

# Endoscopic Ultrasound-Guided Hepaticogastrostomy With Lumen-Apposing Metal Stent for Management of Pyogenic Liver Abscess

Aditi Desai, MD<sup>1</sup>, Amar Manvar, MD<sup>2</sup>, and Sammy Ho, MD<sup>2</sup>

<sup>1</sup>Albert Einstein College of Medicine, Bronx, NY

<sup>2</sup>Montefiore Medical Center, Bronx, NY

## ABSTRACT

A 45-year-old man presented with abdominal pain, fever with chills, nonproductive cough, mild pleurisy, and anorexia. Computed tomography scan showed a heterogeneously enhancing mass in the left hepatic lobe with leukocytosis and elevated C-reactive protein. Interval growth of the lesion was noted on magnetic resonance imaging obtained several days after admission. Given the clinical suspicion for pyogenic liver abscess and favorable location in the left hepatic lobe, endoscopic ultrasound-guided drainage was pursued. The patient underwent endoscopic ultrasound-guided hepaticogastrostomy with a lumen-apposing metal stent. His symptoms gradually abated after procedure. Radiographic resolution of the abscess was noted 1 week after stent placement, and the stent was subsequently removed. He had no clinical or radiographic evidence of recurrence at 1-month follow-up.

## INTRODUCTION

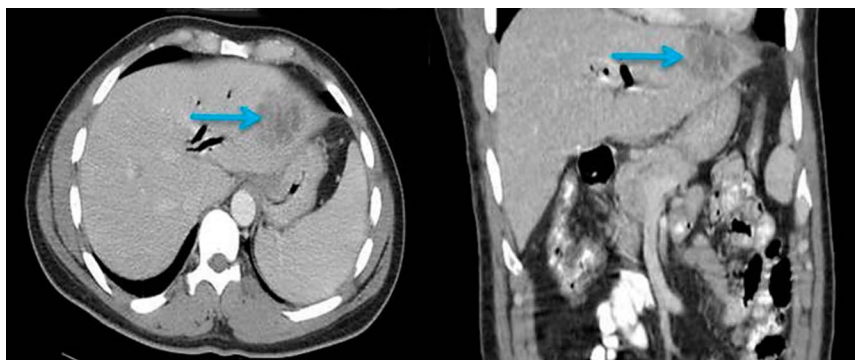
Percutaneous drainage (PCD) has historically been the standard method for the drainage of hepatic abscesses. Endoscopic drainage has been described as an alternative, less-invasive method for the management of liver abscesses. We report a case of endoscopic ultrasound (EUS)-guided transgastric drainage of pyogenic hepatic abscess with lumen-apposing metal stent (LAMS), and compare the clinical advantages of using LAMS placement with EUS-hepaticogastrostomy (HGS) to other methods of abscess drainage.

## CASE REPORT

A 45-year-old man presented to the emergency room with a 2-week history of abdominal pain, fever with chills, nonproductive cough, mild pleurisy, and anorexia. He was status post cholecystectomy with no recent history of travel, recent abdominal procedure, long-term medications, or alcohol or illicit drug use. Physical examination was notable for a febrile, ill appearing male, without any signs or symptoms of jaundice, with right upper quadrant tenderness to deep palpation.

Pertinent admission laboratory findings were notable for leukocytosis of 15500/ $\mu$ L with left shift, an elevated C-reactive protein of 28.9 mg/L, minimally elevated liver function tests with aspartate/alanine transaminases levels of 74/25 U/L and alkaline phosphatase of 123 U/L; reduced proteins with a total level of 5.5 g/dL, albumin level of 2.9 g/dL, and a bilirubin level of 0.3 mg/dL. International normalized ratio was mildly elevated on day 1 of hospitalization to 1.5, which dropped to 1.2 on day 3.

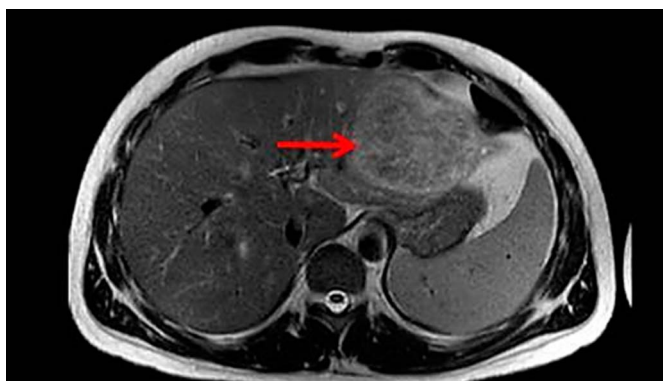
A computed tomography (CT) scan demonstrated a heterogeneously enhancing mass measuring 2.5  $\times$  4.1  $\times$  2.9 cm in the left hepatic lobe (Figure 1). Blood cultures were obtained, and the patient was started on ceftriaxone and metronidazole. On day 3, fever and abdominal pain persisted despite resolution of leukocytosis. A magnetic resonance imaging taken on the third day of admission demonstrated a heterogeneously enhancing multiseptated mass with interval growth, measuring 7.5  $\times$  8.2  $\times$  4.7 cm (Figure 2).



