Percutaneous transhepatic ultrasound-guided gallbladder aspiration: Still a safe option for gallbladder decompression in patients at high surgical risk

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Abstract
Aims: Cholecystitis generally warrants immediate cholecystectomy; however, high-risk patients require non-surgical options for gallbladder decompression. The continuous evolution of endoscopic techniques makes it difficult for clinicians to choose the best technique for high-risk patients. Here we aimed to show that percutaneous transhepatic gallbladder aspiration, a technique that has fallen into disuse, is a safe and rapid method for gallbladder decompression. Materials and methods: In our local database, we identified 48 patients who had undergone transhepatic punctures of the biliary system, 34 of whom were excluded because they had received bile duct punctures. The remaining 14 patients had received gallbladder punctures, of whom 9 were considered eligible for analysis. Cases were retrospectively analyzed for technical success, complications, and individual outcomes. Results: Our analysis included 9 patients (3 female, 6 male; median age, 51 years; range, 32-84 years). Underlying malignancy was found in 5 patients, while 4 were in a palliative situation. Underlying infection was found in 8 cases. All punctures were technically successful without complications. In all patients, individual therapy goals were met, including clinical stabilization in palliative situations, stabilization before liver surgery, exclusion of gallbladder empyema and infection in gallbladder hydrops, and avoidance of gallbladder rupture. The white blood cell counts at the day of puncture were significantly reduced one week after the puncture (p=0.023). Conclusions: When selecting an appropriate technique for high-risk patients, clinicians should remember that gallbladder aspiration is a feasible and successful bedside procedure in patients at high surgical risk, which does not require an experienced endoscopist. Keywords: gallbladder; decompression; interventional ultrasonography; puncture; aspiration

Introduction
For patients with acute cholecystitis, current guidelines recommend laparoscopy within 24-72 h [1,2]. Although open and laparoscopic cholecystectomy are generally considered safe surgeries, the mortality rate is higher in patients with significant comorbidities [3-5]. In high-risk patients, an alternative to surgical gallbladder removal is a timely decompression, especially in gallbladder hydrops. Minimally invasive decompression can be performed as a temporary measure or as definitive treatment [6-8]. Several gallbladder drainage techniques are available. The oldest procedure is percutaneous cholecystostomy, which involves ultrasound-guided percutaneous transhepatic gallbladder aspiration (PTGBA) or gallbladder drainage (PTGBD). Tokyo guidelines recommend PTGBD as standard procedure for patients with acute cholecystitis who are at high risk for perioperative morbidity and mortality. Compared to aspiration, drainage therapy can more effectively mobilize thick exudate [9]. An international multicenter study showed that the 3-day clini-
Med Ultrason 2023; 25(1): 14-21

Cal success rate was significantly higher after PTGBA than after PTGBD and endoscopic gallbladder stenting (EGBS), although the 7-day clinical success rates did not significantly differ [10]. Cholecystostomy has a technical success rate of 98.5-100% [11]. The choice of access route (direct gallbladder puncture or transhepatic access) is not associated with significantly different complication rates [12].

Newer procedures include endoscopic transpapillary gallbladder drainage (ETGBD) and endoscopic ultrasound-guided gallbladder drainage (EUSGBD). ETGBD is safe and effective [13,14], and is associated with less pain and better objective treatment response than PTGBD [15]. However, it is also technically challenging, associated with an increased risk of pancreatitis, and may fail when cystic duct obstruction (by stones or inflammation) prevents selective cannulation of the cystic duct. EUSGBD has become popular in recent years because it improves patients’ quality of life through internal drainage, and reduces the risks of repeated hospitalizations and necessary re-interventions [16]. Endoscopic ultrasound-guided puncture is usually performed via the duodenum or stomach [9,17,18]. Drainage can be provided using various stents, e.g., self-expansible metal stents (SEMS), double-pigtail stents, lumen-apposing metal stents (LAMS), or electrocautery-enhanced LAMS [9,17,18].

EUSGBD and PTGBD show comparable technical (97% vs. 97%) and clinical (100% vs. 96%) success rates [19]. Teoh et al report that compared with PTGBD, EUSGBD was associated with significantly lower 1-year rates of adverse events (32.2% vs. 74.6%, p<0.001) and re-admission for re-intervention (6.8% vs. 71.2%, p<0.001) [20]. Most adverse events in the PTGBD group were due to tube-related problems, including leaks, obstructions, or infections. Clinicians must choose among these constantly evolving endoscopic options to select an appropriate individual treatment plan, considering technical requirements and costs, patient factors, and the expertise of the treating physician.

