Douglas G. Adler MD, FACG, AGAF, FASGE, Series Editor

Endoscopic Ultrasound-Guided Gallbladder Drainage

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CASE REPORT

An 81 year old man with metastatic pancreatic cancer, diabetes mellitus, and other comorbidities developed fever, right upper quadrant pain with a serum bilirubin of 9.8 mg/dL, an alkaline phosphatase of 770 U/L, and an AST of 110 U/L. His white blood count was 15,000/uL. CT scan showed findings consistent with a malignant biliary obstruction and acute cholecystitis. The gallbladder was enlarged and distended with a thickened wall and dense internal contents. General surgery evaluated the patient and felt that he was not a candidate for cholecystectomy. The therapeutic service was consulted to perform ERCP and to place a transmural gallbladder stent to decompress both the biliary tree and gallbladder in one procedure.

At ERCP, a malignant appearing stricture was seen in the mid common bile duct. This was stented with an 8x10mm uncovered metal biliary stent (Alimaxx-B, Merit Endotek, South Jordan, Utah) (Figure 1). After the ERCP, a linear echoendoscope was used to evaluate the gallbladder. The gallbladder had a thick wall, pericholecystic fluid, and dense fluctuant appearing contents (Figure 2). Using a freehand technique, an electrocautery-enhanced, 15mm wide x 10mm long lumen apposing metal stent (Axios, Boston Scientific, Natick, MA) was used to access the gallbladder in a transgastric manner (Figure 3). The stent was deployed without difficulty with one flange in the gallbladder and one in the stomach (Figure 4). There was copious drainage of purulent gallbladder contents and sludge into the stomach. The lumen of the stent was dilated with a 13.5mm esophageal dilation balloon to good effect (Figure 5). A 7Fr double pigtail stent was then placed across the stent with one pigtail in the gallbladder and one in the stomach (Figure 6). The patient tolerated the procedure well and there were no complications. The patient's laboratory studies normalized and he had a rapid improvement in his clinical symptoms. The patient was discharged to hospice and passed away several months later without recurrence of biliary symptoms.

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Overview and Efficacy of EUS Guided Gallbladder Drainage

Laparoscopic cholecystectomy is the definitive treatment of choice for acute cholecystitis. Patients

(continued on page 34)

(continued from page 32)

who are poor surgical candidates or have severe sepsis at presentation often undergo percutaneous transhepatic gallbladder drainage (PTGBD) for second line primary therapy or as a bridge to surgery. However, hospital readmissions and adverse events associated with using external drainage catheters such as pneumothorax, peritonitis, bleeding and dislodgement are reported in up to 12% of cases. Endoscopic ultrasound-guided transmural gallbladder drainage (EUS-GBD) has emerged as a promising alternative that allows for minimally invasive, internal drainage of the gallbladder in the setting of acute and chronic cholecystitis in high-risk patients. Using EUS guidance, transmural stents can be placed via a transgastric or transduodenal approach.

Several studies have described the advantages of EUS-GBD over PTGBD, which include feweradverse events, decreased cost, and fewer re-interventions. EUS-GBD has several other distinct advantages. For example, placement of lumen-apposing metal stents (LAMS) creates a portal between the gallbladder and the luminal GI tract that can allow, in some cases, for spontaneous passage of stones and further advanced endoscopic evaluation.[5] Complete clearance of gallbadder stones with LAMS has been reported in up to 88% of patients. EUS-GBD has also been shown to be safe and effective in patients with coagulopathy or that require anticoagulation.

Several large studies have looked at outcomes for patients who have received EUS-GBD for acute cholecystitis and have had very positive results. Tyberg et al. performed a retrospective review comparing 42 patients who underwent EUS-GBD with 113 patients who underwent PTGBD. This study found similar technical success between the two (95.3 vs. 99%), but patients with EUS-GBD required fewer repeat procedures (9.5% vs. 27.7%) and had fewer hospital readmission (14.3% vs. 23.9%). Further, clinical success was higher EUS-GBD vs. PTGBD (95% vs. 86%).

Teoh et. al. performed a matched cohort study of 118 patients comparing EUS-GBD (59 patients) with PTGBD (59 patients).[6] This study found similar rates of technical and clinical success, but, similar to the study by Tyberg et al., patients who underwent EUS-GBD had decreased hospital

