Access fistulotomy: technical tips for success

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Background and Aims: Biliary cannulation, although critical to procedural success in ERCP, can be difficult and, if unsuccessful, can lead to longer hospital stays, repeat procedures, and increased costs. Expertise in adjunct techniques, including access fistulotomy, can increase success rates and potentially avoid these issues. The aim of this case series is to describe the technique of access fistulotomy and illustrate key points that are important for successful biliary access.

Methods: Three cases are reviewed in which access fistulotomy was used to achieve biliary access. The steps for the procedure are reviewed, and key technical tips and anatomic landmarks are illustrated in the video.

Results: Successful biliary access is obtained using fistulotomy in 3 cases. In each case, the anatomic landmarks of the papilla and intraduodenal biliary segment are reviewed. The first case illustrates a large papilla in which initial incision followed by careful exposure reveals a clear "onion ring" structure corresponding to the bile duct. The second case requires stepwise incision, each guided by anatomic landmarks before the biliary adventitia is identified, leading to biliary cannulation. In the third case, the utility of fistulotomy in a duodenal diverticulum is illustrated. Recognition of the distorted anatomy allowed precise, careful incision leading to biliary access.

Conclusions: Access fistulotomy is an invaluable technique to aid in biliary access. Knowledge of key landmarks and careful evaluation of the incision are critical to successful biliary access when performing fistulotomy. (VideoGIE 2020;6:49-53.)

INTRODUCTION

Although biliary cannulation is a critical step in ERCP, it can be a challenging one. Biliary access is necessary for success, but the failure rates outside of expert centers can be as high as 10% to 20%.[1] Failure can lead to adverse events or repeat procedures, resulting in longer hospital stays and increased costs. Familiarity and expertise in adjunct techniques can help increase cannulation success when initial wire-guided cannulation fails. These techniques include the double-guidewire technique, cannulation over a pancreatic stent, transpancreatic sphincterotomy, needle-knife access sphincterotomy, and needle-knife access fistulotomy. Each technique has specific advantages, although not all techniques are feasible or appropriate based on the patient's anatomy, the endoscopist's skill, and ease of pancreatic access.

Needle-knife access fistulotomy can be invaluable to provide biliary access in certain cases. It has been shown to have a success rate of >90% when used appropriately, despite failure of conventional techniques.[2] Furthermore, the technique appears to decrease the rate of post-ERCP pancreatitis in several studies when applied early in the procedure.[2,3] Given this advantage, access fistulotomy is even recommended as the preferred technique for precutting in one guideline.[4] Of note, it is recommended

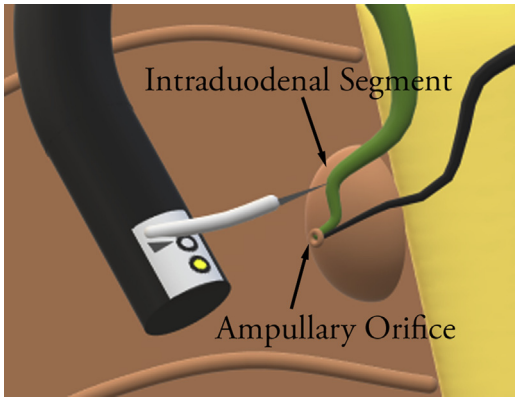

Figure 1. Schematic showing ampullary anatomy with the pancreatic duct and biliary duct forming the common channel near the ampullary orifice. The location of access fistulotomy is depicted several millimeters superior to the orifice in the intraduodenal segment of the bile duct, as opposed to traditional access sphincterotomy in which the incision begins at the ampullary orifice. The risk of pancreatitis is minimized given that manipulation is distant from the pancreatic duct.

