

## Editorial

# Endoscopic Ultrasound-Guided Biliary Drainage

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Artifon ELA. Endoscopic Ultrasound-Guided Biliary Drainage. *Endosc Ultrasound* 2013; 2(2): 61-63

## INTRODUCTION

Endoscopic transpapillary biliary drainage is the procedure of choice for biliary decompression in patients with unresectable pancreatic cancer associated to obstructive jaundice.<sup>1-4</sup> However, endoscopic retrograde cholangiopancreatography (ERCP) failure can occur in 3 to 10% of cases<sup>1,2,4</sup>, even in experienced hands. This failure is related to operator inexperience, anatomic variation, tumor extension, prior surgery or incomplete drainage.<sup>1-4</sup>

The alternatives for biliary drainage in unsuccessful ERCP cases include precut sphincterotomy when a pathologic lesion is suspected, second-attempted ERCP, percutaneous transhepatic drainage (PTBD) or surgery.<sup>1,3,5,6</sup> However, PTBD has a complication rate of up to 30%, including biliary fistula, peritonitis, empyema, hematoma and liver abscesses.<sup>1,7</sup> Furthermore, if subsequent internal drainage cannot be achieved, the patients would have to accept long-term external biliary drainage which can be uncomfortable and is non-physiological, with significant impairment of quality of life.<sup>1</sup> Surgery offers long-term patency but is associated with increased morbidity and mortality.<sup>7</sup>

Several reports have reported the use of endoscopic ultrasound (EUS)-guide biliary drainage in patients with malignant biliary obstructions, allowing for bilio-digestive anastomosis with acceptable success and complication rates.<sup>4,7</sup> We herein describe our experience in two studies which compared the EUS-guided choledochoduodenostomy versus surgery and another one with percutaneous transhepatic cholangiography (PTC) in patients with unresectable pancreatic cancer associated with obstructive jaundice.

## CRITICAL ANALYSIS

Over more than 20 years EUS has continued to evolve from

a purely diagnostic to a therapeutic procedure.<sup>3,4,6,7</sup> The ability to place a needle within the imaging plane of the ultrasound endoscope allows the expansion of the potential applications of this technique.<sup>7</sup> In 1996, Wiersema *et al* firstly performed EUS-guided cholangiography in 7 patients, which was used to guide ERCP.<sup>6</sup>

EUS rendezvous to obtain bile duct access for conventional ERCP was first reported in 2004, by Mallory *et al*.<sup>8</sup> This technique is used solely to puncture the obstructed bile duct and pass a guide wire antegrade through the native papilla to allow subsequent ERCP. EUS-guided biliary rendezvous can be done through a transduodenal route to the common bile duct or through a transgastric route to the intra-hepatic ducts. The technical success rate is about 80%.<sup>9</sup> Complications are uncommon, but duodenal perforation and fluid leaks have been described.<sup>9</sup> Advantages of this procedure include achievement of biliary drainage at a single session by using conventional ERCP techniques, and possibly fewer complications than other EUS transluminal drainage approaches. However, a limitation of this technique is that it can be attempted only in patients in whom the papilla is endoscopically accessible. In our cases, we tried to pass the guidewire through the distal lesion, to reach the duodenum and complete an ERCP, as a rendezvous maneuver. However, it was not possible because the guidewire did not pass to the duodenum, even after several attempts. Then, the EUS-guided biliary drainage was performed.

Giovannini *et al*. in 2001 performed the first choledochoduodenal fistula under EUS guidance in a patient with pancreatic cancer using a needle knife followed by transduodenal stenting.<sup>10</sup> Ang *et al*. reported two cases with unresectable pancreatic cancer and the obstructed biliary system was successfully decompressed by the creation of a choledocoduodenal fistula and transduodenal biliary stent.<sup>1</sup>

Giovannini *et al*. in 2003 described the first EUS-guided hepaticogastrostomy in a patient with proximal metastatic biliary obstruction.<sup>11</sup> Other authors have also reported successful outcomes of this technique in which an anastomosis is created between the dilated left intra-hepatic biliary system and the cardia or the lesser curve of the

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Received: 2013-04-13; Accepted: 2013-04-20

stomach.<sup>12,13</sup>

Kahaleh *et al.*<sup>4,14</sup> recommend intra-hepatic access to the biliary system because it seems to be safer than the extra-hepatic approach. However, other studies have shown that the extra-hepatic approach may also be feasible and safe.<sup>15-17</sup>

Artifon *et al.*<sup>2</sup> and Bories *et al.*<sup>12</sup>, in 2007, described the successful use of a partially recovered metallic stent for EUS-guided biliary drainage during hepaticogastrostomy.<sup>16</sup>

In our cases, it was used a 19-G fine needle aspiration (FNA) needle to perform the initial transduodenal common bile duct (CBD) puncture as reported above. Then, we used a 0.035-inch guidewire through the needle into the CBD, followed by the insertion of a wire-guided needle knife to perform the increase of the orifice in the duodenal wall, with the same diameter of the needle knife (5.9 Fr), avoiding bleeding and an additional dilatation at the puncture site. This step could be done with other specific materials such as a cystotome. However, this needle was not available and we felt that the wire-guided needle knife could provide an adequate orifice for the passage of metal stent, with little risk of bleeding.

