Precut: two (combined techniques) better than one

One of the most satisfying images for biliary endoscopists is a freely ascending guidewire within the bile duct after struggling (and suffering) to enter the papilla. Such deep biliary cannulation is a necessary prerequisite for elective treatment, usually following sphincterotomy. From the start, this suffering comes by the hand of the endoscopic retrograde cholangio-pancreatography (ERCP) technique. Early endoscopic cannulations of the papilla of Vater by McCune, Shorb, and Moscowitz (1) had a success rate of only 25%. Fortunately enough our performance is now clearly better – improved duodenoscopes, cannulas of various types, sphincterotomes, guidewires and other accessories are available, wherewith different techniques have been developed to access the biliary tract via the pancreatic duct in order to remove stones, drain blocks, repair leaks, or perform a number of other treatments (2-4). However, in spite of these technical and methodological advances we still cannot ensure biliary cannulation on all occasions. Anatomic features and —of course— endoscopist experience play a role in this. It is widely accepted that following appropriate training a biliary endoscopist should be able to cannulate the desired duct in over 80% of attempts, that most endoscopists should be successful at cannulation in over 85% of cases, and that expert endoscopists in high-level sites should perform successful cannulations on 95% of occasions (5). Real practice studies do not fully support these data. A review of over 5,000 ERCPs in England showed that 77% of endoscopists obtained cannulation rates above 80%, and only 42% were successful in over 90% of attempts, not to mention that the cannulation rate among senior endoscopists with more than 200 ERCPs performed was 66% (too many trainees in too many low-volume centres) (6). A few months ago Revista Española de Enfermedades Digestivas offered a fine article on ERCP implementation in a low-volume hospital (7), as well as a brilliant editorial with contrasting viewpoints on this controversial topic (8).

In summary, despite technological advances, ERCP —most probably the most challenging, complex endoscopic technique with the highest morbidity and mortality— fails to provide the biliary cannulation needed for a complete procedure in up to 20% of patients (9,10). Alternatives to this failed intervention include referral —when possible— to a more experienced, skilled (or lucky) colleague; delayed examination (another day, other hands), or alternative methods (percutaneous access by interventional radiology, surgery, and more recently —without leaving the endoscopy unit— endoscopic ultrasound-assisted access to the biliary tract (11,12). Another option, possibly before examination delay, would be precut prior to cannulation. So-called precut sphincterotomy—or simply precut— involves first cutting the duodenal mucosa at the ampulla of Vater in order to uncover the bile duct and facilitate access.
Early endoscopic precuts were described a few years following the first sphincterotomies reported by Classen and Kawai in 1974, and simply consisted of an extension of existing spontaneous choledocho-duodenal fistulas in the papillary area using the sphincterotome (13). Shortly afterwards a specific endoscopic fistulotomy was performed using a needle-knife sphincterotome in a patient with obstructive jaundice from pancreatic cancer having undergone a failed conventional ERCP procedure (14). The term precut was first used by Siegel in 1980 as a “novel approach to improve success rates in ERCP and sphincterotomy” (15). He used a conventional sphincterotome to advance 3-5 mm into the papilla and make a cut towards the bile tract. He successfully performed this procedure for 18 patients with scarce complications (2 patients with transient fever and high amylase levels). Even then the author concluded “Precut papillotomy is recommended when bile duct opacification is not possible because of papillary stenosis, stone impaction, or natural or acquired anatomic variations, and should only be performed by endoscopists experienced in ERCP and papillotomy” (few changes have occurred over the last 30 years!).

Basically, we may categorize precut methods according to type of sphincterotome (needle-knife sphincterotome and classic or modified pull-type sphincterotome) and cutting technique. Traditionally in needle-knife precut sphincterotomy (NK-PCS) the cutting starts at the papillary orifice itself and proceeds cephalad (towards “11 o’clock”) for at least 5-6 mm at a depth of at least 2-4 mm. Such is the description in the first study representative of the technique by Kees Huibregtse in Amsterdam (16). He used precut for 190 patients and was successful in 91 % of cases with few complications (1 % pancreatitis, 1.5 % bleeding), not more than with conventional sphincterotomy. Subsequent studies by this team reveal similar results (99 % of success) albeit with more complications (12 %) (17). A variant of this technique also uses a needle-knife sphincterotome to start cutting at the papillary impression and then proceed downwards. This would be needle-knife precut sphincterotomy, fistulotomy type (NK-PCS/F). Advantages include avoidance of the papillary orifice (pancreatitis theoretically less likely) and perhaps clearer anatomic borders. This procedure is preferred by some experts (18,19).