**Figure 1.** Initial transverse and coronal computed tomographic scan showing heterogeneous, predominantly hypodense mass noted in the left hepatic lobe. Intrahepatic pneumobilia was also observed.

The clinical impression was pyogenic liver abscess. As the location appeared favorable for endoscopic drainage, EUS-HGS was attempted. On esophagogastroduodenoscopy, extrinsic compression was noted along the lesser curvature on the stomach. A linear echoendoscope was passed, and a 70 mm heterogeneous hypoechoic lesion with internal debris was found in the left hepatic lobe. A 19 G fine needle aspiration (FNA) needle was inserted into the lesion, and purulent fluid was aspirated. A 15 mm electrocautery-enhanced LAMS (Axios; Boston Scientific, Marlborough, MA) was deployed into the fluid collection (Figure 3). The stent was dilated with a 15 mm CRE RX biliary balloon dilatation catheter (Boston Scientific, Marlborough, MA), and following dilation, purulent, necrotic debris emanated from the stent (Figure 4).

The patient's fever defervesced 24 hours after LAMS placement, and his symptoms fully resolved 3 days after LAMS placement. Aspirated abscess fluid cultures demonstrated polymicrobial organisms. Follow-up CT scan 7 days after the stent placement demonstrated a collapsed abscess cavity. The stent was removed during the follow-up esophagogastroduodenoscopy 10 days after stent placement when endoscopic evidence of abscess resolution was confirmed. The patient was discharged with a 4-week course of oral antibiotics. He was assessed 1-month after discharge without recurrence of any clinical symptoms and a repeat CT scan which was unremarkable.



**Figure 2.** Day 3 magnetic resonance imaging showing heterogeneously enhancing multiseptated mass in the left hepatic lobe.

## DISCUSSION

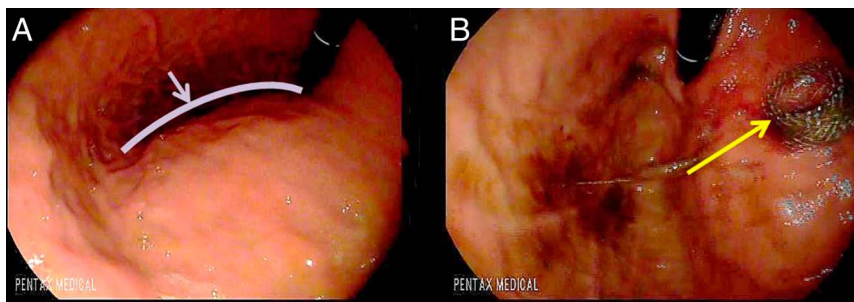
We have described a case of EUS-HGS with LAMS placement for successful management of idiopathic pyogenic liver abscess. The use of EUS-guided transgastric drainage is a feasible, appealing, and less invasive means of management of hepatic abscess with several advantages over the conventional use of PCD.

Liver abscesses are commonly located in the left or the caudate lobe of the liver.<sup>1</sup> They are in close proximity to the stomach and duodenum and hence are more favorable sites for EUS-HGS.<sup>1-4</sup> Longer stents are generally not preferred, but a few cases have been reported for right hepatic lobe abscess drainage.<sup>1,2,5</sup>

A few recent relatively large case series involving 7–27 patients undergoing EUS-HGS or PCD recruited over a mean period of approximately 2 years reported technical and clinical success for EUS-HGS as 100%.<sup>1,2,6</sup> Of these, in the Ogura et al study, 27 patients were retrospectively examined and the clinical outcomes of EUS abscess drainage and PCD were compared.<sup>1</sup> Technical success rates were equivalent at 100% for each technique. The clinical success rate for EUS-HGS was higher than that for PCD (100% vs 89%, respectively) although the difference was not statistically significant ( $P = 0.34$ ).

This study reported 2 cases of tube migration and one case of self-tube removal with PCD.<sup>1</sup> The overall adverse event rate was 15.8% (3/19). Based on these events, EUS-HGS was indicated in patients at risk of self-tube removal, presence of ascites, or recurrent abscesses following PCD.