Burmester *et al.* (2003) described a one-step method using a new device consisted of a 19-G fistulotome with a 0.025-inch guidewire, a pusher tube and an 8.5-F plastic stent fixed with a 3.0 nylon-suture. This method of direct puncture of the extra-hepatic or an intra-hepatic duct could reduce the risk of guidewire dislocation during the instrument change, what must be made with the two-step method.<sup>3</sup> However, more studies with this device are needed.

EUS-guided biliary drainage has many advantages over PTBD<sup>1,3,4,18</sup>. The proximity of the transducer to the bile duct during EUS is the major advantage.<sup>4,19</sup> Even in patients who have undergone total gastrectomy or partial gastrectomy with a Billroth II reconstruction, EUS can reveal the etiology of extra-hepatic cholestasis, situations in which ERCP may not be possible<sup>1,3,4,6,20</sup>. Other advantages include puncture of the biliary tree with color-Doppler information to avoid vascular injury, the lack of ascites in the interventional field and the lack of an external tube, improving the quality of life of the patients<sup>1,21</sup>.

Choledochoduodenostomy can prevent clogging and tumor ingrowth and/or overgrowth, because it creates a fistula far from the obstructing tumor.<sup>17,21</sup> Besides, the short access route between duodenal bulb to the bile duct provides good stabilization of the echoendoscope, no major vascular structures and direction of the puncture being toward the hepatic hilum.

Many studies described this procedure with high success rates (more than 90%) and low rate of procedure-related complications (around 19%).<sup>22</sup> The main risk of EUS-guided biliary drainage is bile leakage, especially if stent insertion is unsuccessful.<sup>1</sup> Burmester *et al.* reported the failure of stent placement in 1 of their 4 patients, causing bile peritonitis.<sup>3</sup> They also reported that only local peritonitis developed, which did not contribute to the death of the patient. Some investigators recommended the transhepatic approach to

decrease the risk of biliary peritonitis in case of stent failure.<sup>3</sup> Other complications include pneumoperitoneum and minor bleeding.<sup>1,2,6</sup>

EUS-guided choledochoduodenostomy for malignant biliary obstruction has been shown to be an effective alternative to PTBD or surgery when ERCP fails. Increasing experience, improvement of the technique and equipment will probably improve the safety of the procedure. Studies comparing EUS-guided biliary drainage versus PTBD and surgery are needed.

In a pioneering study, Artifon *et al.*<sup>23</sup> compared EUS-guided choledochoduodenostomy (EUS-CD) and PTC in 25 patients with distal biliary malignant obstruction. The two groups were similar before intervention in terms of quality of life [EUS-CD (58.3) *vs.* PTBD (57.8),  $P = 0.78$ ], total bilirubin (16.4 *vs.* 17.2,  $P = 0.7$ ), alkaline phosphatase (539 *vs.* 518,  $P = 0.7$ ), and gamma-glutamyl transferase (554.3 *vs.* 743.5,  $P = 0.56$ ). All procedures were technically and clinically successful in both groups. The study concluded that EUS-CD can be an effective and safe alternative to PTBD with similar success, complication rates, cost, and quality of life.

Another study conducted by Artifon *et al.*, presented at DDW 2012, at the plenary session, showed results on comparative trial between EUS-CD and surgery to patients with biliary distal cancer. There was no significant difference in the technical and clinical outcomes between the two groups. Cost analysis demonstrated a significantly increased cost per patient in the surgical group ( $P = 0.039$ ). Complications were significantly higher in the surgical group ( $P = 0.041$ ). There was 1 case of self-limited bleeding in the EUS-CD group and 1 case each of wound abscess, abdominal abscess, internal fistula and pneumonia in the surgical group. All patients in the surgical group were managed conservatively.

Both of our studies comparing EUS-CD versus PTC and surgery are limited by a small sample size and larger multicenter studies are needed, but they demonstrated an effective non-surgical alternative for biliary drainage in patients with unresectable malignant distal biliary obstruction.

