Precut sphincterotomy: Another perspective on indications and techniques

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INTRODUCTION

Precut sphincterotomy/papillotomy refers to a variety of endoscopic techniques used to gain access to the bile (and occasionally pancreatic) ducts before deep cannulation has been achieved. The term "precut" has been used to describe this technique because an incision is made on the papilla prior to free cannulation and/or guidewire cannulation. Many authors have taken issue with this nomenclature, preferring instead to call the maneuver "access papillotomy" [1] or "fistulotomy" [2]. Regardless of semantics, the term "precut" is popularly accepted and will be used here.

This topic review will focus on the commonly used techniques for performing precut sphincterotomy, while providing the authors' perspective on this controversial technique. A discussion on the efficacy and complications of precut sphincterotomy is presented separately (see "Precut sphincterotomy: Another perspective on efficacy and complications"). Because of the controversy surrounding this area, this topic is also presented separately from the perspective of another authority. (See "Precut (access) papillotomy".)

INDICATIONS

Precut sphincterotomy is widely considered to be a risky procedure that should be used only by experts and only when all reasonable efforts at gaining access to the biliary tree by

conventional methods have failed [3-5]. Most authorities believe that unless there is an absolute need, failure to gain biliary access by itself is not an indication for precut sphincterotomy. Precut sphincterotomy should not be undertaken for a purely diagnostic endoscopic retrograde cholangiopancreatography with low likelihood of therapeutic intervention [1,6].

On the other hand, precut sphincterotomy is reasonable if attempts at conventional cannulation have failed and if there is a compelling need to have biliary access (suspected malignant jaundice, common duct stones, cholangitis, etc) [7]. The decision must be made after an honest appraisal of one's own endoscopic skill, the skill of others immediately available, and the availability of percutaneous or surgical methods. In experienced hands and in highly selected cases, precut sphincterotomy can be safe and effective [1,2,8-10].

METHODS

At least five different methods are commonly used by experts to perform precut sphincterotomy, which can be broadly grouped into needle knife and non-needle-knife techniques.

Needle knife techniques — Precut sphincterotomy has traditionally been accomplished using a needle knife, although a number of variations have been described.

Our technique — The method we prefer is a variation of needle-knife papillotomy (NKP), in which a thin-wire, needle-knife papillotome (HPC-2, Wilson-Cook Medical, Winston-Salem, NC) is used to incise the papilla in an upward direction beginning at the orifice [8,9]. Although similar to the manufacturer's instructions and other published methods, our technique differs in a number of ways.

We do not use the elevator to stroke upward at the papilla with the needle knife, which we believe increases the risk of perforation and damage to the pancreatic duct (PD). This is because, in stroking upward with the elevator, the needle knife also moves **outward** at the apex of the stroke, sometimes yielding a deeper penetration than intended.

Instead, after exposing 2 to 3 mm of cutting wire, we lock the elevator in the fully up position and use scope positioning and dials to engage the papillary orifice gently with the needle. The endoscope is rotated and/or the outer dial is adjusted to ensure an en face position so that the cut will be in the 11 to 12 o'clock direction. Care is taken to ensure that the tip of the needle is just under the roof of the papilla and not impacted against the duodenal wall or the PD orifice. The endoscope is then retracted very slightly, lifting the papilla and placing a small amount of tension on the wire, a maneuver we call "loading the wire" (figure 1A-B).

A small burst of blended current is then delivered, yielding an incision 2 to 3 mm long and 2 to 3 mm deep. The endoscope is then withdrawn slightly, and the dials are adjusted as necessary to "load the wire" once more at the top of the freshly made incision. The cut is continued in small increments in this fashion until the incision reaches an arbitrary upper limit (usually well below the first transverse fold, or below the junction of the papilla and the duodenal wall).

The incision is then carefully inspected for bile seepage. If bile is seen, the area of seepage can be probed gently with a cannula or cannula/guidewire combination in an attempt to access the bile duct. Once access is gained, the sphincterotomy can be completed with a conventional, pull-type papillotome as needed (figure 2). If no bile is seen, or if careful, gentle probing does not result in free cannulation, the needle knife can be used to unroof more of the papilla, once again beginning at the orifice and advancing through the previously cut area to expose deeper layers. In this way, the papilla can be unroofed by layers until bile flow indicates that an attempt at cannulation is needed. In practice, it is rare to need more than two complete passes of the needle knife (from orifice to apex, in short bursts) to obtain biliary access.

