10.6 Basic ERCP technique

Summary

1. Inserting the duodenoscope and positioning over the papilla 000
2. Locating the papilla 000
3. Cannulating the major papilla 000
4. Failure to cannulate the desired duct 000
5. Cannulating the papilla beside a diverticulum 000
6. Cannulating a stricture 000
7. Cannulating the minor papilla 000
8. ERCP in patients with altered anatomy 000
9. Successful cannulation rate 000
10. ERCP in children 000

Key Points

- Patience is key to successful cannulation.
- The major papilla usually has a ‘neck tie’ appearance.
- The minor papilla is usually 2 cm proximal and anterior to the major papilla and is usually most easily identified and cannulated with the patient supine.
- ERCP in patients with altered anatomy is associated with lower success rates and higher complication rates. It is essential to know what type of surgery has been performed. Augmented enteroscopy, with single/double balloon or spiral enteroscopy is sometimes required.

1. Inserting the duodenoscope and positioning over the papilla

How to intubate and position the duodenoscope in front of the papilla is illustrated in Figure 1. Gently insert the duodenoscope to the upper esophageal sphincter. The esophagus is intubated blindly with gentle forward pressure and slight clockwise torque. If there is resistance STOP, and change to a forward viewing gastroscope to exclude anything which may cause difficulties with intubation (i.e. Zenker’s diverticulum/stricture). Due to the side-viewing nature of the side-viewing duodenoscope, a full view of the esophagus is not possible. Once the duodenoscope passes the gastroesophageal junction, make a half turn clockwise and follow the lesser curve to the pylorus. As the duodenoscope is side viewing, the duodenum is entered by placing the pylorus in the ‘setting sun’ position, so that the upper half of the pylorus is visible at the 6 o’clock position. Check that the shaft of the scope is at 12 o’clock position when intubating the pylorus as this ensures optimum positioning in front of the papilla. The duodenoscope is then inserted into the second part of the duodenum. Two maneuvers are performed in succession: first turn the big wheel anticlockwise and the small wheel clockwise, thus deflecting the tip of the scope up and right, then withdraw the endoscope to 50–70 cm from the incisors to reduce the gastric loop.

1.1. Problems with intubation

- Unable to intubate the esophagus:
  - STOP. DO NOT PUSH. Withdraw the duodenoscope and insert a forward-viewing scope to exclude a pharyngeal pouch or stricture. A guidewire can be left in the stomach to guide insertion with the duodenoscope if required.
- The duodenoscope coils in the fundus:
  - Ensure the patient is fully in the left lateral decubitus position. If necessary, place a bolster under the patient. Withdraw to the cardia then deflect slightly to the right after advancing through the cardia once again. Follow the vertical folds along the lesser curvature to the pylorus
  - Avoid over inflating the stomach.
- The duodenoscope advances as far as the superior flexure of the duodenum facing upwards:
  - Rotate the scope to the right through 90°, by turning from facing the patient to facing the head of the patient. This will present the second part of the duodenum.

Box 1 Short versus long scope position

- In a short scope position, the duodenoscope is straight with no gastric loop, and is normally between 50–70 cm from the incisors.
- In the long scope, a gastric loop is left in the stomach, so the side-viewing duodenoscope is usually at 70+ cm.

2. Locating the papilla

The major papilla should now be in the field of vision. The major papilla consists of a frenulum, a hood, infundibulum, and orifice (Fig. 2). It is often a different color from the rest of the duodenum. The papilla should be inspected for evidence of stone passage (gaping or inflamed orifice), edema or papillary adenoma. The major papilla is then classified depending on its appearance (Fig. 3). This is important when assessing how far a sphincterotomy may be extended.

2.1. Problems identifying the major papilla

The papilla is normally found on the medial wall of the duodenum, but can be located anywhere from the duodenal
Figure 1. Inserting the duodenoscope and positioning over the papilla. (A) Duodenoscope advancing blind into the esophagus. (B) Advancing along the lesser curvature. (C) The endoscope rests on the greater curvature and faces the pylorus. (D) Deflection upwards, before advancing through the pylorus. (E) The apparatus advances to the superior flexure.
bulb to the mid-descending duodenum. If the papilla is not visible after performing the maneuvers described above, the following should be tried:

- Wait a little before changing position
- Improve visualization with antifoam solution (i.e. simethicone)
- Give glucagon to decrease duodenal motility
- Search for the papilla by gently lifting the mucosal folds with a catheter and look for the frenulum, infundibulum, or hood
- There is usually only one longitudinal fold in the second part of the duodenum – the major papilla is usually located at the end of this fold.