The other group is standard precut sphincterotomy (PCS) or Erlangen-type precut sphincterotomy (ET-PCS), with the Erlangen type being a modified pull-type sphincterotome with a short (5-10 mm) cutting wire that virtually reaches the instrument’s end (leaving a free tip of only 1-2 mm). The use of ET-PCS is limited even though the results achieved by Nib Sohendra’s team in Hamburg are very good (20), including as an alternative to conventional cannulation (21). A variant of these precut modalities is performed with a standard sphincterotome by placing its tip (5-6 mm in contrast to the Erlangen variety) within the pancreatic duct and directing the diathermy wire towards “1 o’clock” to cut the common septum. This is called transpancreatic precut (TPPC) or transpancreatic septotomy, which was initially described by Goffe and has become increasingly popular in the last few years (23-25), possibly because it offers a steadier, better controlled cut versus NK-PCS (“hands-free”).

Excellent reviews are available with in-depth technical descriptions and results for precut sphincterotomy (2,18). Its use by endoscopists is highly variable (0-38 %), initial success in accessing the biliary tract also offers a wide range of results, around 35-97 % (usually above 60-70 %), and successful outcome rates are usually higher than 90 %, with 2-39 % of complications (2). This is one of the big dilemmas and black legends regarding precut. Different multicenter prospective studies show that precut is overall a risk factor for ERCP complications when using a multivariate analysis (26-29). The association of precut with specific complications, particularly
pancreatitis, yields conflicting results—from studies demonstrating that this procedure indeed is a risk factor in multivariate analyses (26,28) to studies that only show this in univariate analyses (30), through studies where precut is no risk factor at all for pancreatitis (27,29,31,32). Other complications (bleeding, perforation) also show conflicting results in association with precut (33). The overall trend is that most multicenter studies suggest an increase in complications when using precut as compared to conventional sphincterotomy, whereas other studies by experts, usually from tertiary institutions, do not support this notion. Such discrepancies likely reflect different patient profiles, precut timings, techniques, and endoscopist experiences (34,35). As regards precut timing, studies are available that support repeat cannulation attempts (over 10?) with the mechanical and maybe pressure trauma entailed by (unnoticed) injections in the pancreatic duct, and which are more responsible for post-ERCP pancreatitis than precut itself, which might even represent a protective factor when performed early during the procedure (36-38).

No confirmed evidence exists on the superiority of any individual precut technique. When reviewing some of the last-decade studies with higher numbers of patients on the most common precut types, results regarding final success/complications are 70-98 % / 12-15 % for NK-PCS (37,39,40), 87-90 % / 5-7 % for NK-PCS/F (41,42), and 56-95 % / 10-12 % for TPPC (24,25,40).

Few studies compare these techniques with one another, and they usually include few patients. Some suggest similar effectiveness for NK-PCS/F and NK-PCS, with fewer pancreatitis cases with the former modality (39,43). TPPC has gradually consolidated itself as a valid alternative to NK-PCS (44), achieving even better outcomes and fewer complications in some papers (45) while others reveal similar success and complication rates (46). A recent study in 274 patients compared various techniques (NK-PCS 47 %, NK-PCS/F 28.5 %, and TPPC 24.5 %). Success rates for these three types of precut were similar but complications were less common with NK-PCS/F (47). In the series with the highest number of TPPCs (n = 262) (40) it is concluded that the technique has a high success rate although biliary cannulation is only achieved for 56 % of patients, and 41 % required a subsequent NK-PCS to complete the procedure. An interesting study applied different precut techniques according to the papilla’s anatomic features (TPPC for small papillas, NK-PCS for big papillas, and NK-PCS/F for swollen papillas) with positive results (48). Few studies use precut modalities in combination, and those that do so —except for one of the above-mentioned studies (40)— include very few, marginally discussed patients (26,44,46,48).

This issue of Revista Española de Enfermedades Digestivas includes two studies (49,50) on the use of combined precut techniques by the two most experienced Spanish endoscopists in this aspect of ERCP (51-53). Both highlight the benefits of combining various precut modalities to achieve biliary cannulation when a single technique fails to do so.