In this article, we report the technical and clinical success of PTGBA among nine patients who were not candidates for surgical therapy. We aimed to demonstrate that this procedure can be considered for patients with different clinical backgrounds, particularly when an experienced endoscopist is not available.

Materials and methods

Study population and data collection

We searched our local medical database, and identified 48 patients who had undergone percutaneous tran-

![Fig 1. Screening for the study population](image)
sonographic Murphy sign, gallbladder wall thickening (>4.5 mm), echolayering of the gallbladder wall (alternating hypoechoic and hyperechoic layer with prominent specular mucosal lining), and pericholecystic fluid. Patients were examined for gallbladder hydrops by applying graduated pressure on the gallbladder, and considered positive if the gallbladder maintained its round contour during compression [26]. Additional criteria included transverse width >4 cm, longitudinal length >9 cm, and straight or convex borders.

The nine cases were analyzed for technical success, complications, and patient outcome. Technical success was assumed when the needle could be visualized in the gallbladder and fluid was evacuated. Medical reports were analyzed for major complications associated with gallbladder aspiration, such as increased pain, rupture, hemodynamic instability, or bleeding. Patient outcome was analyzed in terms of the achievement of various individual goals, such as clinical stabilization, symptom relief, and infection control in palliative patients, stabilization and infection control before liver surgery, exclusion of gallbladder empyema and infection in gallbladder hydrops, and prevention of gallbladder rupture.

**Technical procedure**

Percutaneous gallbladder aspiration was performed by two certified examiners under ultrasound guidance (Toshiba Aplio XG; Tokyo, Japan) using a special biopsy transducer (Toshiba PLT308P 3.75 MHz), with a 0.9-mm (20-gauge) or 0.7-mm (22-gauge) needle (Pajunk Germany). Only local anesthesia (xylocaine, 1%; Aspen Pharmacare, South Africa) was typically required. Before puncture, color Doppler assessment was performed to prevent accidental vascular injury by excluding the presence of any major hepatic or portal vessels within the intended route. The drainage route was planned under ultrasound guidance. After local anesthesia administration, the needle was introduced with its tip positioned within the gallbladder lumen. Diagnostic aspiration of a small amount of fluid was performed to obtain samples for microbiology analysis and culture. Gallbladder fluid was evacuated, and the gallbladder was rinsed with 0.9% NaCl. The examiner decided whether to administer antibiotic injection, depending on macroscopic aspects of the bile and clinical necessity. The decision concerning injected antibiotics was made following previous antibiograms (fig 2).

**Statistical analysis**

All statistical analyses were performed using SPSS Statistics 26 (IBM Corp, Armonk, NY). Laboratory results on the day of puncture were compared with the results one week after the first puncture. Statistical significance was evaluated using a two-sided exact Wilcoxon test. Cases with no laboratory data after one week were excluded from statistical analysis.

**Results**

**Patient characteristics**

Of the nine included patients, six were male and the median age was 51 years (range, 32-84 years). No patient had liver cirrhosis or was liver transplanted. All patients were severely pre-diseased, and too high-risk for cholecystectomy according to multidisciplinary assessment. Five patients had underlying malignant diseases, including cholangiocarcinoma (n=3), stomach cancer with hepatic metastasis (n=1), and breast cancer with hepatic metastasis (n=1). Four patients were in a palliative situation. Eight patients exhibited underlying infection, including spontaneous bacterial peritonitis (n=1), cholecystitis (n=5), post-ERCP pancreatitis (n=3), cholangitis (n=1), and gallbladder empyema (n=1). Patient characteristics are described in Table I.
Every puncture was successful on its first attempt. Gallbladder hydrops was observed in seven cases, and cholecystitis in five cases. Six patients could be treated with a single PTGBA. Three patients required a second PTGBA. Concomitant systemic antibiotic therapy was needed in eight patients. No patient required permanent drainage. This increases patient comfort, which is especially important in a palliative situation. Table II presents detailed information about macroscopic aspects of bile, microbiological analysis, antibiotic administration, concomitant antibiotic therapy, and underlying disease.