This is often described as having a ‘neck tie’ appearance (Fig. 4)
- Occasionally, the papilla is located in the third part of the duodenum. This can be reached using the long scope position (>70 cm)
- The infundibulum can be divided into four types (Type 0–3; Fig. 3). This system is useful if a pre-cut sphincterotomy is required. A Type 0 infundibulum is not suitable for pre-cut, while a Type 2 or 3 have the ideal configuration for pre-cut sphincterotomy.

In cases where there is difficulty identifying the major papilla, look for the ‘neck tie’ appearance with a longitudinal fold (arrow) in the second part of the duodenum.
2.2. Locating the minor papilla

The minor papilla is smaller (Fig. 5), and is usually located 2 cm proximal and anterior to the major papilla in the second part of the duodenum. It can be difficult to locate. In these cases consider the following:

- Use a long scope position: this is usually the optimum position to see the minor papilla
- Place the patient in the supine position
- Give secretin. Some authors recommend spraying the second portion of the duodenum prior to giving secretin.

3. Cannulating the major papilla

Flush the catheter or sphincterotome with dye prior to commencing the procedure to prevent any injection of air. Prior to attempting cannulation, optimize conditions and ensure there is an adequate view of the papilla by ensuring:

Figure 2 Normal papilla. (1) Papillary orifice. (2) Frenulum. (3) Hood. (4) Infundibulum.

Figure 3 Classification of the various types of infundibulum. Type 0: no infundibulum. Type 1: the infundibulum extends to the limit of visibility. Type 2: a prominent infundibulum. Type 3: a large infundibulum which covers the papilla.
• Duodenal hypotonia: give glucagon if necessary
• No bubbles or mucus: use antifoam solution (simethicone)
• Take time to optimally position the duodenoscope and ensure that the orifice is at the center of the image
• Wait a little for the orifice to open.

3.1. Cannulating the bile duct and pancreatic duct

To selectively cannulate the bile duct, the side-viewing duodenoscope should be placed below the major papilla. Place the catheter slightly below the papilla and direct the catheter vertically towards 11–12 o’clock (Fig. 6) in the right upper quadrant. Cannulation of the pancreatic duct requires the duodenoscope to be placed en-face, and slightly to the left of the papilla. The catheter should be placed on the right side of the papilla between 1 and 3 o’clock, with the catheter moving from left to right. If the os is difficult to catheterize, the catheter can initially be introduced a few millimeters, then directed towards the biliary or pancreatic orifice. The catheter is then introduced as far as possible into the chosen duct.

In obese patients, those with malignant pancreatic disease, particularly where there is a lesion in the genu of the pancreas, it can be difficult to properly centre the major papilla.

In these cases, a long scope position may be required, and the endoscopist may need to position themselves in the opposite of the classic position (i.e. at 90° to the patient’s face) (Fig. 7).

### Box 2: Role of a guidewire

- A wire allows the sphincterotome to be manipulated (i.e. withdrawn to just above the ampulla) without losing cannulation. This is very useful for people learning ERCP or after a difficult cannulation. It is useful for difficult cannulation (i.e. stenotic os)
- It can be useful to determine whether the correct duct has been cannulated, thus avoiding repeated injection of contrast into the pancreatic duct
- The guidewire is also very useful where minimizing contrast injection is important, e.g. in a patient with cholangiocarcinoma.
Figure 9 Selective cannulation with a wire. A wire can be used to selectively cannulate either the bile duct or the pancreatic duct. Once the correct duct has been cannulated with the guidewire, the sphincterotome is then inserted over it.

4. Failure to cannulate the desired duct

- Check that the catheter is in the correct orientation to cannulate the desired duct:
  - Use fluoroscopy to check the position of the endoscope and the direction of the catheter. To cannulate the bile duct, check that the tip of the endoscope is slightly under the papillary orifice, with the catheter pointing towards 11 o’clock (Fig. 8A). For the pancreatic duct, the tip of the endoscope should be placed in the same area as the papillary orifice, with the catheter directed towards 1–3 o’clock (Fig. 8A).

