



Percutaneous Hepaticogastrostomy for Failed Endoscopic Drainage

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Abstract

Hepaticogastrostomy (HGS) serves as an alternative approach for biliary drainage in patients with difficult-to-cross perihilar biliary strictures. Although endoscopic ultrasound-guided HGS (EUS-HGS) has become widely accepted, it can sometimes fail due to technical challenges with duct access and guidewire manipulation. In such situations, percutaneous HGS (P-HGS) offers a valuable alternative. We report our experience with three patients treated with P-HGS between February 2020 and July 2023. Conventional percutaneous and endoscopic methods as well as EUS-HGS had failed to internalize the drainage catheter in all the cases. Technical success was achieved in all the three cases. Self-limiting bile leak was seen in one patient. Rest of the patients did not develop any major complications. After a mean follow-up of 10.3 months (range, 5–14 months), P-HGS stents were patent in all three patients. In conclusion, P-HGS is technically feasible and an effective alternative to EUS-HGS or long-term external biliary drainage for noninternalizable malignant biliary strictures.

Keywords

- ▶ hepaticogastrostomy
- ▶ endoscopic ultrasound
- ▶ cholangiocarcinoma

Introduction

In patients with perihilar biliary obstruction due to inoperable malignancies, conventional palliative biliary drainage typically involves choledochoduodenal stenting across the stricture using either a percutaneous or endoscopic approach, achieving success in majority of cases. However, in rare cases, navigating through the obstruction may fail, even after multiple staged procedures and despite the use of various techniques and devices. Such patients must be kept on long-term external biliary drainage leading to patient discomfort, heightened risk of infections, instances of dislodgment or kinking of the catheter, and overall poor quality of life. For such “noninternalizable” strictures, hepaticogastrostomy (HGS) is an alternative. The technique involves

creation of a communication between biliary radicals of the left hepatic lobe and the gastric lumen, followed by placement of a stent to enable bile drainage into the stomach. By virtue of its approach, HGS offers distinct advantages in malignant strictures by avoiding tumor-related bleeding and stent ingrowth, as it bypasses the tumor rather than traversing through it.^{1,2} HGS can usually be accomplished from gastric lumen under endoscopic ultrasound guidance (EUS-HGS) and the procedure has gained widespread acceptance. On EUS-HGS, both segment 2 and 3 ducts can be accessed for stenting. Segment 3 duct is typically preferred because it offers a straighter puncture angle and allows a stable scope position with less risk of mediastinal injury. However, passage of guidewire into the hilum from segment 3 duct can

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Table 1 Clinical characteristics and relevant procedural details of the patients

Serial no.	Age/Sex	Etiology	Type of hilar block (Bismuth–Corlette classification)	Stent used	Follow-up	Complication	Stent patent till last follow-up
1	89 y/M	Hilar cholangiocarcinoma	Type 1	Fluency-Plus	5 mo	Self-limiting bile leak	Yes
2	69 y/M	Hilar cholangiocarcinoma	Type 1	Giobor	12 mo	None	Yes
3	72 y/M	Hilar cholangiocarcinoma	Type 1	Giobor	14 mo	None	Yes

Abbreviation: M, male.

often be tricky due to the acute angulation, leading to failure in certain cases.³ Percutaneous HGS (P-HGS) offers a valuable alternative in this scenario. The authors share their experience with P-HGS in this clinical setting.

Case Presentation

Between February 2020 and July 2023, 3 patients with inoperable hilar cholangiocarcinoma underwent P-HGS at the authors’ institute. Patient characteristics have been detailed in ►Table 1. The decision to proceed with P-HGS in each patient was made following multiple unsuccessful attempts to navigate the obstruction using the transhepatic and endoscopic approaches and after failed EUS-HGS. Initial external drainage was established in all the patients.