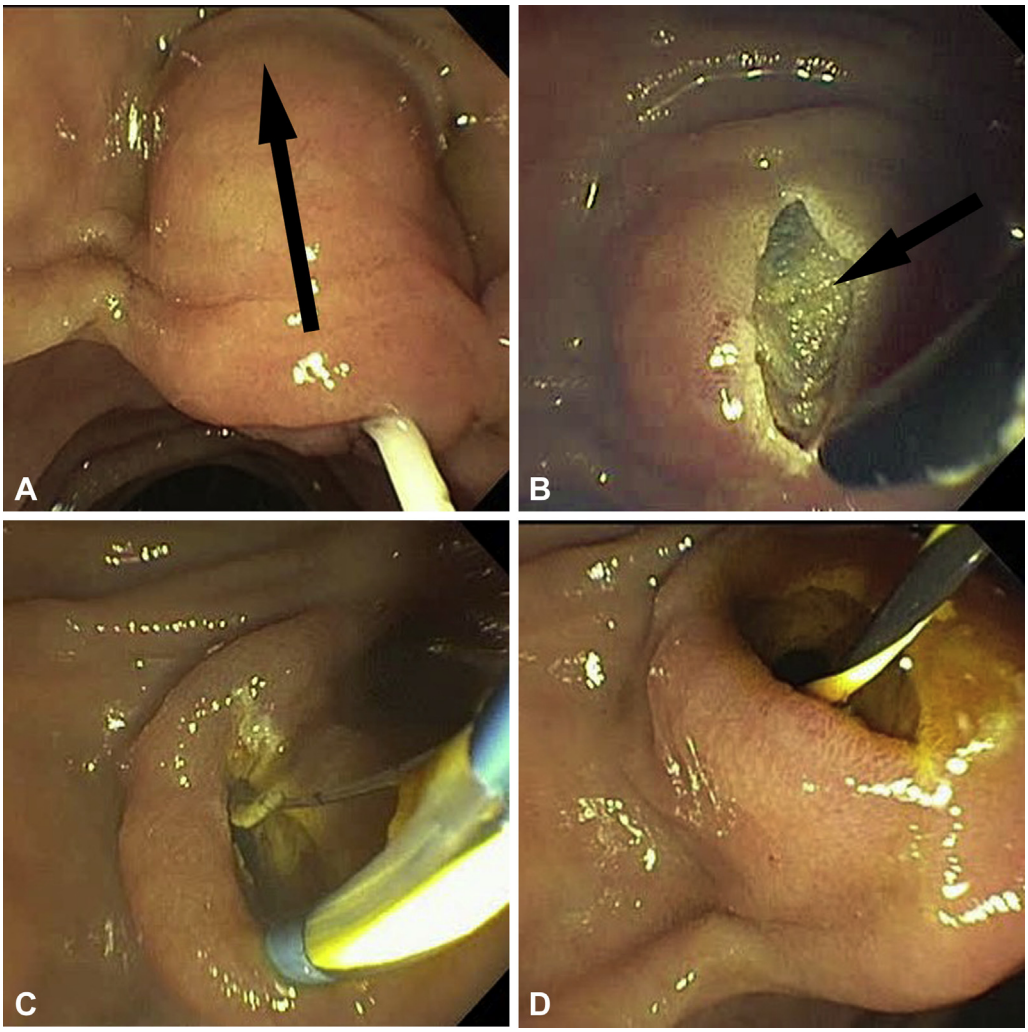

Figure 2. A, A prominent intraduodenal segment above the papilla is noted, and the trajectory of the bile duct is seen (*arrow*). **B,** After incision and gentle exposure, an "onion skin" structure (*arrow*) corresponding to the biliary orifice is seen. **C,** Biliary access is obtained, and the incision is extended with a sphincterotome. **D,** Bile flows freely after completion of the incision.

that this technique be used by those with specific ERCP training and experience, given the potential for adverse events.[5] This includes proficiency with a needle knife. Furthermore, although pancreatitis rates are negligible, bleeding (2%-5%) and perforation (0%-2%) can occur, although this is similar to other precut techniques.[5] This case series will review the technique for access fistulotomy and key technical tips that will aid in success during the procedure (Video 1, available online at www.giejournal.org).