With regard to clinical outcomes, the reported recurrence rate with EUS-HGS is lower than that for PCD though this has not been systematically analyzed.<sup>1,6</sup> The recorded median hospital stay are significantly shorter after EUS-HGS than PCD (21 vs 41 days;  $P$  value 0.03).<sup>1,7</sup> Although a median indwelling stent time of 2–3 weeks has been reported, longer indwelling times were described in patients with recurrent or malignancy-related



**Figure 3.** Stent placement with endoscopic ultrasound showing (A) extrinsic compression on the lesser curvature of the stomach due to the abscess (purple arrow) and (B) stent placed (yellow arrow).

abscesses.<sup>2,3,6</sup> The authors speculate that the use of internal drainage increases patient's quality of life given the lack of need for a percutaneous drain and a significantly shorter hospitalization.

Stent selection significantly affects the outcome of the patient as well the adverse event associated with them. We used a 15 mm electrocautery-enhanced LAMS. These stents are currently available in 3 different sizes based on inner diameter (10, 15, and 20 mm). In the Bang et al study, 10- and 15-mm LAMSs were used.<sup>7</sup> By comparison, patients who underwent PCD had 7 Fr plastic double pigtail stents placed after tract dilation. To date, no randomized data have demonstrated superiority of larger diameter stents with respect to enhanced drainage, though in standard practice, larger lesions with internal heterogeneity are typically drained with larger diameter stents.

The Ogura et al study compared the benefits of fully covered self-expandable metallic stent (FCSEMS) to plastic stents.<sup>1</sup> FCSEMS were concluded to be more suitable than the plastic stents since they reduce bile leakage, have longer patency, and may also provide tamponade effect to stop bleeding in the stomach wall; however, they are more expensive.

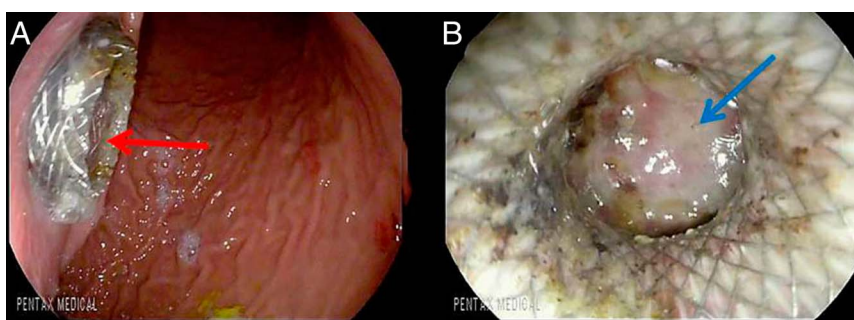
While infrequent, adverse events associated with EUS-HGS are associated with high morbidity and include pneumoperitoneum, biloma, infection, perforation, and cholangitis.<sup>1,7</sup> Stent migration may also be seen with EUS-HGS, but it can be solved by using the stent-in-stent method (pigtail used within

the self-expanding metallic stent [SEMS]), a long FCSEMS, or a LAMS.<sup>6</sup>

Bang et al's study, a randomized controlled clinical trial, compared the endoscopic and surgical management of pancreatic fluid collection.<sup>7</sup> During an interim audit, they reported LAMS-related complications. Six of the 12 patients managed with LAMS reported complications as opposed to none with plastic stents (50% vs 0%;  $P = 0.019$ ). These complications include early or delayed bleeding and buried LAMS syndrome.<sup>7</sup> Buried LAMS syndrome is seen usually with long indwelling stent times (5–6 weeks or longer) where the stent gets embedded in the gastric mucosa. Removal can also lead to massive hemorrhage. On rare occasions, biliary stricture may be seen.<sup>1</sup>

Although these are significant complications and may sometimes be fatal, proper patient selection, optimal insertion technique, procedure by experienced endoscopists, and routine patient follow-up may help mitigate the incidence of these risks.

In conclusion, EUS-HGS with LAMS has wide indications and advantages and can be considered as a safe and efficacious method to manage hepatic abscesses, particularly in the left lobe of the liver. Prospective long-term studies with a large sample size comparing EUS-HGS with LAMS vs FCSEMS vs PCD with respect to efficacy, safety profile, and cost-effectiveness are warranted.



**Figure 4.** Inspection endoscopic ultrasound 2 days after stent placement: (A) LAMS seen and (B) granulation tissue.

## DISCLOSURES

**Author contributions:** All authors contributed equally to the manuscript. S. Ho is the article guarantor.

**Financial disclosure:** None to report.

**Informed consent** was obtained for this case report.

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