The procedures were done under general anesthesia. The existing external biliary drainage catheter in the right hepatic lobe was first removed over a 0.035-inch, 150-cm, J-tip Amplatz Ultrastiff guidewire (Cook Inc., Bloomington, Indiana, United States) and a 10-Fr, 11-cm vascular access sheath (Avanti, Cordis, Miami, Florida, United States) placed. Using a combination of 40-cm, 5-Fr Kumpe catheter (KMP, Cook Inc.) and 0.035-inch, 150-cm hydrophilic guidewire (Radifocus, Terumo Corporation, Japan) segment 2 or 3 bile ducts were accessed. The segmental duct was selected based on which one offered a straighter, more “in-line” angle for puncturing the gastric wall from the right side. The hydrophilic guidewire was exchanged for an Ultrastiff Amplatz guidewire and the 10-Fr, 11-cm sheath removed. This was followed by placement of the 10-Fr, 40-cm flexor Check-flo introducer sheath and dilator from Rosch-Uchida Transjugular Liver Access set (RUPS-100, Cook Inc.) over the Ultrastiff guidewire and the dilator was removed. Under fluoroscopic visualization, the stomach was then inflated with air through a nasogastric tube after achieving gastroparesis with 20 mg of intravenous hyoscine-butyl-bromide, such that the lesser curvature was closely opposed to the hepatic silhouette. The 14-gauge stiffening cannula and the trocar stylet and catheter set from RUPS-100 were then sequentially introduced through the 10-Fr flexor Check-flo introducer sheath. Under combined transabdominal ultrasound and fluoroscopic guidance, the stiffening cannula was directed toward the

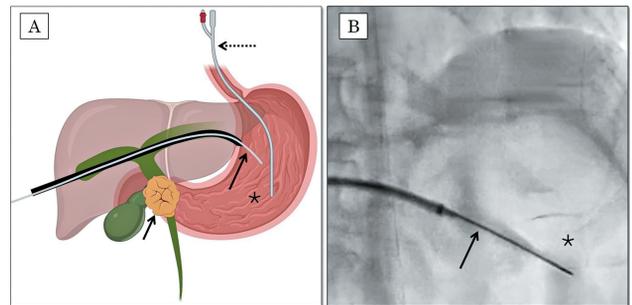


Fig. 1 Graphic representation (A) and fluoroscopic spot image (B) demonstrating the trocar stylet and catheter set (long solid arrows) used to puncture the gastric wall from percutaneous transhepatic route. Dashed arrow denotes the nasogastric tube used to insufflate the gastric lumen (asterisk). Short solid arrow denotes the malignancy causing biliary stricture.

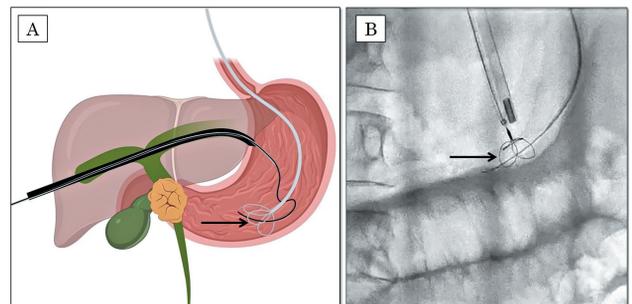


Fig. 2 Graphic representation (A) and fluoroscopic spot image (B) demonstrating the vascular snare (solid arrows) used to capture the guidewire introduced into the gastric lumen via the 5-Fr catheter of RUPS-100 set.

stomach and the gastric wall punctured through the left lobar hepatic parenchyma using the trocar stylet and catheter set (►Fig. 1). The trocar stylet was then removed and intraluminal position of the catheter confirmed by injection of nonionic contrast medium. A 0.035-inch, 260-cm hydrophilic guidewire (Radifocus, Terumo Corporation) was then introduced into the gastric lumen. The guidewire was snared transnasally using a vascular snare (Atrieve, Terumo Corporation) to achieve through-and-through access (►Figs. 2 and 3). The hydrophilic guidewire was exchanged for a 0.035-inch, 260-cm Ultrastiff guidewire over a 100-cm, 5-

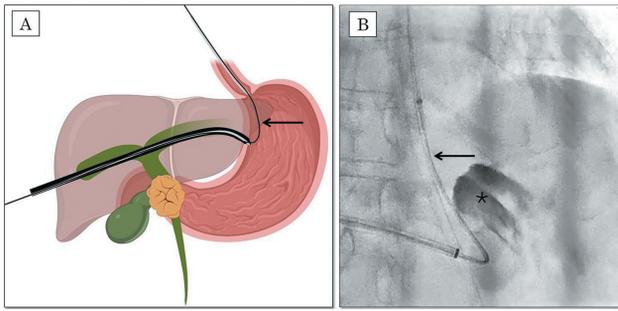


Fig. 3 Graphic representation (A) and fluoroscopic spot image (B) demonstrating the guidewire being pulled through nasal route to establish through-and-through access (solid arrows). Asterisk denotes the nonionic contrast in gastric lumen.

