

friction was noted between the cryo probe and the echoendoscope channel and also the maneuverability was similar to a 19-gauge FNA needle based on subjective impressions of the 3 examiners. Also, the tissue could be extracted with a single pass of the CB probe through transgastric and transduodenal punctures in all the cases. The authors concluded that the EUS-guided cryobiopsy gave better specimen quality for histological analysis and a shorter bleeding time compared with a conventional 19-gauge FNA needle in the animal model.

Commentary

Cryobiopsy has been shown to obtain high-quality tissues for histological evaluation during bronchoscopy and the current study has shown the technical feasibility as well as superiority of EUS guided cryobiopsy of pancreas in animal models as well as human cadavers.^{5,6} Importantly, it has been shown that an adequate specimen could be obtained in all the cases by using a single pass only. This potential of obtaining good samples by a single pass has an immense potential of improving the feasibility and safety of EUS guided tissue acquisition. The concerns of removing a large chunk of tissue of enblock are risks of bleeding as well as risk of pancreatitis and pancreatic duct disruptions. Surprisingly in the current study, the bleeding rates have been shown to be lower with the cryo probes as compared to conventional FNA needle. This may be related to single pass taken while using a cryo probe as compared to multiple passes taken during FNA. The risk of pancreatitis and pancreatic duct leaks is real and these concerns should be evaluated by further animal studies and thereafter in human studies. This technology seems fascinating but the large diameter of the cryo probe (18G) and risks of removing large chunks of pancreatic tissue need to be addressed by further studies before this instrument sees the light of daily clinical practice.

Endoscopic Ultrasound-Guided Transmural and Percutaneous Transhepatic Gallbladder Drainage are Comparable for Acute Cholecystitis

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Acute cholecystitis is one of the common surgical emergencies and is usually treated conservatively with intravenous antibiotics. However, patients who do not respond to

medical therapy may need emergency cholecystectomy. Laparoscopic cholecystectomy is usually considered the treatment of choice in patients with acute cholecystitis with low morbidity and mortality.^{7,8} However, the surgical treatment is associated with higher morbidity and mortality in high risk patients. In such high risk patients alternative minimally invasive methods like percutaneous transhepatic gallbladder drainage (PTGBD) have been evaluated with response rates ranging from 56% to 100%.^{9,10} Even this procedure is associated with complications like biliary peritonitis, bleeding, and pneumothorax and is difficult to do in patients with coagulopathy and massive ascites.^{9,10} Endoscopic ultrasound (EUS) guided transmural gallbladder drainage (EUS-GBD) is a newer procedure that might be an effective alternative to PTGBD in high risk patients with acute cholecystitis with an added advantage of avoiding a percutaneous catheter and its associated discomfort. Although there are some case reports/series describing its successful use in high risk patients with acute cholecystitis but no prospective studies have evaluated its safety and efficacy.¹¹⁻¹³ The authors of the current study conducted a prospective, randomized trial comparing the technical feasibility and efficacy of EUS-GBD with that of PTGBD in high risk patients with acute cholecystitis.

All consecutive patients with acute cholecystitis who did not respond to conservative medical treatment and were considered high risk for emergency cholecystectomy because of underlying comorbid conditions (n=59) were randomized by computer-generated numbers to undergo EUS-GBD (30 patients) or PTGBD (29 patients). The EUS-GBD was done using a linear-array echoendoscope (GF-UCT240-AL; Olympus Optical, Tokyo, Japan) and the gall bladder body or neck was accessed through the puncture made using a 19 G needle at the prepyloric antrum or the bulb of the duodenum. After securing the guide wire, the tract was dilated using a 6F/7F bougie (Soehendra Biliary Dilatation Catheter; Cook Endoscopy). In cases of resistance, a triple-lumen needle-knife (Microtome; Boston Scientific) with a 7F shaft diameter was used to dilate the tract by using a pure cutting current over the tract. Post dilatation, a 5F nasobiliary drainage tube (ENBD-5; Cook Endoscopy) was coiled into the gallbladder. The PTGBD was performed by experienced interventional radiologists by placing a 8.5F pigtail drainage catheter using a transhepatic route. The primary end point of the study was the technical success whereas the secondary outcomes assessed were clinical success rates, complications, conversion rates to open cholecystectomy, and post-procedure pain.

The technical success rates were comparable between EUS-GBD (29 of 30; 97%) and PTGBD (28 of 29; 97%) as was the average time for the procedure (23±7 minutes for EUS-GBD vs. 24±10 minutes for PTGBD). There was one failure in each group and the clinical success rates in patients with technically successful procedure were 100% (29 of 29) for EUS-GBD and 96% (27 of 28) for PTGBD group (95% one-sided CI lower limit - 2%; $p = .0001$ for a non inferiority margin of 15%). Two patients (7%) in the EUS-GBD group (pneumoperitoneum that improved with conservative management in both patients) and 1 patients (3%) in the PTGBD group (hemobilia that was treated by blood transfusion) had complications ($p=0.492$). The median pain score was significantly lower in the EUS-GBD than in the PTGBD group (1 vs 5; $p < .001$).

The conversion rates to open cholecystectomy was also comparable between two groups (9% for EUS-GBD vs. 12% for PTGBD group; $p=0.999$). The authors concluded that EUS-GBD is comparable to PTGBD in terms of the technical and clinical success as well as complications and therefore is a good alternative for high-risk patients with acute cholecystitis who cannot undergo an emergency cholecystectomy.

Commentary

The findings of this study that EUS guided gall bladder drainage is as effective as percutaneous drainage of the gall bladder for patients with acute cholecystitis who are unfit for emergency surgery opens a new frontier for therapeutic endosonologists. The percutaneous drainage of gall bladder is being performed for decades with very good success rates and acceptable complication rates. So why there is a need for an EUS guided drainage? The EUS guided drainage may have advantage in the following situations:

1. Patients with large amount of ascites will have difficulty in undergoing PTGBD and in these situations EUS-GBD may be a safer option.
2. There are increased chances of bleeding in PTGBD because of the puncture of the liver parenchyma which is more vascular than the antrum or duodenum that are the sites for EUS-GBD.
3. The post procedure discomfort and pain would be less with EUS GBD as compared to PTGBD where a subcostal drain keeps on causing constant pain that worsens with respiration.

In spite of these advantages, all is not so good for EUS-GBD. The limitations of this procedure include:

1. In the current study patients undergoing EUS-GBD required moderate to deep sedation whereas PTGBD was done under local anesthesia only. This may be a major limitation in patients with significant comorbidities.
2. The major concern with EUS-GBD is bile leak as there is free potential space between the gallbladder and the stomach/duodenum. However, none of the patients in the current study had bile leakage or bile peritonitis and the authors speculated that this could be because of the adherence of an inflamed gallbladder wall to adjacent structures and use of smaller diameter 5F nasobiliary tube.

This study has reiterated that EUS-GBD is technically feasible and in centers with expertise it is safe and effective. To prevent bile leaks, newer novel lumen-apposing stents that impart lumen-to-lumen anchorage have been developed that reduce the risk of bile leak and these have been evaluated for patients with acute cholecystitis with encouraging results. 14,15

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