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IN THE EXPERT'S FOCUS

Features of Chronic Pancreatitis - A Focus on ERP ☆, ☆ ☆



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Video

Abstract

Endoscopic retrograde cholangiopancreatography (ERCP) offers an effective interventional option for treating symptomatic chronic pancreatitis. Endoscopic pancreatic sphincterotomy is performed to facilitate endoscopic treatment. Pancreatic duct strictures can be treated by inserting plastic stents, and a 10 Fr endoprosthesis is adequate in many cases. Before stent insertion, hydrostatic balloon dilation is needed in some cases. Pancreatic stones can be removed with a Dormia basket, but combining ERCP and extracorporeal shockwave lithotripsy (ESWL) is often most effective.

Standard and advanced endoscopic treatment approaches are delineated in this article and include stricture dilation with a Soehendra retriever, cSEMS placement and multi-stenting.

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Video related to this article

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*The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

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1. Background

- Chronic pancreatitis is a chronic-inflammatory disease that induces fibrotic changes in the pancreas, often manifests in recurrent bouts of painful exacerbations, and in many cases has an exogenous-toxic etiology
- The disease shortens the life expectancy and it most commonly manifests in men aged 20-40.
- Characteristic complications of chronic pancreatitis include the following and might be treated endoscopically as indicated (*):
 - chronic pain (*)
 - pseudocysts (*)
 - stenosis of the pancreatic duct (*)

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- compression of the common bile duct (**)
- duodenal stenosis (?)
- vascular complications (-)
- malnutrition (-)
- From these, recurring bouts of pain are the symptoms that most severely afflicts the patient. Endoscopic treatment aims at relieving pain without causing harm to the pancreas.
- Pain originating in a pancreatic duct stricture at the pancreatic head and/or in calcifications obstructing the main pancreatic duct, can successfully be approached by ERP.
- In case of failure to respond to endoscopic therapy other cause of the symptoms are probable.
- Alternative treatment options include surgical resection techniques and drainage procedures such as

Table 1 Evaluation criteria for various diagnostic techniques according to the Cambridge classification.

Cambridge classification	Endoscopic retrograde cholangio-pancreatography (ERCP)	Transabdominal ultra-sonography	Endosonography (EUS)	Computed tomography/magnetic resonance cholangio-pancreatography (MRCP)
Cambridge 0	No abnormalities with complete visualization of the pancreatic duct	Normal organ, duct <2 mm, smooth contour	None	None
Cambridge 1	Fewer than 3 abnormal side branches, main duct normal	Echo-dense organ contour, organ enlarged up to 1.5 times normal size, duct <3 mm, honeycomb-like lobulated texture	Honeycomb-like lobulated texture, duct <3 mm	Not identifiable with current CT or MRCP techniques
Cambridge 2	More than 3 abnormal side branches, main duct normal	Irregular contour, irregular echo-dense main duct >3 mm, lobulated texture with echo-dense septa	Hyperechogenic duct and foci, echo-dense contour, duct <3 mm	Two or more of the following abnormalities: <ul style="list-style-type: none"> – pancreatic duct 2 to 4 mm in the body of the pancreas – mild pancreatic enlargement – heterogeneous parenchymal structure – small cysts (<10 mm) – duct irregularities – more than 3 abnormal side branches
Cambridge 3	More than 3 abnormal side branches, main duct pathological	As in 2, with cysts and focal calcifications	Honeycomb-like lobulated texture, duct <3 mm Hyperechogenic duct and foci, echo-dense contour, duct <3 mm	All the abnormalities listed in 2, above, along with abnormal main duct (>4 mm)
Cambridge 4	As in 3, with cysts, duct stones, strictures, involvement of neighboring organs	As in 3, with duct stones, duct obstruction, organ enlarged by tumor to more than twice normal size, splenic vein thrombosis	As in 3, with calcifications, duct stones, cysts	One of the abnormalities listed in 2 or 3, above, and one or more of the following: <ul style="list-style-type: none"> – cystic structures >10 mm – parenchymal calcifications – intraductal filling defects (calcium stones) – duct obstruction (stricture) – major irregularity of duct

lateral pancreatico-jejunostomy, extra-corporeal shock-wave lithotripsy for calcifications, and Endoscopic ultrasound-guided celiac plexus block.