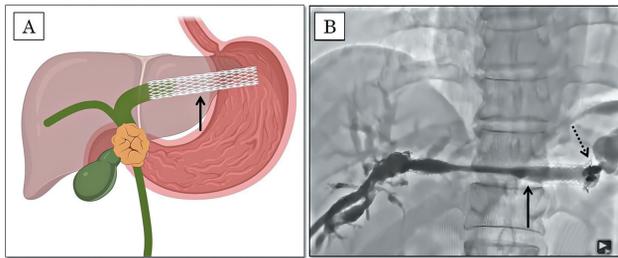


Fig. 4 Graphic representation (A) and fluoroscopic spot image (B) demonstrating the partially covered stent (solid arrows) being placed between the left lobar biliary radicals and gastric lumen. Dashed arrow denotes the flared end of the Giobor stent within the stomach.

Fr multipurpose catheter (MPA, Cook Inc.). This was followed by deployment of a 10-mm diameter stent graft of appropriate length from the hepatic end followed by balloon dilatation of the liver parenchymal tract (—Figs. 4 and 5). Predilatation was avoided to prevent leakage of bile into the peritoneal cavity. The stent used was either fully covered stent graft (Fluency plus, Becton Dickinson, New Jersey, United States) or a dedicated partially covered HGS stent (Giobor, Niti-S, Taewoong, South Korea). In case of Giobor, the covered segment (comprising 70% of stent length) placed in the liver parenchymal tract and within the stomach prevents peritoneal leak while the uncovered hepatic end (comprising 30% of stent length) prevents the occlusion of the side ducts. The Giobor stent additionally has a flared end to prevent dislodgement and a lasso for stent retrieval.

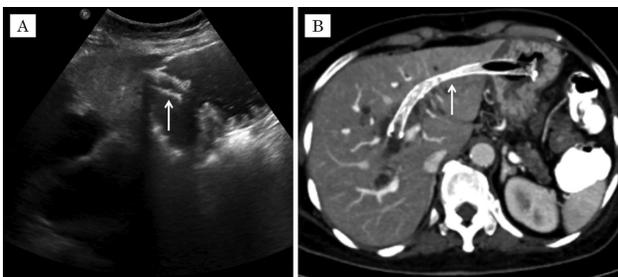


Fig. 5 Immediate postprocedure transabdominal ultrasound image (A) showing one of the ends of the stent within the gastric lumen (solid arrow). Axial image from the follow-up computed tomographic image (B) showing the stent (solid arrow) optimally placed in situ.

However, since the Giobor stent is designed for endoscopic deployment, it was deployed ex vivo and re-sheathed in reverse orientation on the table prior to percutaneous deployment. A 10-Fr drainage catheter (Dawson Mueller, Cook Inc.) was left in place within the HGS stent which was removed the next day after confirming the stent patency with a cholangiogram.

After the procedure, patients were monitored for 2 to 3 days and discharged—provided they remained asymptomatic—following an abdominal ultrasound and routine laboratory tests, including a complete blood count, liver function tests, and C-reactive protein. To prevent biliary gastritis, proton-pump inhibitors were initiated. Follow-up was conducted on an outpatient basis every 6 to 12 weeks, including clinical evaluation, liver function tests, and ultrasound imaging. A patent stent was inferred in the absence of clinical signs of cholangitis, no intrahepatic biliary dilatation on ultrasound, and stable liver function tests.

Technical success was achieved in all three patients. One patient experienced a mild, self-limiting biliary leak, detected on the immediate postprocedural ultrasound scan as a small fluid collection in the caudate recess of the lesser sac. However, since the cholangiogram did not reveal any biliary leak, the patient was managed conservatively and did not require any additional intervention. The other two patients did not experience any major periprocedural complications. Primary stent patency was maintained until the last follow-up in all the three cases (—Table 1). No instances of stent dislodgement were observed.

Discussion

In 1994, Soulez et al published preliminary results on HGS performed as a multistage procedure involving a multidisciplinary team of surgeons, endoscopists, and interventional radiologists. The procedure was carried out irrespective of stricture negotiability, based on the premise that stents placed in nontumorous (healthy) bile ducts would maintain patency longer than those in tumorous ducts.¹ The study reported a mean stent patency of 234 days, with jaundice-free survival rates of 100, 96, 93, and 80% at 1, 3, 6, and 12 months, respectively. Periprocedural cholangitis occurred in 11% of cases, while late-onset cholangitis was seen in 20%. Biliary gastritis was noted in some patients and managed effectively with proton-pump inhibitors. The authors concluded that this approach is particularly suitable for patients with hilar tumors and longer expected survival, as well as those with benign, nonsurgical stenosis. However, the complexity of the procedure and the requirement for a coordinated multidisciplinary team were highlighted as significant limitations.