We believe that our NKP technique is safer than swiping at the papilla using the elevator, a method that lends itself to overuse of the foot pedal and in which it is difficult to control the depth of the cut. From January 1991 to December 1995, we performed 1000 biliary sphincterotomies at our institution, with 154 of these being initiated as NKP (15 percent) [9]. The overall complication rate (bleeding, pancreatitis, infection, and perforation) was significantly higher compared to non-needle-knife sphincterotomy (3.9 versus 0.71 percent). However, no severe complications were observed in the precut group. Furthermore, the difference in pancreatitis rates (0.36 percent for the non-NKP group and 1.9 percent in the precut group) was not statistically significant.

Other groups have noted a threefold increase in pancreatitis rates among patients who were difficult to cannulate [10]. Therefore, the trend toward an increased pancreatitis rate in our series is not surprising. However, our experience suggests that a well-practiced and careful precut technique may actually prevent many complications that would otherwise be expected due to prolonged and repeated attempts to gain access.

Elevator-directed needle knife — A common method of performing NKP is to use the elevator to direct the needle knife while incising the papilla [11-13]. The mechanics of this technique are similar to what was described above, beginning at the papillary orifice and extending the cut cephalad. However, instead of "loading the needle" by retracting the endoscope, the needle is moved upward with the elevator while applying blended current (figure 3). Advocates of this technique believe it is safe and effective in experienced hands.

A modification of this technique involves beginning the incision 2 to 3 mm **above** the ampullary orifice, ostensibly to avoid the PD and its orifice [14]. Once the bile duct is entered, the sphincterotomy can be completed with a standard, pull-type papillotome, and therapeutic maneuvers can be performed. The lower fibers of the papillary roof need not be transected.

Needle knife over pancreatic duct stent — A clever variation of NKP has been applied in settings in which biliary cannulation has failed and when a periampullary diverticulum precludes correct orientation of the papilla for conventional NKP [15]. A temporary PD stent is placed, which causes the papilla to protrude from the diverticulum. A needle knife is then used to make an incision along the PD stent, thereby unroofing the papilla. The PD stent is usually left in place after the procedure to help prevent pancreatitis in case the pancreatic sphincter was damaged during the precut.

Using this method, bile duct cannulation was achieved in seven of eight patients (88 percent) who would otherwise have had a failed endoscopic retrograde cholangiopancreatography. However, two of the eight patients developed pancreatitis (one despite placement of a pancreatic stent). Nevertheless, this may be a useful technique to remember in highly selected individuals with an intradiverticular papilla.

Non-needle-knife techniques — Non-needle-knife techniques involve variations on pull-type sphincterotomy. Only one non-needle-knife technique is commonly used.

Transpancreatic sphincter — An intriguing non-needle-knife precut technique has been used when attempts at biliary cannulation have repeatedly led to PD cannulation (as shown by injection or by wire placement) [16]. The nose of the pull-type papillotome is left in the PD, and the common channel is then unroofed in the biliary direction with the cutting wire (figure 4).

An advantage with this technique is that an extra device (eg, a needle knife) is not required, and the pull-type papillotome used is very familiar to the community gastroenterologist. On the other hand, the potential for damage to the PD orifice is great. If a standard papillotome is extended 5 mm or more into the PD, the pancreatic duct sphincter will be involved in the cut, and the risk for pancreatitis is presumed to be high. This risk was not discussed in the original report of this method, which involved a total of 110 patients undergoing endoscopic sphincterotomy (ES) [16]. Seventy-one patients underwent standard ES, 32 underwent transpancreatic duct ES, and 7 underwent needle-knife sphincterotomy. The rate of pancreatitis was similar in the standard ES and in the transpancreatic groups (10 versus 12, percent, respectively), a difference that was not statistically significant.

However, one criticism of this study is that several patients in the standard ES group underwent sphincter of Oddi manometry, a known risk factor for pancreatitis; three of the seven patients

who developed pancreatitis had manometry. This may have served to inflate the pancreatitis rate in the conventional ES group. If these patients are excluded from the data analysis, the pancreatitis rate in the standard ES group was only 6.5 percent, approximately one-half that of the transpancreatic precut group.

Novel techniques — A number of novel techniques have been described in small numbers of patients. (See "Precut (access) papillotomy".)