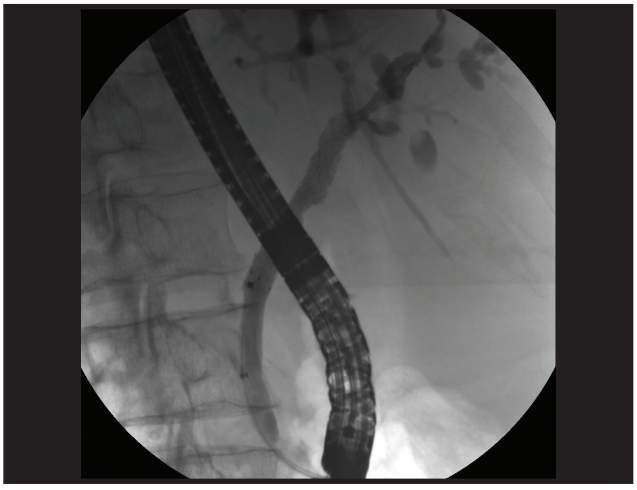

Figure 1. Cholangiogram showing metal stent across biliary stricture

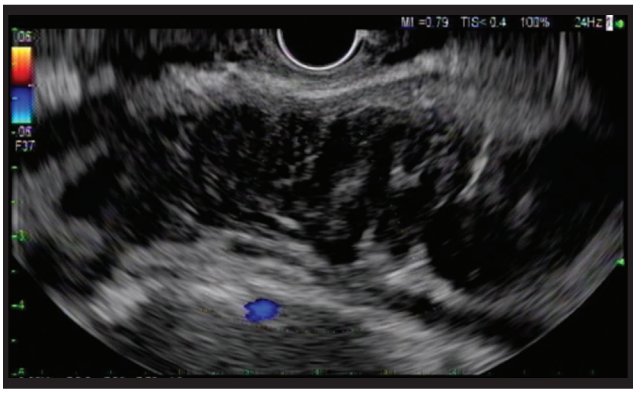

Figure 2. 7.5MHz image of distended gallbladder with thick wall

Figure 3. Axios stent catheter advanced into gallbladder lumen

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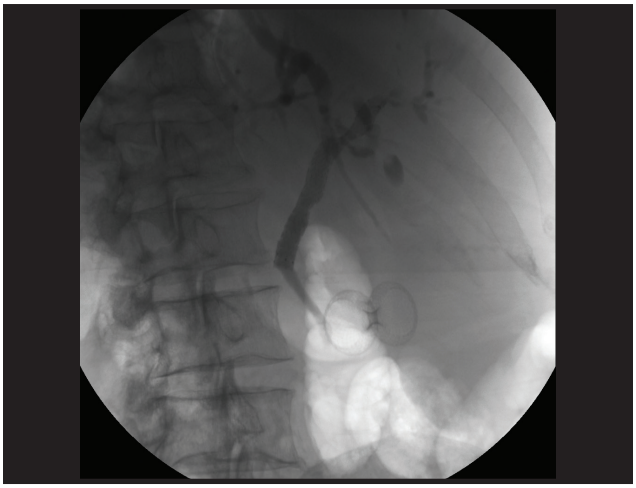

Figure 4a. Flouroscopic image of Axios stent after deployment

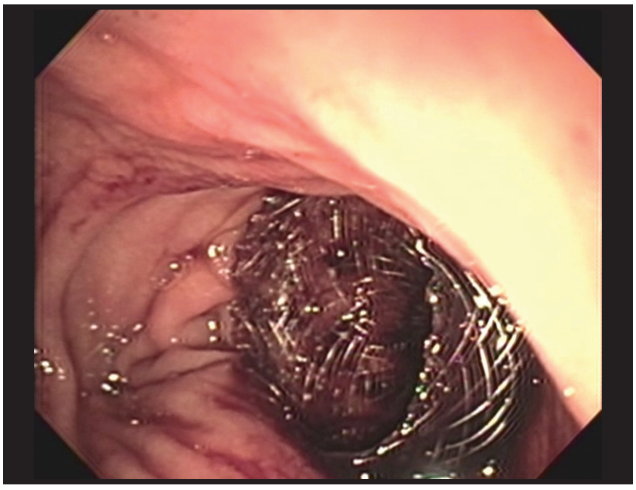

Figure 4b. Endoscopic image of Axios stent after deployment

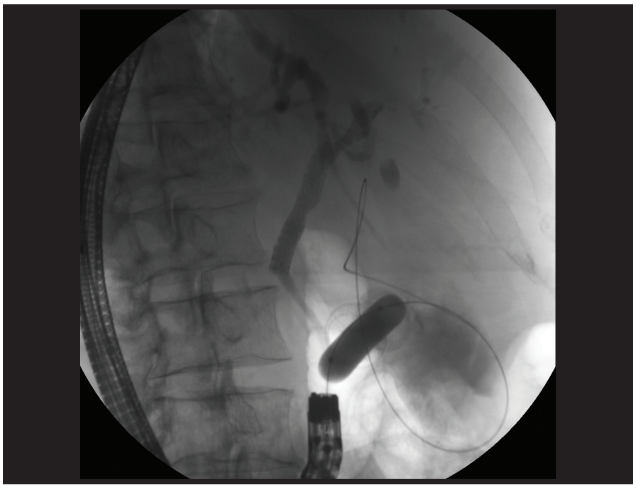

Figure 5. Flouroscopic image of balloon dilation of Axios stent

readmission rates (6.8% vs. 71.2% respectively) and no significant difference in 30-day adverse events. Critically, 95.2% of the readmissions were related to tube dislodgement in the PTGBD group. Finally, Dollhopfet et al. recently performed a multicenter retrospective review of 75 patients who underwent EUS-GBD for acute cholecystitis with a novel LAMS with an electrocautery enhanced delivery catheter (ECE-LAMs). The procedure had very high rates of clinical and technical success (98.7% and 95.9% respectively), with a rate of adverse events of 10.7%. This study also found that using the electrocauteryenhanced device led to significantly decreased stent deployment times. These studies demonstrate that EUS-GBD has similar efficacy to PTGBD, but fewer hospital readmissions and adverse events related to external tube dysfunction.

