Pancreatic Carcinoma – Placement of an Expandable Nitinol Stent

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Abstract

Self-expandable metal stents are used for palliation of malignant biliary obstruction. A case with advanced carcinoma of the pancreatic head and the need for palliative decompression of an obstructed biliary tract is demonstrated. Step-by-step explanation of the stent placement procedure is provided. This article is part of an expert video encyclopedia.

Keywords

Endoscopic retrograde cholangiopancreatography; Metal stent placement; Pancreatic carcinoma; Self-expandable metal stent; Video.

Video Related to this Article

Video available to view or download at doi:10.1016/S2212-0971(13)70248-6

Technique

Endoscopic retrograde cholangiopancreatography (ERCP).

Materials

- Duodenoscope: ED 450XT8; Fujifilm, Tokyo, Japan.
- Sphincterotome: PreCurved Triple Lumen sphincterotome; Cook Medical, Winston-Salem, NC, USA
- Metal stent: Uncovered Niti-S stent, diameter 1 cm, length 6 cm; Taewong Medical Co., Ltd., Korea.
- Snare: Standard snare; Olympus, Tokyo, Japan.

Background and Endoscopic Procedure

A 83-year-old man with known nonresectable cancer of the pancreatic head was admitted for exchange of a clogged biliary plastic stent with a self-expandable metal stent. This intervention is indicated because metal stents have a longer patency compared to plastic stents,[1,2] with a median patency period for expandable stents of approximately 10 months.

In our case, ERCP showed neoplastic infiltration of the ampulla and periampullary region. Before stent retrieval, it is important to have a close look at the exact position of the papillary orifice, because in cases with neoplastic ampullary infiltration, identification might be difficult once the stent is extracted. There are different techniques for stent retrieval. In the present case, simplest method is used: the very distal end of the stent is grasped with a snare and the stent is extracted. In cases with anticipated difficulties in passage of malignant stenoses, a 'beside-the-wire' technique is applied. This involves cannulation of the bile duct alongside the indwelling stent and passage of a guide wire across the stricture. After the guide wire is positioned upstream from the stricture, the stent is extracted with a snare, leaving the guide wire in place for subsequent placement of a new stent. With this technique, access to the duct is secured during the extraction procedure.

In the present case, the common bile duct (CBD) was easy to cannulate. Injection of contrast media revealed a prepapillary high-grade stenosis with a length of 35 mm. The delineation of the stenosis is smooth without irregularities, suggesting a compression rather than an intraductal neoplasia. In the proximal area of the stenosis, the CBD is dilated and shows discrete irregularities suggestive of cholangitis. It is of utmost importance to choose the optimal stent length. This is done by simple addition of the distances. The stricture needed to be bridged is 35 mm. The stent should extend 5–10 mm beyond the papilla into the duodenum and extend 2–3 cm proximal of the stenosis. Therefore, the optimal length of the stent in our case is 7 cm. Keep in mind that metal stents shorten after expansion and this has to be taken into consideration when the stent length is being selected. However, although this is a significant concern for stainless steel metal stents, shortening of nitinol stents occurs to a far lesser extent.

The technique for insertion of the self-expandable uncovered nitinol stent (7 cm length, 1 cm diameter) is rather simple. A 4 m-long guide wire is positioned through the stenosis. The stent is deployed with the aid of an 8 Fr delivery catheter with the constrained stent. This device is inserted through the working channel over the guide wire and positioned at the midpoint of the stricture. Once it is in position, the restraining mechanism is released, and the catheter expands to its predetermined diameter. The delivery catheter is then withdrawn through the expanded stent. The yellow marking of the delivery catheter signals the distal end of the stent after expansion. During stent deployment, always keep the marking positioned 5–10 mm in front of the papilla and adjust the stent position if necessary. As a rule, during expansion it is easier to withdraw the stent than to advance it. Once fully deployed, an expandable stent will be firmly anchored in the duct and difficult to remove.

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What is the optimal stent position? Expandable stents inserted for distal CBD strictures should extend approximately 5–10 mm beyond the papilla into the duodenum. Extension exceeding 2 cm can cause duodenal ulceration and perforation. In contrast, for hilar strictures, the distal end of the stent is usually positioned in the distal part of the bile duct. Placement inside the duct may reduce the risk of clogging from food fibers.