- Pseudocysts are endoscopically treated by a transpapillary or trans-mural drainage.

2. Materials

- Endoscope: Therapeutic video duodenoscope (e.g., outer diameter: 11.3 mm, working channel: 4.2 mm, TJF-Q180V; Olympus EMEA, Hamburg, Germany).
- Plastic stents for pancreatic stricture, e.g. 7 or 10 Fr pancreatic stent (Optimed medical Ettlingen; <http://www.opti-med.de/>), Germany; or: 10 Fr pancreatic stents (MTW, Wesel, Germany); Pusher: 10 Fr, 170 cm (MTW, Wesel, Germany).
- Guidewire (0.025", 270 cm, Visiglide with hydrophilic-coated tip; Olympus endotherapy, Olympus, Hamburg, Germany).
- Catheter (7 Fr, 1.8-2.3 mm, 215 cm; MTW, Wesel, Germany).
- cSEMS for pancreatic stricture: Covered self-expanding metal stent, e.g. TaeWoong medical, BK0807CW ('bumpy', 8 mm diameter, 7 cm length).
- Balloon dilation catheter for treatment of pancreatic stricture: Boston maXForce ttS™ (Boston scientific, Natick, MA, USA).
- Soehendra® Stent Retrievers for second line treatment of pancreatic stricture: for 7 Fr stent (SSR-7), 8.5 Fr stent (SSR-8.5) or 10 Fr stent (SSR-10) (Cook medical, Bloomington, Indiana 47402 USA).

3. Endoscopic procedure

- ERP is effective in treatment of main pancreatic duct strictures at the pancreatic head. Strictures in the pancreatic tail are usually not amenable to endoscopic treatment.
- ERP is frequently combined with ESWL in treating pancreatic calcifications and stones. Complications from endoscopic therapy, e.g. impaction of a basket at attempting stone removal or duct rupture, are best prevented by careful selection of patients.
- Multiple stenting might be an alternative to insertion of a single 10 Fr plastic stent, which is considered the first-line treatment option by many gastroenterologists.
- Fully covered metal stents (cSEMS) are an option for non-operative cases and recurring or refractory strictures.

4. Discussion

In chronic pancreatitis (cP), healthy parenchyma is replaced by fibrotic tissue due to chronic-recurrent inflammation.

Even if the most common classification of pathologic morphology of cP, i.e. the Cambridge classification (Table 1), is originally based on ERP findings, ERCP is rarely performed for diagnostic purpose in cP.

Therapeutic ERP is used to relieve the patient from symptomatic, painful cP. The intervention aims to alleviate the outflow obstruction to exocrine juice flow. This presumes that the obstruction (stenosis or stone) is the cause of the patient's symptoms. In case of failure to respond to endoscopic therapy other cause of the symptoms are probable. Pain relief can be achieved by endoscopic techniques in about two thirds of cases. Surgery is more likely to bring long-term relief compared to endoscopic techniques, but is associated with higher morbidity and mortality for pancreatic resection, and endoscopy usually does not impede later surgery [1-4].

For endoscopic intubation of the pancreatic duct the endoscope is placed in the short position with the papilla located in front. A normal cannula is then advanced at the 1-4 o'clock position of the native major papilla, but more to the 5 o'clock position of a papilla with prior biliary sphincterotomy. Minor papilla cannulation, when indicated, is typically achieved with the endoscope in the long position using a small catheter with a 0.018" to 0.025" guide wire. In case of a failed attempt, secretin may be administered intravenously to promote pancreatic juice flow; alternatively flushing methylene blue over the papilla may help to delineate the papillary orifices. Endoscopic pancreatic sphincterotomy is the first treatment approach in all patients and facilitates later endoscopic treatment but has a low rate of long-term relief if not additional endoscopic techniques are applied. Balloon dilation of the stricture and stent-insertion, e.g. 10 Fr plastic endoprosthesis are the mainstay of endoscopic therapy. Plastic stents are left in place for about one year in most centers. Pancreatic stenting is successful in 85-98% of cases and pain relief is immediate in most patients. During a follow-up of more than one year pain-free patients are observed in 32% to 68%.