The review by Espinel (49) of his series (2004-2012) of 247 precuts shows 48 patients with failed TPPC followed by a highly successful NK-PCS, which resulted in biliary cannulation (83.3 % at initial endoscopy, 16.6 % required a second procedure) with very few complications —only 1 pt. (2 %) had bleeding—. Bearing in mind that the combination group included patients whose papilla had undergone at least 5 conventional cannulation, pancreatic cannulation with septotomy, and ultimately needle-knife sphincterotomy attempts, this complication rate is really low, even when compared to separate TPPC and NK-PCS procedures in this same series (9 % and 7 % overall, respectively). Surely the endoscopist’s great experience plays a role in these numbers, but we should possibly be cautious in extrapolating these results to other scenarios.
The study by De la Morena (50) reviewing 119 precuts (2007-2012) shows a group of 20 patients with a failed initial precut where an additional technique was successful in 75% of cases, thus increasing the combined success rate to 80% with single precuts and 92% with combined techniques. In contrast with the previous study combined techniques included both TPPC followed by NK-PCS (14 patients) and NK-PCS followed by TPPC (6 patients), with a success rate of 71% and 83%, respectively. Increased success in both groups was 70 to 90% (TPPC + NK-PCS) and 87 to 94% (NK-PCS + TPPC). An overall complication rate of 18% is reported (4 pancreatitis, 9 bleeding events, 4 perforations) for all precuts, although with nearly 20% of failed follow-ups (possibly an underestimation, the author reports). Combine procedures added 17% of complications (1 bleeding, 2 perforations). While low numbers make it difficult to draw conclusions, the author suggests that, although TPPC + NK-PCS seemed more effective (success increased by 20 versus 7% for NK-PCS + TPPC), it is NK-PCS + TPPC that he recommends for higher efficacy (83%, possibly because of greater biliary cannulation with initial NK-PCS) and safety (added TPPC resulted in only 1 bleeding episode, whereas added NK-PCS gave rise to 2 perforations).

Even though both authors find increased biliary cannulation with combined techniques, differences in success and morbidity rates between these two studies are remarkable: 100% and 2% in the study by Espinel versus 75% and 17% in the study by De la Morena. Establishing the causes for these differences is indeed challenging. Both authors are renowned for their experience as biliary endoscopists, both series used an ERBE ICC-200 generator with endocut mode on (120 W/effect 2 in the León study, 80 W/effect 3 (TPPC) and 40 W/effect 2 (NK-PCS) in the Madrid study). NK-PCS was also performed by both authors in the classical way (needle at the papillary orifice, cephalad cut), as was TPPC using a standard pull-type sphincterotomy (pancreatic duct confirmation with guidewire or contrast in the study by De la Morena, with the guidewire in place during the cutting; the other study only reports the placing of the sphincterotomy’s tip within the pancreatic duct). Probably, as is the case with other discrepancies, further studies with homogeneous groups of patients in adequate numbers (multicenter studies?) will be needed to confirm the benefits of combined techniques (such is the suggestion of common sense), assess the best scheme, and consider added morbidity.

Interestingly, both studies used no pancreatitis prevention method. Assuming that precut is considered a risk factor for complications in several multicenter studies—even though its association with pancreatitis is more contestable, as discussed above—the fact that not only in these two papers but also in many other precut studies no preventive method is used is outstanding; also, they do use such method when attempting to implant pancreatic stents, usually in small numbers (25,37,40,45-47), although Espinel used such prostheses in 78% of procedures in his prior study on NK-PCS (52). The European Society for Gastrointestinal Endoscopy (ESGE), in their review in post-ERCP pancreatitis prevention (54), acknowledged that repeat cannulation is a risk factor with greater relevance than precut, regarding which they stated that only experienced endoscopists should perform it, and that its use, timing and technique should be based on anatomic features, personal preference, and indication (grade C recommendation); furthermore, they specifically mentioned the use of pancreatic stents and rectal NSAIDs as preventive methods with a high grade of evidence (grade A recommendation). It is interesting that, as far as we know, no precut studies report on NSAID use, a cheap, easy-to-administer, effective method likely to provide additional protection for pancreatic stents; a recent cost analysis study suggests that these drugs might even replace them (this assumption remains to be demonstrated) (55).
In summary, to conclude, combined precut procedures are surely useful to increase ERCP completion rates, but time and further studies are needed to confirm which combinations are more effective and safer, and whether complications derived from such combinations are acceptable, maybe with the use of preventive measures. Anyway, we shall keep the basic rules that have guided the use of precut virtually from its start: stringent indication (exams with therapeutic indication), necessary experience (precut is no substitute for cannulation skills), knowledge of papillary anatomy (each papilla will likely require a specific precut, at least initially), and knowing when to stop (other hands, another day, other technical alternatives).

Juan Ángel González-Martín

Department of Gastroenterology.
Hospital Universitario Ramón y Cajal. Madrid, Spain

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