METHODS

In each case, access fistulotomy begins with careful inspection of the periampullary region to ensure the anatomy is appropriate for the procedure. A prominent bulge above the major papilla indicates a long intraduodenal segment and is the most appropriate ampullary morphology for fistulotomy. Once this prominence is recognized, the trajectory of the bile duct within the prominence is delineated. The needle knife is then used to incise the mucosa at the apex of the prominence, several millimeters superior to the biliary orifice (Fig. 1). The electrosurgical generator is set to a blended cut mode for fistuolotomy, similar to sphincterotomy with a sphincterotome. In these cases, the generator (VIO 300D, ERBE, Tubingen, Germany) was set to ENDOCUT I, Effect 2, duration 3, and interval 3. An incision is made along the trajectory of the bile duct in an upward or downward direction. It is important to limit the length of exposed needle knife to adjust the depth of incision. This allows slow, careful dissection to access the bile duct but prevents deep mural injury or perforation. Of note, ampullary neoplasia may distort the anatomy, making the trajectory of the bile duct more difficult to recognize. Furthermore, an incision into neoplastic tissue increases the risk of bleeding and perforation substantially, given destruction of tissue planes and neovascularization. If bleeding or perforation is present, one should consider using an alternative technique to obtain biliary access.

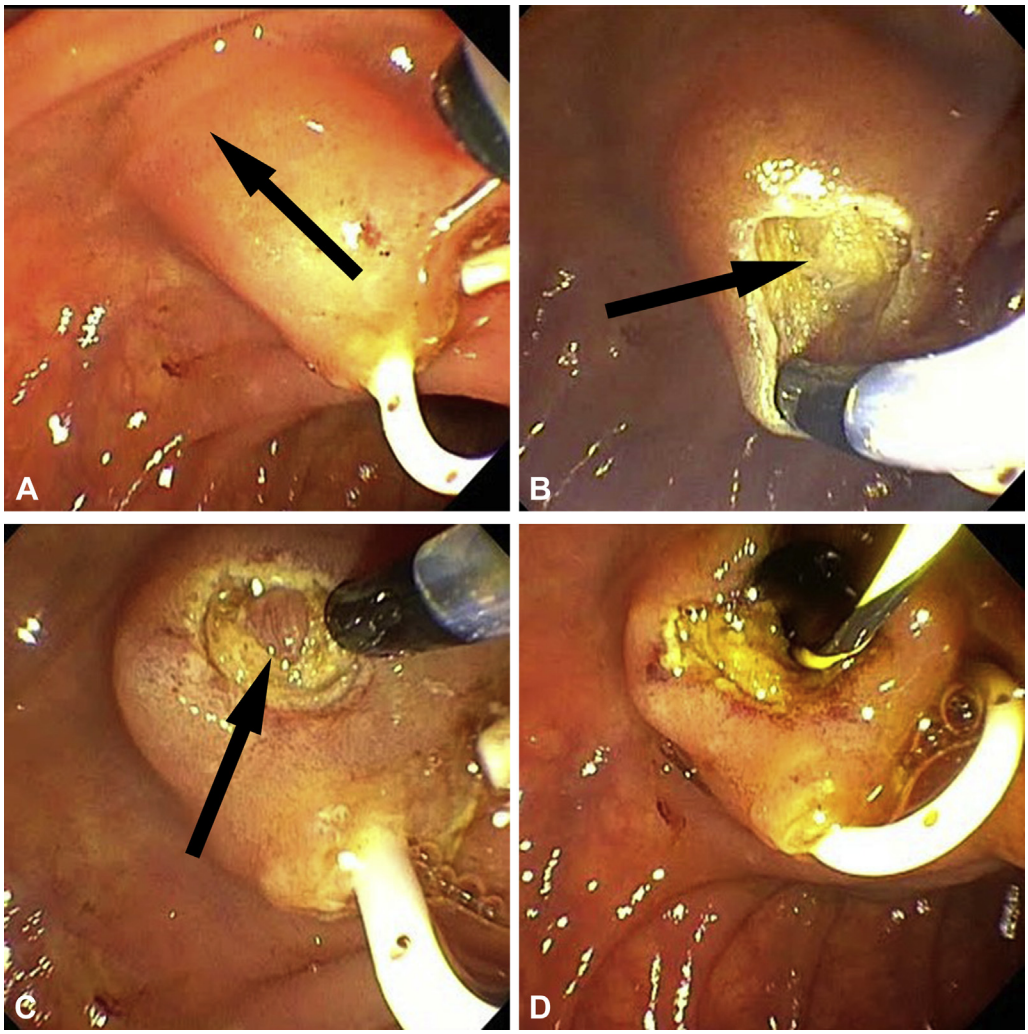

Figure 3. A, The intraduodenal segment in the second case is seen above the papilla, with a slight leftward trajectory (*arrow*). **B,** An initial incision is made, although only the firm, whitish prominence of the biliary sphincter complex (*arrow*) is seen. **C,** Further incision is made, and the glistening, pink adventitia of the bile duct (*arrow)* is discovered upon exposure of the incision. **D,** A small incision is made through the adventitia, and biliary access is obtained.