SUMMARY AND RECOMMENDATIONS

- Precut sphincterotomy/papillotomy refers to a variety of endoscopic techniques used to gain access to the bile (and occasionally pancreatic) duct before deep cannulation has been achieved. (See 'Introduction' above.)
- Precut sphincterotomy is widely considered to be a risky procedure that should be used only by experts and only when all reasonable efforts at gaining access to the biliary tree by conventional methods have failed. Most authorities feel that unless there is an absolute need, failure to gain biliary access by itself is not an indication for precut sphincterotomy. (See 'Indications' above.)
- Performing precut sphincterotomy is reasonable if attempts at conventional cannulation have failed and there is a compelling need to have biliary access (suspected malignant jaundice, common duct stones, cholangitis, etc). (See 'Indications' above.)
- At least five different methods are in use to perform precut sphincterotomy, which can be broadly grouped into needle knife and non-needle-knife techniques. (See 'Methods' above.)

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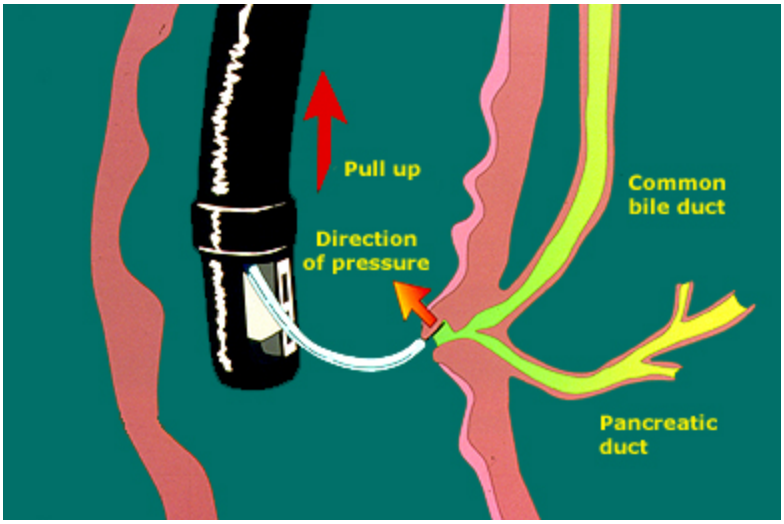
GRAPHICS

Loading the wire technique for precut sphincterotomy

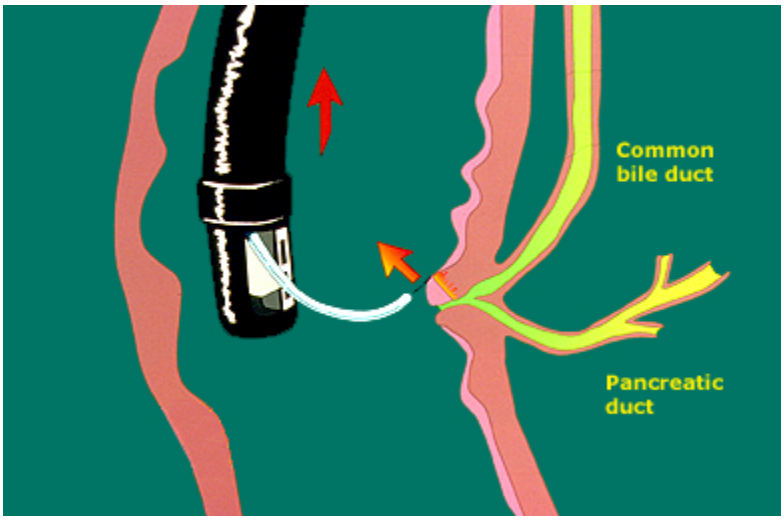


Cartoon depicting the "loading the wire" technique for creating a biliary sphincterotomy (see text for details).

Courtesy of Douglas A Howell, MD and David J Desilets, MD, PhD.

Graphic 52590 Version 2.0

Completion of precut sphincterotomy with blended current

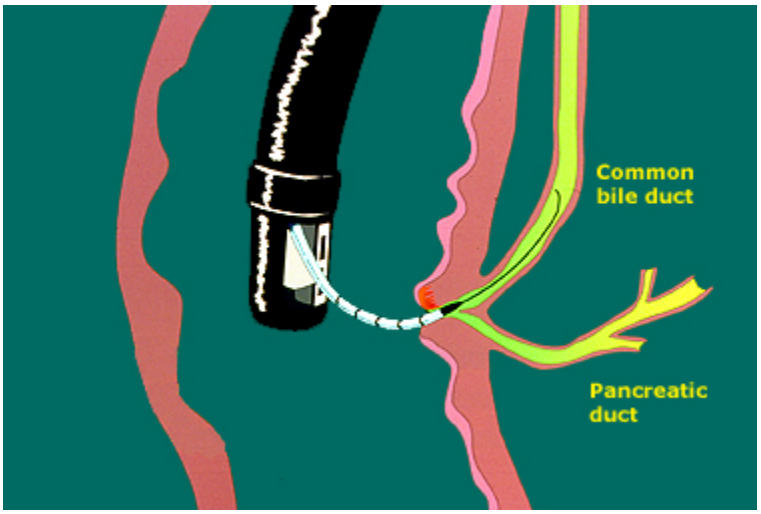


After an initial 2 to 3 mm incision is made with the "loaded wire" method, the endoscope slightly withdrawn, and the dials are adjusted as necessary to "load the wire" once more at the top of the freshly made incision. The cut is then continued in small increments.