Patient outcomes

All patients were alive after treatment, and were sufficiently stabilized for their individual therapy goals. Table III presents laboratory value comparisons.

Among the four palliative patients, clinical stabilization, relief of symptoms, and infection control were achieved in all four. Three palliative patients could be discharged after puncture and concomitant systemic therapy, and were able to avoid high-risk surgery, which can delay systemic tumor therapy and minimize hospital-free lifetime due to prolonged recovery time. One palliative patient needed repeated PTGBAs because hydrops was mechanically evoked by metastasis of the underlying tumor. In this case, PTGBA was the only applicable technique for decompression and clinical stabilization, because massive peritoneal carcinosis prevented cholecystectomy, and drainage therapy can lead to patient discomfort.

In the three patients with a disease that might require extended liver surgery, such as a suspicious bile duct stenosis, PTGBA was performed with the aim of stabilization before liver surgery. All three patients were stabilized with PTGBA and concomitant antibiotic therapy, creating a better starting point for potential liver surgery.

In one patient, PTGBA was performed with the aim of excluding gallbladder empyema, and to flush the bile system with antibiotics prior to an ERCP. The individual goal of puncture was reached in this patient. In one patient with very high surgical risk and signs of discontinuity in CEUS, PTGBA was performed with the aim of preventing gallbladder rupture and promoting stabilization. Aspiration successfully prevented gallbladder rupture, and this patient later underwent elective cholecystectomy as recommended by our surgeons.

Complications and adverse events

Detailed analysis of all medical data revealed that no patient experienced complications or adverse events during their hospital stay. PTGBA was a safe procedure, even in patients with underlying abdominal infection, such as spontaneous bacterial peritonitis and ascites. Notably, no complication occurred in a patient facing imminent gallbladder rupture, with gangrenous cholecystitis, and proved discontinuity of the gallbladder wall.

Discussion

In most patients, early cholecystectomy is the standard therapy for gallbladder diseases, such as acute cholecystitis. However, patients with severe comorbidities, especially advanced palliative patients, face high surgical risk with an overall high morbidity and mortality. Such patients require alternative therapeutic strategies to avoid surgical complications and prolonged distress. In this retrospective study, we demonstrated that PTGBA is a safe and feasible procedure in patients with severe comorbidities, such as palliative diseases, tumors, and infection.

Our analysis revealed that gallbladder aspiration was an appropriate technique not only in cases of proven cholecystitis in high-risk surgical patients, but also in cases of gallbladder hydrops requiring puncture to prevent cholecystitis development, to prevent rupture, and for pain relief in palliative situations. PTGBA was an adequate procedure for gallbladder decompression, especially in cases not requiring a long-term strategy—for example, to allow patients to recover from other underlying diseases (e.g., post-ERCP pancreatitis), and to prepare patients for extended liver surgeries. Among patients not eligible for surgery, PTGBA can be of additional benefit, because the proof of bacteria with sub-specification can help in the selection of suitable antibiotic therapy. PTGBA should especially be considered in palliative patients because it avoids the discomfort of a permanent drainage, especially when endoscopic drainage approaches are not possible.

Besides PTGBA, other alternative therapeutic strategies for gallbladder interventions include PTGBD, EUS-GBD, and ETGBD, which have mostly been evaluated.

Table I. Patients’ baseline characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male gender, n (%)</td>
<td>6 (66.7%)</td>
</tr>
<tr>
<td>Age in years, median (range)</td>
<td>51 (32-84)</td>
</tr>
<tr>
<td>Ascites, n (%)</td>
<td>5 (55.6%)</td>
</tr>
<tr>
<td>ALT, mean</td>
<td>91±58.2</td>
</tr>
<tr>
<td>INR, mean</td>
<td>1.24±1.2</td>
</tr>
<tr>
<td>Jaundice, n (%)</td>
<td>6 (66.7%)</td>
</tr>
<tr>
<td>Underlying malignant disease, n (%)</td>
<td>5 (55.6%)</td>
</tr>
<tr>
<td>Underlying infection, n (%)</td>
<td>8 (88.9%)</td>
</tr>
<tr>
<td>High surgical risk, n (%)</td>
<td>9 (100%)</td>
</tr>
</tbody>
</table>

Quantitative values expressed as mean±SD. Normal range of laboratory values: INR, 0.9-1.25; ALT<34 U/L. ALT: Alanine transaminase; INR: International Normalized Ratio
PTGBA, as performed in our study, is a simple and low-cost bedside procedure that does not require X-ray use. It can be performed outside of tertiary endoscopic high-volume centers, can thus be widely used as a method of decompression in patients with acute cholecystitis. Moreover, it does not have a negative impact on further surgeries.