Once the incision is made, the blunt end of the catheter is used to explore the incision, and suction with the duodenoscope is applied to allow exposure of the defect. This step is critical because visual clues within the incision will guide attempts at access or further incision. A firm, whitish bulge indicates the ampullary complex, which can be recognized in contrast to the soft interstitial tissue of the submucosa. The biliary orifice can also be recognized by an "onion skin"-like structure within the incision. The biliary mucosa can appear pearly white within the incision as well. Suction may also elicit expression of bile, which can guide cannulation attempts; however, one should be aware that bile flow may not be present in the setting of more proximal biliary obstruction. Finally, the adventitia of the bile duct can also be seen as glistening pink tissue with lacy vessels within the incision. A small incision through the adventitia will then allow biliary access.

After biliary access is achieved, the ERCP can be completed with extension of the fistulotomy proximally along the bile duct trajectory without the need to connect the incision with the biliary os. Therapy can then be completed through the existing fistulotomy site.

CASE 1

In the first case, a 68-year-old man with a history of cholecystectomy presented with biliary colic and elevated liver chemistry. MRCP was performed and showed common bile duct dilation up to 18 mm without evidence of obstructing lesion or stone. ERCP with sphincterotomy was performed to treat papillary stenosis. After failed initial attempts at cannulation and pancreatic duct stent placement, the anatomy of the bile duct was found to have a bulging segment above the papilla, and the anatomy was believed to be appropriate for fistulotomy (Fig. 2). The trajectory of the bile duct was visualized, and a single incision from the bottom up was