- The pancreatic and biliary orifices are separate:
  - If the pancreatic duct is repeatedly cannulated, look above the cannulated orifice for the biliary orifice.
  - The catheter is in the correct direction for the bile duct, but deep cannulation cannot be achieved:
    - This is because the catheter is up against the anterior wall of the ampulla or the common bile duct (Fig. 8B). Withdraw the endoscope slightly (Fig. 8C): when the papilla has disappeared from the visual field, push the catheter forward into the bile duct (Fig. 8D).
  - Use a hydrophilic guidewire to cannulate the desired duct (Fig. 9).

Clinical Tip

How do I know which duct I am in?

- Depth of duct cannulation:
  - Deep duct cannulation is usually associated with bile duct cannulation
  - Intermediate duct cannulation usually occurs after cannulating the pancreatic duct as the catheter comes up against the genu of the pancreatic duct
- Aspiration:
  - Aspiration of yellow bile or colourless pancreatic juice helps to determine which duct the catheter is in without injecting it
- Wire direction:
  - The direction of the guidewire can be used to confirm which duct has been cannulated. The wire should advance towards the diaphragm, moving towards 11 o’clock, when the bile duct is cannulated. The guidewire initially moves towards 1 o’clock followed by the 3 o’clock position if the pancreatic duct is cannulated.
5. Cannulating the papilla beside a diverticulum

Diverticulae frequently occur in the second part of the duodenum, especially in elderly individuals. In these cases, look for the papilla at the edges or inside the diverticulum (Fig. 10). Occasionally it is hidden by the duodenal folds, which should be lifted using a catheter. If the papilla cannot be identified, identify the frenulum and hence the papilla. Cannulating a papilla located at the edge, inside or in the middle of a diverticulum is usually possible. The difficulty arises when the papilla is located inside the diverticulum and with the os also facing towards the inside of the diverticulum. In these cases, the following can be tried:

- Evert the papilla by pressing with a catheter on the edge of the diverticulum without insufflating it too much.
- Gently tease the papilla outside the diverticulum with a biopsy forceps (Fig. 11C).
- Saline has been used to raise the papilla from the diverticulum (Fig. 11), however this can be associated with pancreatitis.

Needle knife pre-cut sphincterotomy should not be used to access the biliary or pancreatic duct, except in an emergency. If the above maneuvers fail, the procedure should be discontinued and a repeat attempt made 24–48 h later. This allows the edema to settle, and the second procedure is often successful.

Figure 10 Location of papilla in the presence of a diverticulum. The papilla is located at the left (A) or right (B) edge of a large diverticulum. This is the most common presentation. (C) Papilla between two small diverticula. (D) Papilla in the centre of large diverticulum.
• It is sometimes possible to place the tip of the endoscope into the diverticulum to center it.
• Percutaneous transhepatic wire can be inserted through the ampulla (rendezvous technique, see below).

6. Cannulating a stricture

Traversing a difficult stricture requires patience, skill and optimum X-ray control.
• Failure to cross the stricture. Consider using a fully hydrophilic wire for difficult strictures (Fig. 12). Also an angled tip is sometimes useful. Repeat forward and back movements while simultaneously twirling the wire. Occasionally, a 0.025 or 0.018 inch guidewire is needed. An ultratapered sphincterotome or cure-tipped 5–6 Fr cannula may also be useful. Once the stricture has been traversed, the sphincterotome is advanced across the stricture and the guidewire should be exchanged for a regular guidewire as this facilitates dilation or stent placement.
• The left hepatic duct is usually more difficult to cannulate. Bounce the guidewire off the lateral wall to cannulate the left hepatic duct. A swingtip or Haber Ramp catheter are occasionally useful in difficult cannulation.
• Cannulate the right hepatic duct by placing the sphincterotome at the level of the bifurcation and direct towards the right hepatic duct.
• Distortion of the second part of the duodenum by tumour can hinder the correct centering of the papilla. If cannulation of the papilla is difficult, determine if this is a technical problem or a low stenosis. Review pre-ERCP imaging (ideally MRC or EUS) to determine whether there is a low stenosis near the papillary orifice. In this case, use a sphincterotome mounted on a guidewire to find the orifice of the stenosis. Pre-cut sphincterotomy or diathermy loop excision of the infundibulum may be necessary.
• Make a loop with the guidewire (Fig. 13). Once the loop moves in the desired direction, advance the sphincterotome over the guidewire to the apex of the loop. Then withdraw the guidewire until the wire is straight. Reinsert the guidewire, forming a loop if necessary. This is repeated until the stricture is traversed.
• Advance stepwise if the stenosis has several angulations. The guidewire is advanced to the end of the first angulation (Fig. 14A). The sphincterotome is advanced over the guidewire to this point (Fig. 14B). The guidewire is advanced to the end of the second angulation, followed by the sphincterotome (Fig. 14C). This is repeated until the stricture is crossed (Fig. 14D).
• Changing the patient position can help. For complex hilar strictures, placing the patient in the dorsal decubitus position is often useful.
• Placing an inflated retrieval balloon below the stricture can stretch the bile duct and alter the axis.