In a prospective study, Haas et al reported that gallbladder aspiration was successful in 76% of patients with acute cholecystitis [28]. Komatsu et al demonstrated that 95.6% of their patients with acute cholecystitis recovered after PTGBA, including those at high risk [29]. Present guidelines do not recommend gallbladder aspiration for all acute cholecystitis patients partly because thick dense material cannot be sufficiently aspirated, and therefore

Table II. Characteristics of percutaneous gallbladder aspiration and concomitant therapy

<table>
<thead>
<tr>
<th>Underlying disease</th>
<th>Gall-bladder</th>
<th>Macroscopic aspects of bile</th>
<th>Bile microbiology</th>
<th>Antibiotic instillation</th>
<th>Second punction</th>
<th>Concomitant systemic therapy</th>
<th>Aim of punction</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCC, hepatic metastasis, SBP</td>
<td>Hydrops</td>
<td>Hydrops</td>
<td>Green bile</td>
<td>Streptococcus mitis, Enterobacter cloacae, Candida tropicalis</td>
<td>No</td>
<td>No</td>
<td>Ceftriaxone Metronidazole</td>
</tr>
<tr>
<td>PSC, jaundice, suspicious bile duct stenosis, pancreatitis</td>
<td>Hydrops</td>
<td>Hydrops</td>
<td>Pus</td>
<td>Streptococcus mitis, ORSA</td>
<td>Yes</td>
<td>Yes</td>
<td>Linezolid Ciprofloxacin Metronidazole</td>
</tr>
<tr>
<td>Hepatic metastasis, fever</td>
<td>Cholecystitis</td>
<td>Hydrops</td>
<td>Clear liquid</td>
<td>No bacteria</td>
<td>No</td>
<td>No</td>
<td>Meropenem Vancomycin</td>
</tr>
<tr>
<td>Hepatic metastasis, CCC, hydrops, necrosing pancreatitis</td>
<td>Hydrops</td>
<td>Hydrops</td>
<td>Milky yellow</td>
<td>No bacteria</td>
<td>No</td>
<td>No</td>
<td>Piperacillin/Tazobactam Meropenem Linezolid</td>
</tr>
<tr>
<td>PSC, bile duct stenosis, cholangitis</td>
<td>Hydrops</td>
<td>Cholecystitis</td>
<td>Murky yellow</td>
<td>Staphylococcus aureus</td>
<td>Yes</td>
<td>Yes</td>
<td>Piperacillin/Tazobactam Metronidazole Levofloxacin</td>
</tr>
<tr>
<td>Painless occlusive jaundice, hydrops, large pancreatic cyst, failure of previous ERCP</td>
<td>Hydrops</td>
<td>Unknown</td>
<td>No bacteria</td>
<td>Ampicillin/sulbactam 1.5 g</td>
<td>No</td>
<td>No</td>
<td>Exclusion of gallbladder empyema and infection</td>
</tr>
<tr>
<td>Hepatic metastasis</td>
<td>Acalculous cholecystitis</td>
<td>Hydrops</td>
<td>Pus</td>
<td>Lactobacillus rhamnosus</td>
<td>No</td>
<td>No</td>
<td>Ampicillin/Sulbactam 1.5 g</td>
</tr>
<tr>
<td>Pancreatic mass highly suspicious of cancer, post-PTCD pancreatitis</td>
<td>Cholecystitis</td>
<td>Unknown</td>
<td>Escherichia coli</td>
<td>Ampicillin/sulbactam 1.5 g</td>
<td>No</td>
<td>No</td>
<td>Piperacillin/Tazobactam Meropenem Linezolid Ampicillin/Sulbactam</td>
</tr>
<tr>
<td>High perioperative risk and recommendation for antibiotic therapy</td>
<td>Hydrops</td>
<td>Unknown</td>
<td>Tenacious bloody material</td>
<td>Lactobacillus rhamnosus</td>
<td>No</td>
<td>No</td>
<td>Piperacillin/Tazobactam Metronidazole</td>
</tr>
</tbody>
</table>

