Endoscopic ultrasound-guided gallbladder drainage: Redefines the boundaries

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Last one decade has seen a rapid expansion of indications and technical feasibility for endoscopic ultrasound (EUS)-guided interventions. EUS-guided gallbladder (GB) drainage is gradually emerging as an option among patients who are not eligible for surgical intervention. Calculous and acalculous cholecystitis, biliary malignancy with patent cystic duct and GB hydrops are few of the indications for this novel technique.[1]

Previously, apart from surgery, percutaneous transhepatic GB drainage (PTGBD) and endoscopic retrograde GB drainage (ERGBD) were the options for patients. PTGBD has several limitations as it cannot be performed in patients with ascites, coagulopathy, and dementia.[2-4]

Inadvertent self-removal or slippage of catheter, pneumoperitoneum, pneumothorax, and bile leakage can further be troublesome. It may result in pain at puncture site and significantly compromises the quality of life.[5]

On the other hand, ERGBD has a good technical and clinical success rate, but it is challenging and sometimes difficult due to tortuosity, stricture, calculus and tumor of duct. Post-ERCP pancreatitis is a well-known complication related to ERGBD.[2]

Initially, first EUS-guided GB drainage reported by Baron and Topazian, this procedure has improved in terms of technique and results.[6]

This technique acts as a bridge to surgery in patients unfit for emergent cholecystectomy. Once it is decided that patient qualifies for EUS-guided GB drainage, next question is which approach and what type of stent. There are two approaches to puncture GB by EUS: Transgastric and transduodenal approach. In transgastric approach, body of gallbladder is punctured which is easy to perform but has certain limitations such as impaction of food material, bile leakage, distant stent migration and tissue overgrowth.[7]

Transduodenal approach is technically challenging but yields better results and relatively safe. In this approach, neck of gallbladder is punctured, it is a preferred

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site as it is less mobile as compared to the body of gallbladder. Second, proximal part of stent is toward tail of GB which limits the passage of food particles into common bile duct.[8]

It is hypothesized that transduodenal approach is associated with less tissue overgrowth and provides relatively stable tract to GB as compared to transgastric approach.[9]

Transduodenal approach can be performed by two routes: Short and long route. In long route, tip of EUS scope should be positioned forward and upward in prepyloric antrum. For short route, inflate the balloon in duodenal bulb to anchor tip of echoendoscope and then pull slowly taking the short route as it provides stability and axial force during puncture.[10]

Other important aspect is how to puncture duodenal wall. Puncturing with 19-gauge fine-needle aspiration cytology needle followed by application of cystotome attached with an electric cautery or dilatation catheter or balloon dilator. Gradual dilatation with catheter exerts an axial force which could detach the surface while diathermic effect keeps the surfaces together due to inflammatory reaction.[11]

One more important dimension of this technique is to place which type of stent. Initially, when this technique emerged, plastic biliary stents and nasobiliary drainage catheters were applied but later with passage of time covered self-expandable metallic stents (CSEMS) rapidly gained popularity among endoscopists. Complications related to plastic stents such as bile leakage and early stent blockage were overcome with advent of CSEMS and several other limitations such as small caliber of plastic stent and inability to adjust plastic stents during placement were also rectified.[12,13]

In porcine models, it usually takes 4–5 weeks to mature a fistulous tract, but in humans, it takes about 10 days as noticed histologically on a resected specimen.[14,15]

These CSEMS can be kept as long as up to 3 years without any stent-related complications.[4,12,16]

Nowadays, single step approach is favored over multistep approach of self-expandable metallic stents placement. Each technique has its own advantages and limitations. Single step implies the application of hot delivery system with cautery and is superior to multistep CSEMS placement as it decreases the intraprocedural duration and reduces the possibility of slippage of guidewire during procedure, prevents bile leakage. Multistep procedures usually need fluoroscopy guidance whereas single step approach may be purely EUS guided so reduced exposure to radiation, which is a further advantage for endosonographer and patient.[10]

Single step lumen apposing metal stent (AXIOS, Xlumena Inc., Mountain View, California, USA) has good clinical (96%–100%) and technical success rate (84.6%–100%). There are certain challenges in placing AXIOS stent. Uncontrolled release of stent and migration of distal flange of metallic stent into peritoneum are important procedural complications. Postprocedural complications include fever, hematochezia and hypochondrial pain. Recurrent cholecystitis observed after placement of CESMS can be challenging.[1,9,17]

When carefully analyzed, technical failures are high in a few studies, yet they achieved better rate by the placement of second CSEMS to ensure stent patency and stability.[17]

Placement of double pigtail plastic stent inside CSEMS can be a good option as it prevents food impaction and hypermucosal tissue formation.[8] This technique evolved as EUS-natural orifice transluminal endoscopic surgery over a period of time. Formation of fistulous tract facilitates the entry of endoscope inside GB to perform endoscopic lithotomy and polypectomy.[18,19]

Endosonographers have taken stride to shift from porcine model to humans over a period of time and further improved the stent by modification in the design of stent and gradual improvement of technique to achieve high technical success rate and limited morbidity. Can this technique replace cholecystectomy for some patients? Answer lies in future. We still have a long way to go.

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