A modified technique was later introduced to streamline the procedure and eliminate the need for a multidisciplinary team.² In each case, initial external drainage was achieved via a transhepatic catheter that passed through the biliary confluence. P-HGS was then performed in two stages. In the first stage, hepatico-gastropexy was established by

inserting a Cope anchor system (Cook Inc.) through the liver into the air-filled stomach under computed tomography guidance, followed by retraction of the anchor toward the liver. After several days, the second stage was carried out using the existing right-sided biliary access. Under fluoroscopic guidance, a Colapinto needle was used to target the metallic anchor and gain access to the stomach, enabling completion of the HGS. During a mean follow-up period of 71 days, no cases of stent occlusion or dislocation were observed, though one patient experienced a transient biliary leak.

P-HGS was further simplified into a single-step procedure by snaring the guidewire within the gastric lumen via the oral or nasal route to achieve through-and-through access.^{4,5} Applying gentle traction on both ends of the wire facilitated close apposition between the liver and the lesser curvature of the stomach, enabling precise stent placement. A similar approach was employed in all our cases.

Both fully covered and partially covered self-expanding metal stents have been used to secure the P-HGS. The latter may offer several benefits compared to the former. The uncovered hepatic end could help prevent obstruction of the branch bile ducts. Additionally, the uncovered portion may assist in anchoring the stent, potentially reducing the risk of stent dislocation into the stomach.⁶

Reported complications of HGS include abdominal pain, bleeding, cholangitis, biliary gastritis, bile leak, bile peritonitis, and stent migration.⁴⁻⁶ In our series, only one patient experienced a minor bile leak into the lesser sac, which resolved spontaneously without intervention. No other complications were observed.

Although the authors have performed P-HGS only in patients with type 1 block, the procedure is also technically feasible in those with type 2 and higher blocks. However, in such cases, the main challenge lies in traversing the hilar stricture from the right side to access the left lobe. Additionally, achieving complete liver drainage in complex blocks may necessitate the placement of an extra stent from the left to the right lobe, thereby increasing both procedural complexity and the risk of complications.

The potential contraindications for P-HGS include the inability to pass between right and left biliary systems in perihilar strictures, multifocal strictures, tumors intervening the HGS tract, ascites, large varices, and uncorrectable coagulopathy.

Conclusion

P-HGS may serve as a rational and preferable alternative to long-term external biliary drainage in the management of difficult-to-cross malignant perihilar biliary strictures, offering a convenient and cost-effective option for patients. Our experience demonstrates its technical success with acceptable stent patency rates without significant complications. Its application may reduce the burden of failed biliary interventions in complex cases, though further studies are needed to confirm its broader utility and long-term outcomes.

Conflict of Interest

None declared.

References

- 1 Soulez G, Gagner M, Therasse E, et al. Malignant biliary obstruction: preliminary results of palliative treatment with hepaticogastrostomy under fluoroscopic, endoscopic, and laparoscopic guidance. *Radiology* 1994;192(01):241–246
- 2 Tipaldi L. A simplified percutaneous hepatogastric drainage technique for malignant biliary obstruction. *Cardiovasc Intervent Radiol* 1995;18(05):333–336
- 3 Matsubara S, Nakagawa K, Suda K, Otsuka T, Oka M, Nagoshi S. Practical tips for safe and successful endoscopic ultrasound-guided hepaticogastrostomy: a state-of-the-art technical review. *J Clin Med* 2022;11(06):14
- 4 Ozkan OS, Akinci D, Abbasoglu O, Karcaaltincaba M, Ozmen MN, Akhan O. Percutaneous hepaticogastrostomy in a patient with complete common duct obstruction after right hepatectomy. *J Vasc Interv Radiol* 2005;16(09):1253–1256
- 5 Mistry JH, Varma V, Mehta N, Kumaran V, Nundy S, Gupta A. Percutaneous transhepatic hepaticogastrostomy for portal biliopathy: a novel approach. *Trop Gastroenterol* 2012;33(02):140–143
- 6 Ogura T, Higuchi K. Endoscopic ultrasound-guided hepaticogastrostomy: technical review and tips to prevent adverse events. *Gut Liver* 2021;15(02):196–205