Abbreviations (table II): CCC: Cholangiocellular Carcinoma, SBP: Spontaneous bacterial peritonitis, ORSA: Oxacillin resistant staphylococcus aureus, PSC: Primary Sclerosing Cholangitis, ERCP: Endoscopic retrograde cholangiopancreatography, PTCD: Percutaneous Transhepatic Cholangial Drainage
gallbladder aspiration may not be successful in patients with this presentation [9]. In their study comparing gallbladder aspiration and percutaneous cholecystostomy, Ito et al reported that 18% of attempted gallbladder aspirations failed due to thick material, such as pus, in the gallbladder [30]. Chopra et al retrospectively analyzed gallbladder aspiration and percutaneous cholecystostomy with application of a pigtail catheter in high-risk surgical patients. They reported that clinical outcomes did not differ between patients treated with gallbladder aspiration versus percutaneous cholecystostomy, and that the complication rate was significantly lower with gallbladder aspiration compared to percutaneous cholecystostomy [31]. On the other hand, in their prospective study, Ito et al found that compared to gallbladder aspiration, percutaneous cholecystostomy with a pigtail catheter had superior clinical effectiveness, without a higher complication rate, and was therefore considered the preferred technique for high-risk surgical patients [30].

Itoi et al compared percutaneous gallbladder interventions (PTGBI), including PTGBA and PTGBD, with ETGBD in high-risk surgical patients [10]. The clinical success rates did not significantly differ between PTGBI and ETGBD (62.5% and 69.8%, respectively), and PTGBA had a higher clinical success rate than PTGBD (75% vs. 59.6%) [10]. PTGBA was superior to PTGBD in terms of the clinical success rate at 3 days after the intervention, which may be partly because the PTGBA group included patients with less severe cholecystitis based on the experience of the interventionalist [10]. This finding reveals the importance of an adequate selection of patients who only require a simple PTGBA versus requiring continuous drainage.

Notably, although Itoi et al reported similar clinical success rates for ETGBD and PTGBI, not every patient is eligible for percutaneous drainage and sometimes an endoscopic approach is needed. Advantages of endoscopic transpapillary access with subsequent drainage include that these techniques can be used in patients with severe coagulopathy and thrombocytopenia, in cases with ascites, or in constellations where the gallbladder is anatomically difficult to access for percutaneous drainage [32]. Comparison of endoscopic nasogallbladder drainage (ENGBD) with endoscopic gallbladder stenting (EGBS) revealed high clinical success rates of 94.1% and 90.3%, respectively [32]. Nakahara et al. tested a novel stent, with a three-dimensional spiral-shaped structure and side holes, for EGBS in patients with acute cholecystitis, and demonstrated high clinical success rates of 100% with the novel stent, and 95.7% for the control group with alternative stents [33]. They found that stent migration was significantly higher in the control group, especially with straight stents, compared to the novel stent group [33]. Interestingly, post-procedure pain ratings are reported to be significantly higher following ENGBD compared to EGBS [32]. However, it has also been reported that abdominal pain is less frequent in ENGBD compared to PTGBD [34]. Iino et al compared PTBGD and ETGBD (including ENGBD and EGBS), and found that the success rate was 100% for PTGBD versus 77% for ETGBD; however, the clinical effectiveness did not significantly differ between the two groups [13]. Another interesting finding is that hospitalization time was significantly shorter in the ETGBD group than in the PTGBD group [13].

Since ETGBD involves transpapillary drainage, the complications can include pancreatitis, and clinicians should be aware of this problem when using ETGBD for continuous drainage therapy. Furthermore, cystic duct cannulation, especially in patients with acute cholecystitis, may be challenging due to the infection and corresponding swelling of the duct itself.