Diameter of the plastic stent determines period of stent patency with larger stents (e.g. 10 Fr) occluding after 2-3 months, and smaller stents occluding earlier. Multiple plastic stent insertion is reported in one study, and might be advisable in some cases [4].

Pancreatic pseudocysts are a sequel of acute pancreatitis, pancreatic trauma or chronic pancreatitis in 20-40% of cases. In symptomatic pseudocysts, i.e. infection or symptomatic displacement of adjacent organs, transpapillary or transmural endoscopic therapy may be considered the first-choice treatment. The transpapillary route by way of ERP might be considered first, and might be more effective in small pancreatic cysts, but is feasible in only about 50% of cases. In case of lack of communication of the pancreatic duct system with the cyst, transmural drainage is needed.

Other techniques for pain relief included endoscopic ultrasound-guided celiac plexus block. The ESGE considers EUS-guided celiac block as a second line treatment for pancreatic pain in cP.

Chronic pancreatitis-related biliary strictures are not discussed in this article.

5. Tips and tricks

- In a few cases, the pancreatic stricture might be as tight that hydrostatic balloon dilation does not succeed. The Soehendra stent retriever might be an alternative in these cases by 'screwing' the device through the

stricture. A secure guidance by a (long) guide-wire is necessary to avoid damage to the pancreatic duct in this procedure.

- For cSEMS use, a diameter of 8 mm is adequate in most cases, and a diameter of 10 mm might not be tolerated by at least some patients. Non-covered SEMs are contraindicated in chronic pancreatitis.

6. Scripted voiceover

Voiceover Text

Outflow obstruction in chronic pancreatitis is amenable to endoscopic therapy: This overview highlights ERP in treatment of stenosis of the pancreatic duct or pancreatic calcifications.

For endoscopic intubation of the pancreatic duct the endoscope is placed in the short position with the papilla located in front.

Endoscopic sphincterotomy enables further endoscopic treatment.

Minor papilla cannulation is achieved with the endoscope in the long position.

In this first case, endoscopic therapy was offered for symptomatic pancreatic duct stricture of the pancreatic head and multiple intraductal calcifications.

Ballon dilation of the stricture had been performed to allow removal of the stones by use of a dormia basket.

Multiple 7 Fr stents are inserted consecutively for permanent dilation of the ductal stricture.

Plastic stents are placed side by side to improve dilation effect of stenting.

A pancreatic stricture in the pancreatic head recurred despite one year of treatment with multiple parallel plastic stents.

Successful treatment with a fully covered self-expanding metal stent was performed.

A large intraductal stone obstructs the main pancreatic duct in a 54 year old male patient; it is situated before a tight main pancreatic duct stricture.

Of note, this patient has a rare union of the cystic to the right hepatic duct.

Hydrostatic balloon dilation does not open the stricture. Stent insertion failed.

A Soehendra retriever is applied; with clockwise turning the device it is advanced through the stricture.

A plastic endoprosthesis can finally be placed over the stricture.

Prevertebral calcification resulted from abdominal trauma in a 40 year old male.

Repeatedly recurring abdominal pain was due to compression of the main pancreatic duct from the calcification. Insertion of an endoprosthesis let the pain immediately disappear.

ESWL was applied in and the stone completely fragmented.

ERP is an effective therapeutic option for treatment of main pancreatic duct strictures of the pancreatic head. Plastic stents or fully-covered self-expanding metal stents may be used, and ERP is frequently combined with ESWL for pancreatic calcifications.

Conflict of interest

No conflicts of interest.

Human and Animal Rights

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

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