Figure 11 Techniques for accessing a papilla located within a diverticulum. Saline can be injected (A) which raises the papilla from the diverticulum (B). However, this is associated with an increased risk of pancreatitis. Biopsy forceps can also be used to tease the papilla out of the diverticulum (C).
Basic ERCP technique

**Figure 12** Inserting a guidewire through a stricture. Strictures should be crossed initially using a guidewire. If the guidewire is hitting the side walls (A,B), withdraw the sphincterotome slightly (C). This maneuver allows optimal alignment of the guidewire with the stricture.

**Figure 13** How to manipulate the wire into the correct hepatic duct. (A) Produce a loop with the guidewire. (B) Push the catheter to the end of the loop. (C) Undo the loop formed by the guidewire. (D) Push the guidewire through the catheter lying in the correct direction. Withdraw the guide catheter to change the direction of the guidewire if the guidewire fails to pass through the stenosis.

**Figure 14** Inserting a guidewire through a complex stricture. The guidewire is advanced in a stepwise manner. The guidewire is advanced to the end of the first angulation (A). The sphincterotome is advanced over the guidewire to this point (B). The guidewire is advanced to the end of the second angulation, followed by the sphincterotome (C). This is repeated until the stricture is crossed (D).
7. Cannulating the minor papilla

The accessory or minor papilla is usually located 2 cm proximal and anterior to the major papilla in the second part of the duodenum. The os is often very small (2 mm), with the duct of Santorini running from the 5 o’clock to the 11 o’clock position. The easiest position to cannulate the minor papilla is in the ‘long’ scope position, with the patient supine. Patience is essential. Wait for the orifice to open before attempting cannulation. Cannulation is usually performed initially with wire, following with the sphincterotome once the duct has been cannulated. This is usually possible with a regular sphincterotome, however a tapered sphincterotome can be required if the os is very small or stenosed. Care should be taken to avoid submucosal injection. If the minor papilla is difficult to locate or cannulate, placing the patient in the supine position is often useful helpful. Secretin can be used to aid identification and to encourage the os to open.

8. ERCP in patients with altered anatomy

8.1. Post-surgical anastomoses

Performing ERCPs in patients who have undergone gastroenteric anastomoses is becoming increasingly common as more patients undergo gastric bypass surgery for obesity. It is important to know what type of surgery has been performed before commencing the ERCP, as this will determine the type of endoscope used, as well as the difficulty of the procedure. Some of these procedures, such as post-duodenopancreatectomy (Whipple’s) are technically demanding, and are often best referred to a tertiary referral centres.

8.2. Which endoscope to use?

A duodenoscope is usually used where possible, as the presence of the elevator facilitates cannulation. In addition, the side viewing assists location of the ampulla (Fig. 15A). However, it is sometimes not possible to reach the papillary area due to the length of the afferent loop. In these cases, a forward viewing scope should be used. Reaching the ampulla is often successful with a forward viewing scope, however the ampulla can be more difficult to visualize (Fig. 15B), and the lack of an elevator can make cannulation or exchanging over a guidewire difficult. The choice of forward viewing scope depends on what is available in the unit and the experience of the endoscopist. Options include a pediatric colonoscope, a single or double balloon enteroscope, or an enteroscope with Spirus overtube. Where a forward-viewing endoscope is used, but cannulation has failed, it...
is possible to leave a wire and then backload this wire onto a duodenoscope.

8.3. Pyloroplasty and Billroth I surgery
The major papilla can be reached with a duodenoscope, and the common bile duct or pancreatic duct are cannulated as normal.

