

Reflections on needle-knife papillotomy (with videos)

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Two generations of ERCP endoscopists have been indoctrinated into thinking that needle-knife papillotomy (NKP) is a dangerous procedure that should only be performed by experts. A report from Denmark looking at severe and fatal adverse events of ERCP resulting in litigation between 1992 and 1996 concluded that NKP “should still be regarded as a dangerous procedure.”¹ Early published studies typically reported adverse event rates of NKP that were often double that of standard biliary sphincterotomy. A recent retrospective review of prospectively collected data on NKP continued to show a high post-ERCP pancreatitis (PEP) rate.² However, in some expert hands, NKP apparently could be performed without excess morbidity from the beginning.³ In a recent study from Australia⁴ of 732 cases, 94 of which were deemed difficult, NKP increased the overall biliary cannulation rate to 97.7% at the cost of a 14.9% PEP rate. Statistical analysis revealed that the independent risk factor for PEP was not NKP, but rather the number of cannulation attempts, confirming what Freeman⁵ has been telling us for years: NKP used to finish the job gets blamed unfairly for PEP after the duodenal papilla is traumatized during failed cannulation attempts. Another confounding factor as one tries to follow the literature on NKP is the ever-changing ERCP landscape: when Vandervoort et al⁶ reported their study of adverse events of 1223 ERCPs in 2002, 45% were diagnostic and 55% were therapeutic. A 2006 prospective, multicenter study of risk factors for PEP included 48% diagnostic and 52% therapeutic cases, with an amazing 34% undergoing ERCP for suspected sphincter of Oddi dysfunction.⁷ Today, it is difficult to find a purely diagnostic indication for ERCP,

and the frequent use of sphincter of Oddi manometry is limited to a few academic centers, mainly in the United States.

In the interests of full disclosure, I admit that in the past I, too, contributed to the “keep-out” literature on this subject.⁸ Until about 10 years ago, I did not offer third-year fellows learning ERCP the experience of NKP, and limited my teaching it to fourth year (advanced) fellows who showed particular aptitude for the procedure. Discussions with former trainees convinced me that we have limited training in NKP unfairly. As was recognized a long time ago,⁹ to be able to tackle the full spectrum of difficult-access cases and achieve a nearly 100% success rate, NKP is the sine qua non. Undoubtedly, many would-be NKP exponents have been intimidated over the years by the sight of experts performing unnecessarily large and aggressive needle-knife incisions during live endoscopy courses, usually accompanied by the exhortation “don’t try this at home.” Such “heroic” NKPs are neither necessary nor desirable in everyday practice. Rather than discourage the use of NKP, we should show ERCP trainees how to use the technique selectively to increase their success rates for biliary and pancreatic access. This requires an understanding of the anatomy and the risks involved.

For the purposes of this discussion, when I use the term NKP, I mean the free-hand technique using a needle-knife papillotome, which is essentially a bare wire advanced from the tip of a plastic sheath (Fig. 1). Unlike a standard sphincterotomy, NKP is a relatively uncontrolled technique that lacks the protections afforded by unidirectional cutting wire travel and orientation to the axis of the duct (Video 1, available online at www.giejournal.org). It is amazing to me that needle-knife papillotome design has remained virtually unchanged since its inception decades ago. Despite a lock on the device intended to fix the length of exposed wire, all NKP exponents are familiar with the frustrations of the “disappearing” wire: when the duodenoscope elevator is lifted, the plastic sheath is bent, and the wire tends to retract. What constitutes the ideal amount of wire exposed at the end of the sheath is a matter of personal preference, but too little and too much are both problematic. With too much wire, you lose control, with the very real risk of making too deep a cut; with too little wire, you cannot see what you are doing. Experts cannot even agree on whether the device should be used with

Abbreviations: ASGE, American Society for Gastrointestinal Endoscopy; NKP, needle-knife papillotomy; PD, pancreatic duct; PEP, post-ERCP pancreatitis.

DISCLOSURE: The author disclosed that he is a consultant to Cook Medical.

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0016-5107/\$36.00
<http://dx.doi.org/10.1016/j.gie.2014.01.017>

Received November 13, 2013. Accepted January 6, 2014.