Key Learning Points/Tips and Tricks

- In cases with anticipated difficult recannulation, use the 'beside-the-wire' technique for exchange of biliary stents.
- During stent deployment, the position of the stents needs to be adjusted. The marking of the distal end should always be in sight and positioned approximately 1 cm in front of the papilla.
- Important for adjustment: it is easier to withdraw the stent than to advance it.

Complications and Risk Factors

In malignant strictures, metal stents may occlude due to tumor ingrowth or overgrowth or sludge. Bile duct and ulcerations and perforations may occur, especially after maldeployment. The high cost of expandable stents limits their application. However, metal stents become cost effective in patients who survive long enough to require an exchange of a blocked plastic stent or with an estimated survival longer than three months.[1]

Alternatives

For malignant biliary tract stenosis, uncovered metal stents over covered ones are preferred. It has been suggested that uncovered metal stents may better prevent tumor ingrowth. However, coating might cause occlusion of the cystic duct or branches of the hepatic ducts. Moreover, coated stents are more expensive and, importantly, have greater propensity to migrate.[3] A recent large randomized, multicenter trial showed that there are no significant differences in patency time, patient survival, or complication rates between covered and uncovered nitinol metal stents.[3]

Scripted Voiceover

A 83-year-old man with known nonresectable cancer of the pancreatic head was admitted for exchange of a clogged biliary plastic stent with a self-expandable metal stent. At ERCP, we see beginning neoplastic infiltration of the ampulla and periampullary region and a straight plastic stent within the bile duct. Before we extract the stent, it is important to have a close look at the exact position of the papillary orifice, because in cases with neoplastic infiltration, identification might be difficult once the stent is extracted. Now the very distal end of the stent is grasped with a snare. Because the stent diameter does not allow extraction through the instrumentation channel, the endoscope is removed with the stent. Now we are back in position. The duodenal lumen is compressed by the tumor and does not allow adequate distance to the papilla for optimal positioning of the endoscope. In this case, the sphincterotome allows for a better angle for cannulating the bile duct. The sphincterotome is bent and positioned in line with the bile duct and then the guide wire is jiggled to pass through the stricture. After successful insertion, the catheter can then follow the guide wire and negotiate the stricture and be advanced beyond the stricture. We can also spot massive calcifications within the pancreatic head, pointing to the known history of chronic pancreatitis. Injection of contrast media reveals a prepapillary high-grade stenosis with a length of 35 mm. The delineation of the stenosis is smooth without irregularities, suggesting a compression rather than an intraductal neoplasia. Proximal of the stenosis the bile duct is dilated and shows discrete irregularities suggestive of cholangitis. The optimal length of the stent is determined by simple addition of the distances that need to be bridged. The stricture is 35 mm. The stent should extend approximately 5–10 mm beyond the papilla into the duodenum and extend 2–3 cm proximal of the stenosis. Therefore, in our case we choose an uncovered nitinol stent with 7 cm length. Now we remove the sphincterotome but leave the guide wire in place. The technique for insertion of the self-expandable nitinol stent is rather simple. The stent is deployed with the aid of an 8 Fr delivery catheter with the constrained stent. This device is inserted through the working channel over the guide wire. We advance the delivery catheter of the Niti-S Taewong stent into the bile duct until we see a yellow mark on the sheath. This mark is of utmost importance as it identifies the distal end of the stent. Here it is: Take special care that this marking is always positioned 5–10 mm in front of the papilla during the whole deployment procedure. At fluoroscopic control, we see three fluoroscopic markings that identify the middle portion of the stent and the distal and proximal ends. Once this optimal position is achieved, the restraining mechanism is released, and the catheter expands to its predetermined diameter. During stent deployment, we have to adjust the stent position if necessary to keep the yellow mark in the desired place. As a rule, during expansion it is easier to withdraw the stent than to advance it. By the way: Compared to metal stents made from stainless steel, nitinol stents do not shorten as much during expansion. This is an advantage. Once fully deployed, the expandable stent will be firmly anchored in the duct. Now the delivery catheter is withdrawn through the expanded stent. This is the optimal stent position: Expandable stents inserted for distal common bile duct strictures should extend approximately 5–10 mm beyond the papilla into the duodenum. Extension exceeding 2 cm can cause duodenal ulceration and perforation. Fluoroscopic control confirms complete stent expansion with some narrowing at the level of the stenosis.

References

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