined with biliary diversion is to be regarded as the basic interventional therapy. In individual cases, a stepwise approach with a combination of available methods at the discretion of the interventionist seems advisable.

## Patient consent

Written informed consent for the publication of this case report was obtained from the patient.

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