

## Guidewire cannulation in ERCP: from zero to hero!



For decades biliary cannulation during ERCP was done by lining up and advancing a catheter or a sphincterotome into the ampulla at what one believed was a “good” biliary angle and then gently (or not so gently) injecting contrast. This either resulted in a cholangiogram or a pancreatogram. If the bile duct was accessed, a wire was then advanced through the catheter into the biliary tree, and the procedure moved forward. If the pancreas was accessed, the catheter was pulled out and the maneuver was attempted again (and again and again) until ultimately successful or the biliary tree was not accessed. Obviously, this approach resulted in a lot of undesired pancreatograms and no small number of cases of post-ERCP pancreatitis (PEP) from repeated pancreatic duct (PD) injection. This was, nonetheless, the standard of care.

The idea of using guidewires advanced through a catheter or sphincterotome to access the biliary tree is not new, but for many years this was rarely performed in practice. These injection-free cannulation techniques are collectively referred to as guidewire cannulation (GC). Many had concerns about guidewire injury to the ampulla, pancreatitis from guidewire entry into the PD, or the potential for guidewire perforations and submucosal dissections, and the practice of GC was often discussed and rarely performed.

All of this changed in 2004 with the publication the landmark study by Lella et al<sup>1</sup> of GC performed by a single operator in 400 consecutive patients undergoing ERCP. Two groups of 200 patients each underwent cannulation via standard techniques or GC. The PEP rate in the group who underwent cannulation via standard techniques was 4%, and the PEP rate in the group who underwent GC was zero. This was an extremely striking result, and to this day few large studies of cannulation have a subset of patients with zero episodes of PEP. In the wake of Lella et al’s study, other authors also reported very positive results when using GC, both in terms of achieving success and in obtaining low rates of PEP.<sup>2-5</sup> Several meta-analyses also favored GC over standard techniques.<sup>6-8</sup> It should be noted that not all studies were as robust with regard to their findings when GC was studied.<sup>9,10</sup> Nonetheless, GC entered widespread

use, aided to some extent by the development of so-called short wire ERCP accessories, which allowed the endoscopist to control not just the duodenoscope and the catheter tip but the movement of the guidewire as well.

GC for biliary access typically uses 3 *primary* maneuvers (although other less commonly utilized maneuvers exist), which I describe via the following nomenclature (Adler DG, unpublished speech; ASGE Postgraduate Course: “ERCP Cannulation Techniques to Prevent Post-ERCP Pancreatitis.” Presented at Digestive Disease Week, Chicago Illinois, May 5, 2014). First, in single-wire technique number 1 (SWT#1), a sphincterotome is advanced *into*

Clearly, there is still some role in difficult ERCPs for standard techniques that use dye injection because this helps to clarify anatomy and often facilitates access to the desired duct. At most centers, however, guidewire cannulation is the most commonly used technique, and dye injection is reserved for difficult situations in which guidewire cannulation techniques have not thus far been successful. This order of operations, so to speak, has helped solidify guidewire cannulation techniques as first-line cannulation skills that ERCP practitioners need to learn and subsequently master.

the ampulla and a guidewire is then advanced under endoscopic and fluoroscopic guidance. For single-wire technique number 2 (SWT#2), a sphincterotome is advanced *near* the ampullary orifice without making physical contact. The guidewire is then advanced over a small air gap into the ampullary orifice under endoscopic and fluoroscopic guidance. Third, the two-wire technique is used if both SWT#1 or SWT#2 fail and only guidewire access to the PD is obtained. The wire is left in place and the sphincterotome is exchanged over the wire and reinserted with a second wire, which is then used to access the biliary tree. The wire in the PD serves as an endoscopic and fluoroscopic marker of the location of the PD and helps inform the endoscopist on where to make further biliary

cannulation attempts. After biliary cannulation is achieved, the PD wire can be used to place a PD stent or simply removed depending on the operator's preference.

In this issue of *Gastrointestinal Endoscopy*, Bassi et al<sup>11</sup> compared 2 different guidewire techniques with regard to success and safety. In this study the authors randomized patients to either first undergo cannulation attempts via SWT#1 (which they termed the "touch" technique) or SWT#2 (which they termed the "no touch" technique). The maximum number of attempts was 15, with a duration of no longer than 5 minutes or a maximum of 5 unintentional cannulations of the PD. If cannulation attempts with either initial technique were unsuccessful, patients crossed over to the other technique with the same rule still applying. Failure with both techniques freed the endoscopist to use more aggressive techniques such as needle-knife sphincterotomy.

The final analysis included 300 patients enrolled at 3 centers. The authors found that the primary cannulation rate was significantly higher in the SWT#1 group compared with the SWT#2 group (88% vs 54%,  $P < .001$ ). The cannulation rate was also significantly higher using SWT#1 when compared with SWT#2 at crossover (77% vs 17%,  $P < .001$ ). Other key results included fewer cannulation attempts before success was achieved when using SWT#1 and more pancreatic guidewire entry when using SWT#1 (although the mean number of attempts only differed by less than 1 attempt), both of which were statistically significant. PEP rates were similar between the 2 groups. Of note, the authors *never* administered rectal nonsteroidal anti-inflammatory drugs and never used prophylactic PD stents, further strengthening their findings and eliminating confounding factors.

Although many have studied GC in the past, this may be the first large, well-constructed study comparing specific GC techniques. The study reveals several things. First, GC has again been shown to be highly successful and safe. Second, the study suggests superiority of SWT#1 over SWT#2, although both techniques had a good success rate overall, and in real life one is not precluded switching back and forth between these techniques at will. I imagine that most practitioners of GC (like myself) toggle easily back and forth between different techniques rapidly during cannulation attempts based on the patient's anatomy, the duodenoscope position, and other factors. Third, in the absence of rectal nonsteroidal anti-inflammatory drugs and prophylactic PD stents, GC produced acceptably low rates of PEP (4% in the SWT#1 group, 7% in the SWT#2 group), further demonstrating the safety of this approach. The authors believed that PD guidewire entry was a predictor of PEP, although not all studies have noted this effect.<sup>2</sup>

So where do we stand today on GC? Clearly, there is still some role in difficult ERCPs for standard techniques that use dye injection because this helps to clarify anatomy and often facilitates access to the desired duct.

At most centers, however, GC is the most commonly used technique, and dye injection is reserved for difficult situations in which GC techniques have not thus far been successful. This order of operations, so to speak, has helped solidify GC techniques as first-line cannulation skills that ERCP practitioners need to learn and subsequently master.

In 1905, the so-called *Annus Mirabilis* (extraordinary year), Albert Einstein published 4 landmark papers in the *Annalen der Physik*, including "Zur Elektrodynamik bewegter Körper" ("On the Electrodynamics of Moving Bodies"), his seminal paper on special relativity.<sup>12</sup> Although universally embraced now, relativity was literally heresy to some when first described, and resistance to the theory kept Einstein from finding an academic appointment for years. Einstein reportedly was not worried about resistance to relativity because he believed young physicists would simply be brought up with and taught his theory, whereas older physicists who rejected it would slowly leave the scene, and in this regard he was correct. Although a much more focused area of study than relativity (!), GC (once scoffed at) has also entered mainstream practice and is now widely taught to trainees learning ERCP as a first-line technique around the globe.

## DISCLOSURE

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*Abbreviations: GC, guidewire cannulation; PD, pancreatic duct; PEP, post-ERCP pancreatitis; SWT#1, single wire technique number 1; SWT#2, single wire technique number 2.*

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