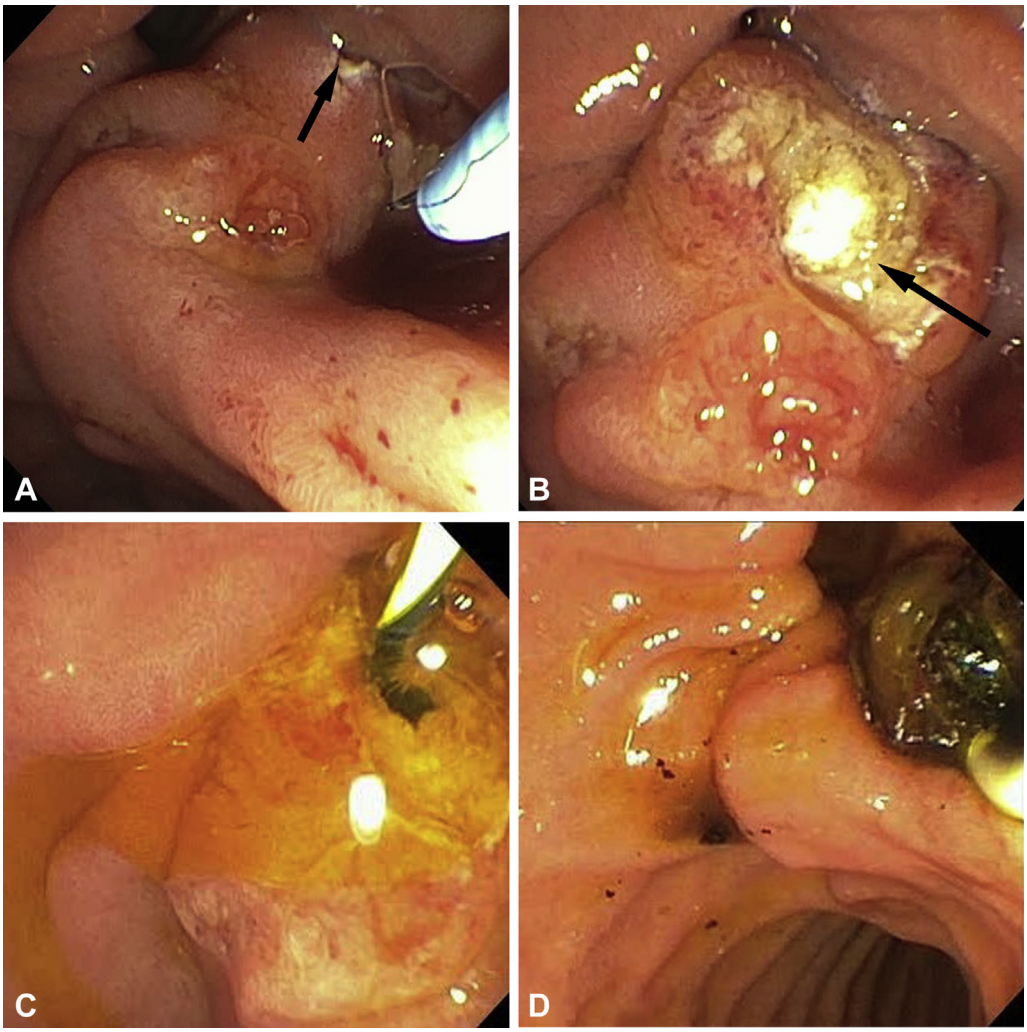

Figure 4. A, In this final case, the major papilla is seen adjacent to a periampullary diverticulum, with the intraduodenal segment in a more rightward (*arrow*) trajectory. **B,** After incision and exposure, the "pearly white" mucosa of the bile duct (*arrow*) is seen. **C,** After biliary cannulation and extension of the incision, **(D)** an extraction balloon is used to clear the bile duct of stones.

performed. Careful exposure of the incision with the catheter and application of suction revealed the "onion skin"-like appearance of the sphincter muscles delineating the biliary orifice. Careful probing with the wire led to easy cannulation. The incision was extended with a sphincterotome, and the bile duct was swept with a balloon to ensure no stones were present. The patient recovered uneventfully with normalization of liver chemistry and resolution of biliary colic.

CASE 2

In the second case, an 87-year-old woman with a history of pancreatic adenocarcinoma presented with painless jaundice. Cross-sectional imaging revealed a dilated common bile duct above the pancreatic head mass. ERCP with stent placement was performed. Again, initial attempts at cannulation were difficult, and the anatomy of the papilla was believed to be amenable to fistulotomy (Fig. 3). The trajectory of the bile duct was delineated, and an incision was made from the top down with the needle knife. After initial exposure, a firm white bulge consistent with the ampullary complex was seen, and repeat incisions were made over this area. With further careful exposure and suction, the glistening, pink adventitia of the bile duct was noted. A small incision into the adventitia was performed, with expression of bile. Probing with the wire through this incision then led to biliary access. A 10-mm × 60-mm covered self-expanding metal stent was placed for palliation of jaundice. No adverse events were noted, and the patient's jaundice resolved, allowing further palliative chemotherapy.

CASE 3

In the final case, a 55-year-old man presented with right upper quadrant pain and elevated liver chemistry. He was

found to have choledocholithiasis on EUS, and he proceeded to ERCP for stone extraction. In this case, he was noted to have a periampullary diverticulum and a mildly prominent intraduodenal segment above the papilla (Fig. 4). Although initial cannulation was difficult, the decision was made to perform fistulotomy given prior reported success using this technique in the setting of periampullary diverticula.[6] This would avoid further attempts at the papilla and potentially avoid pancreatitis. The trajectory of the bile duct was first visualized, this time leading in a more rightward trajectory given distorted anatomy from the diverticulum. After several careful incisions with the needle knife, exposure of the incision and application of suction revealed the pearly white mucosa of the bile duct. Probing with the wire led to biliary cannulation. The incision was extended with a sphincterotome, and removal of the stones with the extraction balloon was successful. The patient recovered without event and underwent cholecystectomy the following day.

CONCLUSIONS

This case series illustrates the nuances of needle-knife access fistulotomy. Understanding the anatomy appropriate for fistulotomy, the anatomic landmarks, and careful exposure of the incision using the catheter and suction to guide further incision and biliary access allow this invaluable technique to be applied in various situations, even when the anatomy is distorted by a periampullary diverticulum.

DISCLOSURE

All authors disclosed no financial relationships.

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