## REFERENCES

1. Ang TL, Teo EK, Fock KM. EUS-guided transduodenal biliary drainage in unresectable pancreatic cancer with obstructive jaundice. *JOP* 2007; 8: 438-43.
2. Artifon EL, Chaves DM, Ishioka S, *et al.* Echoguided hepaticogastrostomy: a case report. *Clinics (Sao Paulo)* 2007; 62: 799-802.
3. Burmester E, Niehaus J, Leineweber T, *et al.* EUS-cholangiodrainage of the bile duct: report of 4 cases. *Gastrointest Endosc* 2003; 57: 246-51.
4. Kahaleh M, Hernandez AJ, Tokar J, *et al.* Interventional EUS-guided cholangiography: evaluation of a technique in evolution. *Gastrointest Endosc* 2006; 64: 52-9.
5. Giovannini M, Pesenti Ch, Bories E, *et al.* Interventional EUS: difficult pancreaticobiliary access. *Endoscopy* 2006; 38 (Suppl 1): S93-5.
6. Wiersema MJ, Sandusky D, Carr R, *et al.* Endosonography-guided

- cholangiopancreatography. *Gastrointest Endosc* 1996; 43: 102-6.
7. Irisawa A, Hikichi T, Shibukawa G, *et al.* Pancreatobiliary drainage using the EUS-FNA technique: EUS-BD and EUS-PD. *J Hepatobil Pancreat Surg* 2009; 16: 598-604.
  8. Mallery S, Matlock J, Freeman ML. EUS-guided rendezvous drainage of obstructed biliary and pancreatic ducts: report of 6 cases. *Gastrointest Endosc* 2004; 59: 100-107.
  9. Kim YS, Gupta K, Mallery S, *et al.* Endoscopic ultrasound rendezvous for bile duct access using a transduodenal approach: cumulative experience at a single center. A case series. *Endoscopy* 2010; 42: 496-502.
  10. Giovannini M, Moutardier V, Pesenti C, *et al.* Endoscopic ultrasound-guided bilioduodenal anastomosis: a new technique for biliary drainage. *Endoscopy* 2001; 33: 898-900.
  11. Giovannini M, Dotti M, Bories E, *et al.* Hepaticogastrostomy by echo-endoscopy as a palliative treatment in a patient with metastatic biliary obstruction. *Endoscopy* 2003; 35: 1076-8.
  12. Bories E, Pesenti C, Caillol F, *et al.* Transgastric endoscopic ultrasonography-guided biliary drainage: results of a pilot study. *Endoscopy* 2007; 39: 287-91.
  13. Will U, Thieme A, Fueledner F, *et al.* Treatment of biliary obstruction in selected patients by endoscopic ultrasonography (EUS)-guided transluminal biliary drainage. *Endoscopy* 2007; 39: 292-5.
  14. Shami VM, Kahaleh M. Endoscopic ultrasonography (EUS)-guided access and therapy of pancreatico-biliary disorders: EUS-guided cholangio and pancreatic drainage. *Gastrointest Endosc Clin N Am* 2007; 17: 581-93, vii-viii
  15. Itoi T, Itokawa F, Sofuni A, *et al.* Endoscopic ultrasound-guided choledochoduodenostomy in patients with failed endoscopic retrograde cholangiopancreatography. *World J Gastroenterol* 2008; 14: 6078-82.
  16. Park do H, Song TJ, Eum J, *et al.* EUS-guided hepaticogastrostomy with a fully covered metal stent as the biliary diversion technique for an occluded biliary metal stent after a failed ERCP (with videos). *Gastrointest Endosc* 2010; 71: 413-9.
  17. Yamao K, Bhatia V, Mizuno N, *et al.* EUS-guided choledochoduodenostomy for palliative biliary drainage in patients with malignant biliary obstruction: results of long-term follow-up. *Endoscopy* 2008; 40: 340-2.
  18. Hanada K, Iiboshi T, Ishii Y. Endoscopic ultrasound-guided choledochoduodenostomy for palliative biliary drainage in cases with inoperable pancreas head carcinoma. *Dig Endosc* 2009; 21(Suppl 1): S75-8.
  19. Tarantino I, Barresi L, Repici A, *et al.* EUS-guided biliary drainage: a case series. *Endoscopy* 2008; 40: 336-9.
  20. Ashida R, Chang KJ. Interventional EUS for the treatment of pancreatic cancer. *J Hepatobil Pancreat Surg* 2009; 16: 592-7.
  21. Yamao K, Sawaki A, Takahashi K, *et al.* EUS-guided choledochoduodenostomy for palliative biliary drainage in case of papillary obstruction: report of 2 cases. *Gastrointest Endosc* 2006; 64: 663-7.
  22. Itoi T, Yamao K; EUS 2008 Working Group. EUS 2008 Working Group document: evaluation of EUS-guided choledochoduodenostomy (with video). *Gastrointest Endosc* 2009; 69(Suppl 2): S8-12.
  23. Artifon EL, Aparico D, Paione JB, *et al.* Biliary drainage in patients with unresectable, malignant obstruction where ERCP fails: endoscopic ultrasonography-guided choledochoduodenostomy versus percutaneous drainage. *J Clin Gastroenterol* 2012; 46: 768-74.