Courtesy of Douglas A Howell, MD and David J Desilets, MD.

Graphic 64371 Version 2.0

Sphinterome insertion with guidewire assistance to complete precut sphincterotomy

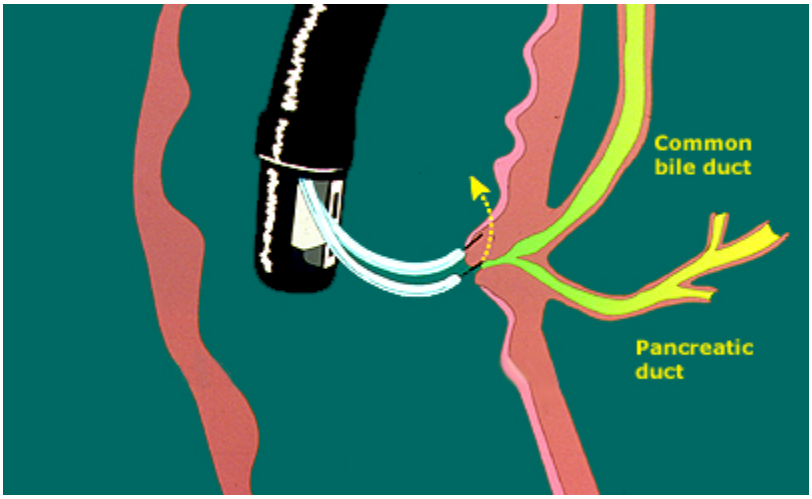


Once access has been gained, a standard guidewire and papilltome can be used to complete the sphincterotomy.

Courtesy of Douglas A Howell, MD and David J Desilets, MD.

Graphic 75790 Version 2.0

Needle-knife approach for precut sphincterotomy

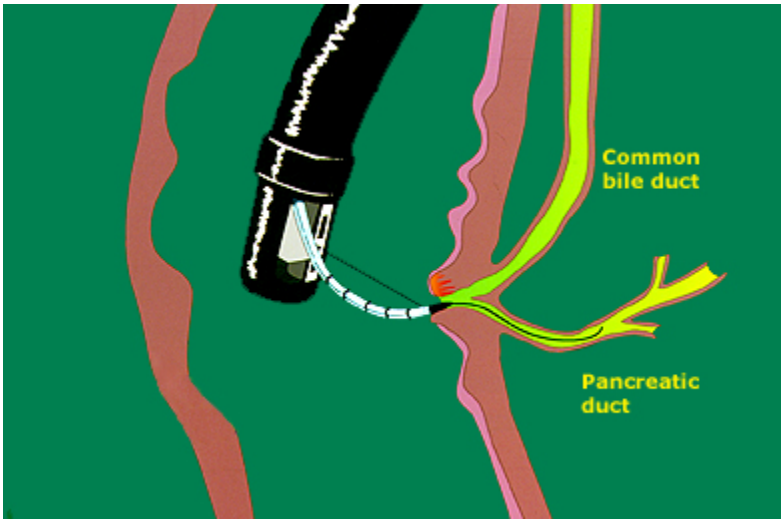


A common method of performing needle-knife sphincterotomy is to use the elevator to direct the needle-knife while incising the papilla.

Courtesy of Douglas A Howell, MD and David J Desilets, MD.

Graphic 50813 Version 2.0

Precut sphincterotomy



The nose of the pull-type papillotome is left in the pancreatic duct and the common channel is then unroofed in the biliary direction with the cutting wire.

Courtesy of Douglas A Howell, MD and David J Desilets, MD.

Graphic 57083 Version 2.0

Contributor Disclosures

David J Desilets, MD, PhD No relevant financial relationship(s) with ineligible companies to disclose. **John R Saltzman, MD, FACP, FACG, FASGE, AGAF** No relevant financial relationship(s) with ineligible companies to disclose. **Kristen M Robson, MD, MBA, FACG** No relevant financial relationship(s) with ineligible companies to disclose.

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