De novo EUS-guided biliary drainage

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INTRODUCTION

EUS-guided biliary drainage (EUS-BD) was developed as a rescue method of ERCP.

Recently, the usefulness of EUS-BD for the papilla tumors, duodenal stenosis by tumors, or altered anatomy patients were reported in many papers. EUS-BD is a good indication for difficult ERCP cases. In addition, “de novo EUS-BD” for malignant lower biliary obstructions is focused by experienced endosonographers now. The most different points in these two procedures are kinds of complications. Post-ERCP pancreatitis is a big problem in ERCP until now. All physicians made efforts to decrease post-ERCP pancreatitis for very long time, but still unresolved. EUS-BD is very low risk of pancreatitis, nearly zero. However, bile peritonitis is a common complication of EUS-BD. Which is the better procedure for malignant lower biliary obstructions?

Hence, in this review, we will focus on de novo EUS-BD, not a rescue of the standard transpapillary drainage for lower biliary obstructions. We will not mention about de novo EUS-BD for hilar obstructions which is still controversial because of not enough evidence.

RESULTS IN PUBLISHED PAPERS

The possibility of de novo EUS-BD was reported from the early stages of the development. First report of the primary EUS-BD was EUS-guided choledochoduodenostomy (EUS-CDS) cases enrolled in the prospective study by Hara et al., in 2011.[1] First prospective study of focusing de novo EUS-BD was also reported in 2013 by Hara et al.[2] Results of these two papers showed clinical usefulness in de novo EUS-BD. Okuno et al. reported usefulness of primary EUS-guided hepaticogastrostomy (EUS-HGS) for estimated difficult ERCP cases.[3] They also reported the safety of 6 mm bore fully covered metal stents. Kawakubo et al.[4] and Nakai et al.[5] published papers of comparative studies in EUS-CDS and ERCP. They reported EUS-CDS is the acceptable procedure compared with ERCP. Three randomizes controlled trial papers[6-8] referred to EUS-BD vs. ERCP were already published in 2018. Bang et al.[8] and Park et al.[9] reported ERCP vs. EUS-CD. Paik et al.[10] reported ERCP vs. EUS-BD (both EUS-HGS and EUS-CDS). Park et al.[4] reported EUS-BD had similar safety to ERCP. They also reported EUS-BD was not superior to ERCP in terms of relief of malignant biliary obstruction. EUS-BD may have fewer cases of tumor ingrowth but may also have more cases of food impaction or stent migration. Bang et al.[8] reported the similar rates of adverse events and treatment outcomes in the randomized trial. They also mentioned

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EUS-BD was a practical alternative to ERCP for primary biliary decompression in pancreatic cancer. Paik et al.\(^7\) reported comparable technical and clinical success rates between EUS-BD and ERCP in relief malignant distal biliary obstruction. Substantially, longer duration of patency coupled with lower rates of adverse events and reintervention, and more preserved quality of life (QOL) were observed with EUS-BD.

Total early adverse events rate in published papers is 12% (23/199) in the present paper. Technical and clinical success rate are both 95% in the present paper [Table 1].

**DISCUSSION**

From the published papers, *de novo* EUS-BD has a comparable technical success rate, clinical success rates, and safety. Stent patency of EUS-BD may be longer than ERCP. EUS-BD may have the benefits in reintervention and patient’s QOL also. The most different and beneficial point in *de novo* EUS-BD is zero pancreatitis. Zero pancreatitis is so happy for both patients and physicians. Until now, we cannot prevent post-ERCP pancreatitis, so EUS-BD is the ideal procedure at this point. Bile peritonitis is a common complication in EUS-BD; this is the unresolved problem also. Can we decrease these two complications in future? If dedicated devices are developed, EUS-BD can decrease severe complications, especially bile leakage. One step devices such as Hot AXIOS\(^9\) may prevent bile leakage and other complications also. We can minimize complications of EUS-BD by ourselves. However, ERCP is not in the same condition. Even if ERCP devices are so developed in the near future, we cannot easily prevent pancreatitis. A long history of ERCP can show this fact. Only one way of the prevention pancreatitis is “no touch the papilla.”

The second beneficial point in *de novo* EUS-BD is the new drainage route. EUS-BD creates the new drainage route outside the tumor. On the other hand, ERCP put the stent into the tumor. In the clinical course, tumors may involve ERCP stent and duodenum. Reintervention of ERCP may be difficult in this situation. On the other hand, EUS-BD stent is located above the tumor, so sent dysfunction by the tumor progression is not so common.\(^7\) Reintervention of EUS-BD is much easier than ERCP\(^9\). Ascites are commonly seen in advanced malignant patients. After pooling ascites, EUS-BD is not a safe procedure due to the possibility of infectious peritonitis. Hence, finally, we recommend the early stage EUS-BD, especially *de novo* EUS-BD before pooling ascites and duodenal obstruction.

However, some physicians do not agree the *de novo* EUS-BD.\(^9\) Because EUS-BD is a still not matured procedure. There are no good teaching system and few

| Author     | n   | Year | Study design | Method                | Technical success | Clinical success | Early AE         | Grade of AE                                      |
|------------|-----|------|--------------|-----------------------|-------------------|------------------|------------------|-----------------------------------------------|
| Hara et al.| 16  | 2011 | Prospective  | EUS-CDS using PS      | 100% (16/16)      | 100% (16/16)     | 19% (3/16)       | 3 mild (2 bile peritonitis, 1 bleeding)       |
| Hara et al.| 18  | 2013 | Prospective  | EUS-CDS using MS      | 94% (17/18)       | 100% (17/17)     | 11% (2/18)       | 2 mild (2 bile peritonitis)                  |
| Kawakubo et al.| 26  | 2016 | Retrospective| EUS-CDS using MS      | Not analyzed      | 96% (24/26)      | Overall 27% (7/26) | Not mentioned                                  |
| Okuno et al.| 20  | 2018 | Prospective  | EUS-HGS using MS      | 100% (20/20)      | 95% (19/20)      | 15% (3/20)       | 2 moderate (2 focal cholangitis, 1 mild (1 fever) |
| Nakai et al.| 34  | 2018 | Prospective  | EUS-CDS using MS      | 97% (33/33)       | 100% (33/33)     | 12% (4/34)       | 2 moderate (2 cholecystitis, 2 mild (2 abdominal pain) |
| Paik et al. | 64  | 2018 | RCT, EUS-BD  | EUS-CDS and HGS using MS | 94% (60/64)      | 90% (54/60)      | 6% (4/64)        | Not mentioned (2 pneumoperitoneum, 1 bile peritonitis, 1 cholangitis) |
| Park et al.| 14  | 2018 | RCT, EUS-BD  | EUS-CDS using MS      | 100% (14/14)      | 93% (13/14)      | 0% (0/14)        | No AE                                         |
| Bang et al.| 33  | 2018 | RCT, EUS-BD  | EUS-CDS using MS      | 91% (30/33)       | 97% (29/30)      | 21% (7/33)       | 2 moderate (1 bile peritonitis, 1 cholecystitis, 5 mild (5 abdominal pain) |
| Present paper | 225 | 2019 | Primary      | CDS173: HGS52         | 95% (190/199)     | 95% (205/216)    | 12% (23/199)     | No severe adverse events, moderate 4% (6/135), mild 10% (13/135) |

HGS: Hepaticogastrostomy, RCT: Randomized controlled trial, BD: Biliary drainage, CDS: Choledochoduodenostomy, PS: Plastic stent, MS: Metal stent
good trainers in these fields. Hence, the clinical benefits of de novo EUS-BD are still controversial.

Conflicts of interest
There are no conflicts of interest.

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