Patients requiring continuous drainage, who are not considered eligible for percutaneous drainage or aspiration therapy, can also be treated with EUSGBD, which is an echoendoscopic technique for continuous gallbladder drainage. Teoh et al compared EUSGBD and PTGBD, and reported high clinical success rates of 92.3% and 92.5%, respectively [17]. Notably, the 1-year rate of

<p>| Table III. Biochemical characteristics of the patient cohort |
|-----------------------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline</th>
<th>Follow-up T1</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP, mg/L</td>
<td>89±87 (2.5-232)</td>
<td>57±64 (1-192)</td>
<td>0.07</td>
</tr>
<tr>
<td>WBC, 1000/µL</td>
<td>17±10 (6.7-39)</td>
<td>13±11 (5.4-39.9)</td>
<td>0.023</td>
</tr>
<tr>
<td>Creatinine, µmol/L</td>
<td>63±18 (39-34)</td>
<td>86±52 (43-192)</td>
<td>0.523</td>
</tr>
<tr>
<td>Bilirubin, µmol/L</td>
<td>102±104 (3-335)</td>
<td>99±75 (30-217)</td>
<td>0.09</td>
</tr>
<tr>
<td>GGT, U/L</td>
<td>519±735 (68-2379)</td>
<td>858±926 (35-2463)</td>
<td>0.022</td>
</tr>
<tr>
<td>AP, U/L</td>
<td>643±676 (60-2223)</td>
<td>518±419 (119-1047)</td>
<td>0.438</td>
</tr>
</tbody>
</table>

Quantitative variables are expressed as mean±SD (range). Normal range of laboratory values: CRP<5 mg/L; WBC 3.9-10.2 1000/µL; creatinine 45-84 µmol/L; bilirubin 2-21 µmol/L; GGT<38 U/L; AP 35-104 U/L. CRP: C-reactive protein, WBC: white blood cell count, GGT: Gamma-Glutamyltransferase, AP: Alkaline Phosphatase.
adverse events was significantly lower in the EUSGBD group than the PTGBD group (p<0.0001) [17]. Lisotti et al reported an 88% overall clinical success rate for EUS-GBD, and identified acute kidney injury and severe comorbidities as factors predicting long-term mortality in these patients [18]. In a meta-analysis, Krishnamoorti et al reported that EUSGBD had significantly higher clinical and technical success rates than ETGBD [35]. The authors stated that the increased clinical success rate of EUSGBD could be associated with the higher lumen of the SEMS and LAMS, leading to more sufficient drainage and allowing stones to pass [35]. Since EUSGBD with stent placement is considered for patients who are not eligible for cholecystectomy, EUSGBD may be an appropriate technique in cases requiring prolonged drainage of the gallbladder. Another clear advantage of endoscopic drainage therapies is that internal drainages are probably more accepted by patients than nasal or external drainages. Moreover, endoscopic approaches seem to be more cost-effective compared to PTGBD, which can likely be explained by shorter hospitalization durations and lower readmission rates. Despite the advantages of endoscopic approaches, the current guidelines recommend that endoscopic techniques be performed only by skilled endoscopists in high-volume centers [9,36]. Besides a skilled endoscopist, EUSGBD requires high-end endoscopic equipment that is probably not available in every communal hospital. Moreover, patients requiring drainage therapy in this setting can sometimes be negatively affected by sedation. Therefore, clinicians should consider PTGBA or PTGBD, which do not require sedation, as alternative therapy strategies.

There are several limitations to our study. It must be emphasized that our present study was limited to a small number of patients, and an inhomogeneous group that did not allow performance of a retrospective case-control study. Therefore, we cannot clearly calculate the contributions of concomitant antibiotic therapy, or of gallbladder aspiration towards the patients’ stabilization. Another limitation is that this is a retrospective study of a single tertiary center. However, as shown in our present study, PTGBA is also possible in patients with ascites or palliative patients and should thus be considered for alternative rapid decompression in these patients. As additional endoscopic approaches become available for gallbladder drainage in acute cholecystitis patients, ultrasound-guided strategies, such as PTGBA, should not be discounted as alternative therapeutic strategies, especially in cases where no acute cholecystitis is visible. Importantly, ultrasound-guided gallbladder approaches are bedside techniques that are easy to perform, without requiring high-end equipment or an experienced endoscopist.

**Conclusions**

PTGBA is a safe technique that can be easily performed for gallbladder interventions, such as for gallbladder hydrops, cholecystitis, pain relief in a palliative situation, or as a bridging strategy for surgery. Especially for patients who do not require long-term drainage, PTGBA is a cost-effective and easily performed bedside technique, which should not be overlooked as an alternative therapeutic strategy, even in endoscopic high-volume centers.

**Conflict of interest:** none

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