

# EUS-guided gallbladder drainage: Current status and future prospects

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A decade ago, when natural orifice transluminal endoscopic surgery (NOTES) was all the rage, there was brisk and frequent talk of gastroenterologists performing endoscopic cholecystectomies by either transgastric, transcolonic, or transvaginal routes. This seemed to be the wave of the future. So convinced was I that these procedures were about to go mainstream that I went so far as to learn to perform these procedures using a variety of models.

Much to my surprise, and the surprise of many, the full promise of NOTES has, so far, not materialized. While research into NOTES has soldiered on, most of the work in this field has been done by surgeons and not gastroenterologists.<sup>[1-3]</sup> Surgeons were more comfortable working in the abdomen proper, had extensive experience in creating and managing a pneumoperitoneum, and had better access to the facilities and technology that can make NOTES feasible. As of 2017, few gastroenterologists have performed or will ever perform a NOTES cholecystectomy, and much of the interventional gastrointestinal endoscopy world has moved on from NOTES to focus on other procedures.

The advent of transluminal stenting through lumen-apposing metal stents (LAMSs), ostensibly

for endoscopic drainage of pancreatic fluid collections (PFCs), has been widely embraced on a global scale, and endoscopic transluminal drainage of PFCs is now being performed on a scale previously unimagined as these devices have made these procedures much easier and faster to accomplish.<sup>[4-6]</sup> Older approaches, using double pigtail stents and fully covered metal biliary stents, are still in use but are largely and rapidly being supplanted by LAMS-based protocols.<sup>[7-10]</sup> LAMSs have now widely disseminated into interventional EUS practice.

Among endosonographers with experience using LAMS to drain PFCs, attention quickly turned, once again, to the gallbladder. Could LAMS be used to perform transluminal drainage of the gallbladder? The answer, at least in theory, seemed to be yes. The gallbladder is often (but not always) in proximity to the gastric antrum or the duodenal bulb, and the tools and techniques used to deploy a LAMS into a well-circumscribed structure containing fluid and/or solid material were already well known to many interventional endosonographers from their experience using these devices to drain PFCs. Most patients with acute gallbladder disease undergo

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cholecystectomy, but a subset is poor surgical candidates who were often relegated to receive a percutaneous cholecystostomy tube, often as destination therapy, and often for the rest of their lives. EUS-guided gallbladder drainage serves as an alternative to a percutaneous cholecystostomy tube. Other options for these patients include ERCP with stenting of the gallbladder by the cystic duct which, while effective, has never received widespread adoption.<sup>[11,12]</sup> Transcystic stenting of the gallbladder may not be feasible in patients with an obstructed or extremely tortuous cystic duct.

Soon after LAMS appeared on the scene, papers reporting EUS-guided gallbladder drainage began to appear in the endoscopic literature.<sup>[13-15]</sup> Most studies compared EUS-guided gallbladder drainage to percutaneous cholecystostomy tubes with favorable results. Endoscopic maneuvers performed through the LAMS, including stone removal, also became possible with some authors describing this as well.<sup>[16]</sup>

Currently, almost anyone who can place a LAMS for a PFC can place a LAMS for gallbladder drainage, and the number of people with experience in EUS-guided gallbladder drainage is (slowly) growing. Barriers to entry for the procedure include the (real) perception that many people referred for this procedure are quite ill with the high American Society of Anesthesiologists status and concerns about adverse events, long-term management, and liability issues. In addition, issues such as postprocedure bile reflux into the stomach and the risk of food impaction in the stent are real and may require ongoing management.

Furthermore, there are many questions about EUS-guided gallbladder drainage that endosonographers who perform these procedures (such as myself) have no clear answers to. These include:

1. What percent of nonsurgical patients are truly candidates for EUS-guided gallbladder drainage? To date, published papers have focused on patients who have successfully undergone EUS-guided gallbladder drainage, but few studies have reported on how many patients did not have a gallbladder that was in proximity to the stomach or duodenum and were thus not candidates for the procedure. That is, what is our numerator and what is our denominator?
2. Is the transgastric or the transduodenal route superior for EUS-guided gallbladder drainage in terms of safety and efficacy?

3. Should a LAMS be dilated after deployment to facilitate rapid gallbladder drainage?
4. Should patients have a double pigtail plastic stent placed through the LAMS after deployment to reduce the risk of stomach and gallbladder injury and to increase long-term patency?
5. Should LAMS placed into the gallbladder be considered permanent implants or should they be removed at some unspecified later date?
6. How feasible is cholecystectomy following EUS-guided gallbladder drainage, and does the site of LAMS placement affect surgical outcome in these patients?
7. Should stone extraction from the gallbladder be performed after deployment or is this not clinically warranted once drainage has been achieved?

We are now entering the second phase of investigation into EUS-guided gallbladder drainage. We already know from first-generation studies that these procedures are technically feasible and appear to be safe based on early, small, retrospective studies. Larger, prospective, multicenter second-generation studies will need to be performed to obtain better assessments of the safety, adverse event profile, and long-term outcomes in these patients. In addition, the questions above will likely need to be answered in comparative studies, *i.e.*, randomize patients to have a double pigtail stent placed through the LAMS *versus* no double pigtail stent, dilate the LAMS after deployment *versus* no dilation, *etc.*

While I may be wrong, I suspect that EUS-guided gallbladder drainage will continue to develop and will enter mainstream practice. There is too much interest in this topic and too much need for an alternative to percutaneous drainage in nonsurgical candidates with acute or chronic cholecystitis for development not to proceed apace. I know that I look forward to these cases with great enthusiasm. We may not end up doing NOTES cholecystectomies, but I suspect that a great many of us will be performing EUS-guided gallbladder drainage in the years to come.

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