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Figure 1. Needle-knife papillotome.

pure cutting current, blended (cutting and coagulating) current, or coagulating current alone. Even endoscopists with a rudimentary understanding of the physics of electrocautery should know that the current density at the tip of a fine wire is huge (being inversely related to the area of wire in contact with tissue). A really deep NKP cut is almost never desirable, with repeated cuts in the range of 2- to 3-mm depth being much safer and usually effective. Ideally, one should set the wire extension to that length. However, because a short length of wire at the end of the plastic sheath is difficult to see, we frequently have more wire than we need exposed during the procedure. The bile duct (choledochus) does not lie deep within the fold that runs down to the main duodenal papilla; in fact, it is quite superficial. When a deep cut results from injudicious application of a needle-knife papillotome, it risks penetrating the posterior wall of the duct and entering the retroduodenal space. One of the most hazardous situations in which to attempt NKP is when the bile duct is not dilated. A 2- to 3-mm diameter distal bile duct is a very small target, which is 1 reason why NKP should never be used as an alternative to skill in standard biliary cannulation. Most of us recognize a technically proficient biliary sphincterotomy performed with a pull papillotome (Video 1). However, far fewer of us know what constitutes an elegant NKP (Video 2, available online at www.giejournal.org).

These days, there are very few purely diagnostic indications for ERCP. It should be superfluous to state that NKP should rarely be used for diagnostic access alone. Unfortunately, as evidenced by malpractice cases related to adverse events of NKP used for marginal indications, some of our colleagues still have not heard the message. True, there are situations in which experts need to access an obstructed biliary tree via a nondilated distal bile duct

(eg, jaundice caused by hilar biliary strictures); nonexperts are wise to refer such cases to a tertiary center and avoid a high-risk procedure. With the wealth of anatomic information available from modern cross-sectional abdominal imaging (especially CT and MRCP), such cases are not difficult to identify ahead of time. In the past, many patients with jaundice went directly to ERCP. As a result, endoscopists got some unpleasant surprises. In 2014, there is no excuse for not having anatomic information, even if only from transabdominal US, before cannulating a duodenal papilla. Not every patient with malignant obstructive jaundice needs preoperative biliary drainage. This should be a decision made by a multidisciplinary team, including a specialist surgeon, with all the necessary imaging available. The headlong rush to perform ERCP should be resisted, especially one that involves NKP.

I would not presume to teach the art of NKP in a short commentary such as this. The trainee absolutely has to “be there,” ie, the ERCP suite, to share the experience with a skilled exponent. With this disclaimer firmly up front, I would, however, like to offer some observations from personal experience. (Because my own ERCP mentors chose not to share their NKP secrets with me, I take sole responsibility for the comments that follow.) First and foremost, the trainee must have sufficient experience in handling a duodenoscope to be comfortable making small inputs around the target (ie, the papillary fold). He or she must understand what causes, and how to apply, motion in all of the axes of the instrument (ie, up-down, right-left, twist [torque], and push-pull) and have a light touch on the elevator. Second, the trainee must understand the anatomy of the papillary fold and have a feel for the likely location of the choledochus. Like buying or selling a house, successful NKP is all about “location, location, and location.” With a deft hand, the white, wormlike structure that is the choledochus (Fig. 2) can actually be dissected free (this is rarely necessary, but it is a nice trick when it happens). Wandering off the axis of the duct is probably the most common cause for failing to access it by NKP. This is particularly likely when the anatomy of the duodenal papilla and its fold are distorted by a mass. Diverticula can also displace the papillary fold, but rarely obscure its axis. Making a needle-knife fistula into the bile duct within a diverticulum requires a steady hand (Fig. 3). Marking the anticipated axis of the duct with an endoscopic paint brush or marker (equipment makers: please note) would likely help to avoid NKP deviations. Unless the pancreatic duct (PD) is protected with a prophylactic stent, keeping the needle-knife away from the papillary opening is a good idea because the pancreas detests heat. Cutting upward from the papillary orifice (or close to it) is probably safer than cutting downward toward it. Boring a hole in a bulging papilla with a needle-knife (fistulotomy) is acceptable only if you have good evidence that there is a large, dilated bile duct beneath. This is where previous EUS examination of the duodenal wall can be very helpful.

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