8.4. Gastroenteric anastomosis with a preserved pylorus
In cases of gastroenteric anastomosis, a duodenoscope can be used if the pylorus is patent. However, the pylorus often becomes stenosed. In these cases, the afferent loop should be used to access the papilla.

8.5. Choledochoduodenal anastomosis
For patients with a choledochoduodenal anastomosis (Fig. 16A), a forward-viewing endoscope is sometimes required. The anastomosis is usually located on the anterior side of the bulb. If the anastomosis is patent, the endoscope can be introduced into the bile duct. If it is an end-to-side choledochoduodenal anastomosis (Fig. 16B), i.e. if the segment underlying the anastomosis is closed, access to the papilla should be gained using a duodenoscope.

8.6. Pancreaticoduodenectomy (Whipple’s)
The classic pancreaticoduodenectomy described by Whipple consists of removal of the pancreatic head, duodenum, first 15 cm of the jejunum, common bile duct, and gall-bladder, as well as a partial gastrectomy (Fig. 17). There is

Figure 16 Choledochoduodenal anastomosis. (A) A side-to-side choledochoduodenal anastomosis. (B) An end-to-side choledochoduodenal anastomosis.

Figure 17 Classic Whipple. This is a non-pylorus preserving pancreaticoduodenectomy. The head of the pancreas has been resected. There is a gastrojejunostomy, with an afferent and efferent limb. The afferent limb leads to the hepatico and pancreaticojejunostomies. Note that the pancreaticojejunostomy is past the hepaticojejunostomy and is often found almost at the end of the afferent limb.
There are two types of gastric bypass surgery performed. In patients with gastric outlet obstruction, a side-to-side gastrojejunostomy is performed. Patients undergoing gastric bypass surgery as a treatment of obesity often have a gastric pouch which is separated from the rest of the stomach. The pouch empties into an end-to-side gastrojejunostomy. A jejuno-jejunostomy connects the other part of the stomach, duodenum and jejunum in a Roux-en-Y configuration. Although it is occasionally possible to reach the anastomosis with a duodenoscope, a forward viewing endoscope is usually required. There is a native papilla, but as with a Billroth II or pancreaticoduodenectomy, the anatomy is reversed with the bile duct between 5 and 6 o’clock.

Box 3 The afferent loop

**How to identify and enter the afferent loop**
- The afferent loop is almost always more difficult to access than the efferent loop
- The afferent loop is usually adjacent to the lesser curve
- If it is not possible to intubate the afferent loop, place the patient to prone or supine position
- A wire can be advanced into the correct loop, and the endoscope guided over the wire into the loop
- If this fails, a CRE wire-guided balloon is sometimes useful. It can be inflated in the loop, and the endoscope then guided into the loop. These procedures should be performed under fluoroscopic guidance to avoid complications.

**How do I know if I am in the afferent loop?**
There are several tools you can use to determine if the endoscope is in the correct loop:
- Use fluoroscope to confirm that the endoscope is moving towards the right hypochondrium
- The presence of bile.

Clinical Tip

**Sump syndrome**
’Sump syndrome’ is a rare complication of a side-to-side choledochoduodenostomy (Fig. 10). The common bile duct between the anastomosis and the ampulla of Vater acts as a reservoir in which debris and stones collect. This can result in abdominal pain, cholangitis, biliary obstruction or pancreatitis. ERCP findings include dilated bile or pancreatic duct, and signs of chronic pancreatitis.

Box 4 Jejuno-jejunal anastomoses

- Enteric anastomoses can either be in the ‘Y’ configuration, which presents the endoscopist with two lumens to choose from, or in a side-to-side anastomoses, which appears as three lumens
- The afferent loop is usually the most difficult loop to enter.

8.9. Gastric bypass surgery

There are two types of gastric bypass surgery performed. In patients with gastric outlet obstruction, a side-to-side loop gastrojejunostomy is performed. Patients undergoing gastric bypass surgery as a treatment of obesity often have a gastric pouch which is separated from the rest of the stomach. The pouch empties into an end-to-side gastrojejunostomy. A jejuno-jejunalostomy connects the other part of the stomach, duodenum and jejunum in a Roux-en-Y configuration. Although it is occasionally possible to reach the anastomosis with a duodenoscope, a forward viewing endoscope is usually required. There is a native papilla, but as with a Billroth II or pancreaticoduodenectomy, the anatomy is reversed with the bile duct between 5 and 6 o’clock.
8.10. Cannulating the bile duct and pancreatic duct in patients with Billroth II or Whipple’s procedure