Adverse Events

Adverse events associated with EUS-GBD have been reported to occur in 6.3% to 32.2% for patients who have undergone the procedure for acute cholecystitis, but this rate has declined as endoscopic experience with the technique has grown.[8,11] Immediate adverse events include bleeding, bile leak and stent migration. Stent migration can be both into the luminal GI tract and into the gallbladder, and is more common when plastic stents are used. Notably, the progression from plastic stents to SEMS and LAMS has reduced the incidence of stent migration and bile leak by anchoring the stent on the apposing organs of the newly created fistulous tract. However, procedure and stent related adverse events associated with LAMS use have been reported up to 13%, suggesting a high level of endoscopic expertise is pivotal.[13] Delayed adverse events include abscess formation and recurrent cholecystitis.[7] Interestingly, the rate of recurrent cholecystitis in EUS-GBD is about 4%, compared to up to 22% after 151 days from drain removal for PTGBD.[11] The reduced rate of recurrent cholecystitis may be related to clearance of stones through the fistulous tract over time.[8,11,13]

Long Term Management

Several studies have performed long-term evaluation of SEMS or LAMS kept in place for

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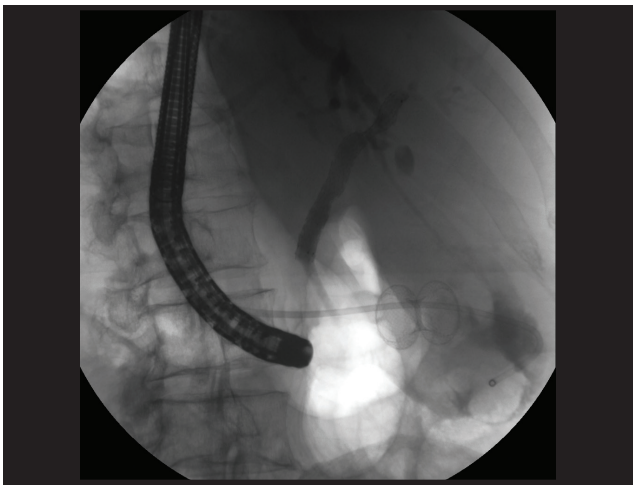

Figure 6a. Flouroscopic image of double pigtail stent through axios stent

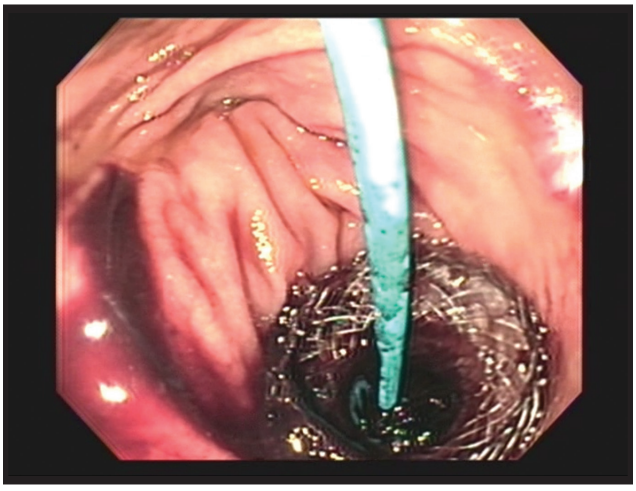

Figure 6b. Endoscopic image of double pigtail stent through axios stent

up to 3 years.[13] Reasons for foregoing stent removal in these studies include poor clinical condition, patient refusal, and tissue overgrowth. A recent study by Walter et al. in which patients had LAMS in place for up to 364 days found that 10% of patients studied had significant tissue overgrowth of their LAMS that precluded stent removal. However, no LAMS-related complications had occurred by long-term follow up. Choi et al. used partially covered SEMS with large bilateral flares (BONA-AL stent, Standard Sci Tech Inc., Seoul, Korea) and found that complete distal migration of the stent had occurred in 3.6% of patients at long-term follow up, but interestingly had no recurrence of cholecystitis occurred, suggesting full maturation of the cholecysto-enteric fistulous tract. These studies suggest that EUS-GBD may serve as not only an effective treatment for acute cholecystitis, but also definitive management in a select group of patients who remain poor surgical candidates over time due to malignancy or other significant medical comorbidities.

CONCLUSION

EUS-GBD is an evolving technique that can be an alternative to PTGBD when treating acute or chronic cholecystitis in high-risk surgical patients, and also has promising results when used for long-term or definitive treatment. Current research suggests that the two procedures appear to have similar technical and clinical efficacy, however it may not be valid to extrapolate this data to centers without high levels of endoscopic expertise. ■

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13 P	14 A	D	■	B	■	15 G	L	U	T	A	M	I	N	E
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