

Ultrasound-guided Bedside Percutaneous Transhepatic Biliary Drainage in Critically Ill: A Friend Indeed

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Percutaneous transhepatic biliary drainage (PTBD) is a minimally invasive interventional radiology procedure done to effectively drain the biliary system using both fluoroscopy and ultrasonography (USG). The first reported fluoroscopy-guided PTBD was in 1962. It can be performed bedside in intensive care units (ICUs) using USG. Commonly, endoscopic retrograde cholangiopancreatography (ERCP) is performed for drainage of the biliary tree, but PTBD can be employed in certain specific scenarios. In patients with an altered biliary tree, failed ERCP, hilar strictures, and severe cholangitis, it is indeed of great essence. In patients with severe cholangitis, most of whom will require ICU care and cannot be mobilized to the ERCP suite, PTBD performed bedside, can be lifesaving.¹ Biliary tract obstruction above the level of the cystic duct and extrahepatic bile duct junction is called as proximal obstruction. This distal to this junction is called distal obstruction.

Biliary puncture is a challenging procedure and may require multiple attempts, thus increasing the risk of bleeding. With rapid advances in spatial and temporal resolution of USG, it provides improved access to biliary anatomy. However, data for USG-guided PTBD is limited, mostly originating from small cohort studies. Lee et al. more than a decade ago reported successful PTBD in 50 patients with a non-dilated biliary tree using both USG and fluoroscopy.² More recently, Giurazza et al. in their multicenter observational study on the safety of USG-guided PTBD found clinical success, that is, a decrease in serum bilirubin levels in 95.7% of patients, with complication rate (all minor) in 10.8% patients. The mean number of liver punctures required successfully cannulate the biliary tree was 1.57, thus concluding that it is a safe and effective procedure.³ Park et al. found that combining USG with fluoroscopy-guided PTBS was safe and effective, and also it reduced the radiation dose exposure.⁴

There is a limited head-to-head comparison of the technical aspects of fluoroscopy- and USG-guided PTBD. Nennstiel et al. in their study found fluoroscopy-guided PTBD to be superior for the right biliary system while USG may be better for the left side. Although major complications occurred in the fluoroscopy method.⁵ Albeit, USG-guided PTBD may be the only option for patients in ICU on mechanical ventilation and with a high vasopressor requirement. Comparison on the use of PTBD for dilated vs non-dilated bile ducts is again limited and lacking for USG-guided technique. However, Pedersoli et al. in their retrospective analysis comparing fluoroscopy-guided PTBD in dilated vs non-dilated biliary ducts, PTBD for non-dilated ducts was associated with similar overall complication rates but higher bleeding complication rates.⁶

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Percutaneous transhepatic biliary drainage can be associated with minor to life-threatening complications. Common complications include bleeding (both venous and arterial), bile leak, hemobilia, and pain. The reported complication rates with PTBD range from 3% to 10%.⁷ Society of interventional radiology has reported a major bleeding risk of 2.5%.⁸ In a recently published meta-analysis by Lee et al., which included studies using both fluoroscopy and USG for the procedure found that side of PTBD, the level of insertion into the bile duct and USG guidance were not associated with a significant risk of bleeding after PTBD, however, the left-sided approach was associated with more hepatic artery injury.⁹ Endoscopic ultrasound-guided biliary drainage (EUS-BD) when compared to PTBD in patients who fail ERCP has shown lower re-intervention, decreased adverse events, and pain.¹⁰ Role of EUS-BD is questionable in the patient subgroup admitted to the ICU, where bedside USG-guided PTBD may be the procedure of choice but needs further evaluation.

In this issue, Singh et al. have published their retrospective, observational trial on the use of USG-guided PTBD for biliary drainage in critically ill severe cholangitis patients. Data were collected over one year and 20 patients were included in the study. They performed bedside USG-guided PTBD only if the patient could not be shifted to the fluoroscopy suite. A total of 11 patients had a proximal biliary obstruction. They were able to cannulate the biliary tree on both right and left sides. The mean number of liver punctures required was 1.75. They observed no major complications except for three patients developing transient hemobilia and one patient developing small subcapsular hematoma, none of which required any further interventions. They were able to cannulate the biliary tract in all 20 patients, thus achieving 100% technical success. They were able to conclude that USG-guided PTBD is a safe and effective

method of managing severe cholangitis patients who cannot be mobilized outside the ICU.¹¹ The conclusion of the study may be limited by the fact that it was performed by a single interventional radiologist, had a small sample size and it would be prudent to conduct a larger prospective trial in this regard. Gupta et al. in their observational study on 10 patients had a similar conclusion, that is, USG-guided bedside PTBD was safe in patients with severe cholangitis.¹²

The USG-guided bedside PTBD in multiple but limited trials may have affirmed its worth as a life-saving procedure in critically ill ICU patients with severe cholangitis. Its use is limited by a lack of expertise at most centers. Larger, prospective trials and adequately supervised human resource development, both will indeed help in the propagation of the technique to more centers and wider acceptance.

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