In Billroth II the ampulla will be intact, while in a Whipple’s or other reconstructive surgery there will be a surgical anastomosis (i.e. choledochoenteric anastomosis), and the pancreatic and bile duct anastomoses are usually found separately in the jejunum. The pancreatic duct is often located just proximal to the end of the loop, while biliary orifice is located proximal to the pancreatic orifice, on the anti-mesenteric wall. As the papilla has been reached retrograde through the afferent loop, the anatomy is reversed by 180° with the biliary orifice found between 5 and 6 o’clock rather than the normal 11 o’clock position (Fig. 19). A straight catheter can be used to cannulate the bile duct or pancreatic duct. It is helpful to maintain an en-face position and exaggerated distance away from the ampulla. A standard cannula is sometimes useful, as a standard sphincterotome may make biliary cannulation difficult in this situation due to its pre-curve. In our experience, guidewire cannulation is particularly useful in these circumstances.

8.11. Rendezvous procedure

A percutaneous transhepatic catheter (PTC) is inserted by an interventional radiologist prior to or at the same time as the ERCP.

Technique (Fig. 20)
- Identify the percutaneous catheter
- Insert a sphincterotome into the catheter
- The percutaneous catheter containing the sphincterotome is retracted into the bile duct
- The sphincterotome is placed in the papilla and a standard sphincterotomy performed.

Alternative techniques
- Use the PTC catheter as a guide, and cannulate alongside the catheter using a sphincterotome with a wire.
- A guidewire is inserted percutaneously (Fig. 21). The guidewire is retrieved using a snare and gently pulled into the instrument channel. A sphincterotome is then inserted over guidewire and a standard sphincterotomy performed.
- A variation of this is where a catheter has been placed by radiology. Insert a guidewire through the catheter (Fig. 22). The guidewire is retrieved using a snare. A sphincterotome is then advanced over the guidewire as the catheter is being withdrawn.

Box 5 How to reach the duodenal stump
- The afferent loop should be approached in a similar manner to a colonoscopy, with repeated shortening of the endoscope and removal of loops
- Contrast can be injected either through a catheter or a CRE balloon (if reflux of contrast is a problem). This is useful where there are sharp angulations to determine the direction of the afferent loop
- External manual compression can be useful
- Take care not to stretch the anastomosis, as perforation can occur.

Note!
It is very important to work closely with radiology. Large catheters should not be removed without prior discussion with radiology, as these can cause bile to leak into the peritoneum.
Figure 20  Rendezvous procedure. (A) A PTC catheter is inserted by an interventional radiologist. (B) The catheter is identified. (C) The sphincterotome is advanced up the bile duct. Once access to the bile duct has been secured, the PTC catheter is withdrawn. (D) Biliary sphincterotomy is performed.
Figure 21 Rendezvous procedure. (A) Percutaneous insertion of a guide through the papilla. (B) Retrieval of the guide using a snare which is re-inserted in the operating channel. (C) A sphincterotome is inserted over the guidewire. (D) Biliary sphincterotomy is performed.

Figure 22 Alternative rendezvous technique for access to the papilla. (A) The percutaneous guidewire is recovered using a diathermy loop. (B) The guide catheter is mounted on the guidewire in the bile duct. (C) The stent is pushed through the stenosis. (D) Withdrawal of the guidewire before withdrawal of the catheters. (E) Stent in the hepatic parenchyma to be repositioned.
and the bile ducts in 85–90%. Failures are due to duodenal stenosis, a papillary lesion, or the intradiverticular location of the papilla.

In patients with altered anatomy, success rates depend on the type of surgery. Patients with a pyloroplasty, Billroth I, or choledochoduodenal anastomosis, have a similar success rate to normal ERCP. Patients with a Roux-en-Y have lower success rates of between 60% and 75%, provided the afferent loop is not too long or located transmesocolically.

10. ERCP in children

ERCP in children should be undertaken under general anesthesia. A diagnostic side-viewing duodenoscope may be used from the age of 1 year upwards. A therapeutic duodenoscope can be used in children over 5 foot. A 7.5 mm diameter duodenoscope with a 2.0 mm operating channel is available for use in children under the age of 1. There are few indications: bile duct stones, jaundice due to bile duct malformation, recurrent pancreatitis, pancreatic trauma, bile stones.