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EUS-Guided Gallbladder Drainage versus Choledochoduodenostomy for Malignant Distal Biliary Obstruction: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION**Support** - Hallym University Medical Center Research Fund.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2026100044**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 9 October 2026 and was last updated on 9 October 2026.**INTRODUCTION**

Review question / Objective This systematic review and meta-analysis compares the efficacy and safety of endoscopic ultrasound-guided gallbladder drainage (EUS-GBD) and EUS-guided choledochoduodenostomy (EUS-CDS) in adults with malignant distal biliary obstruction (MBO), after failed endoscopic retrograde cholangiopancreatography (ERCP) or as first-line drainage. The primary outcomes are technical and clinical success; the secondary outcomes are overall adverse events, bleeding, cholangitis, stent migration and recurrent biliary obstruction.

Rationale ERCP with transpapillary stenting is the first-line drainage method for MBO, but it fails in up to 5–10% of patients. EUS-CDS with a lumen-apposing metal stent (LAMS) is the main EUS-guided rescue technique and is increasingly evaluated as first-line drainage. It is challenging when the common bile duct is small or deeply located or the duodenal wall is thick, and stent

dysfunction is frequent during follow-up. EUS-GBD drains bile through a patent cystic duct with the same LAMS and is an alternative when EUS-CDS is unfavorable. A 2026 meta-analysis (Chandan et al., *Gastrointest Endosc*) found no difference between the two techniques. However, it pooled matched and unmatched cohorts, with only 196 of 352 patients from propensity score-matched (PSM) studies, and gave no estimates by clinical setting. Two PSM studies published since then add 424 matched patients. An updated meta-analysis restricted to matched evidence and exploring the clinical setting was therefore warranted.

Condition being studied Malignant distal biliary obstruction requiring biliary drainage, caused by pancreatic cancer, distal cholangiocarcinoma, ampullary or duodenal cancer, or extrinsic malignant compression of the distal common bile duct.

METHODS

Search strategy MEDLINE (via PubMed), Scopus and the Cochrane Library were searched, with the last update on 23 September 2026; MEDLINE and Scopus searches covered publications from 1970 onward. Database-specific strategies combined controlled vocabulary (MeSH in MEDLINE) and free-text terms for gallbladder drainage (e.g., “gallbladder drainage,” “cholecystogastrostomy,” “cholecystoduodenostomy,” “EUS-GBD”) and for endoscopic ultrasound (e.g., “endoscopic ultrasound,” “endosonography,” “lumen-apposing,” “LAMS”). In MEDLINE and Scopus, a third set of terms covered biliary obstruction, choledochoduodenostomy and the underlying cancers (e.g., “jaundice,” “biliary obstruction,” “choledochoduodenostomy,” “EUS-CDS,” “pancreatic cancer,” “cholangiocarcinoma,” “ampullary”). Only reports published in English were included. Reference lists of eligible articles and relevant reviews were screened manually, and the PubMed “similar articles” feature was used. The full search strings will be published as supplementary material with the review.

Participant or population Adults (≥ 18 years) with MBO undergoing EUS-guided biliary drainage, either after failed ERCP (rescue setting) or as first-line drainage.

Intervention EUS-guided gallbladder drainage (EUS-GBD), transgastric or transduodenal, with any stent, with or without a coaxial plastic stent.

Comparator EUS-guided choledochoduodenostomy (EUS-CDS) with a lumen-apposing metal stent or a tubular self-expandable metal stent, with or without a coaxial plastic stent.

Study designs to be included Randomized controlled trials and prospective or retrospective comparative cohort studies, including propensity score-matched (PSM) studies. Conference abstracts were eligible if they reported arm-level comparative data not published elsewhere.

Eligibility criteria Studies were included if they enrolled adults with MBO, directly compared EUS-GBD with EUS-CDS, and reported technical success, clinical success or adverse events separately for each group. Excluded were non-comparative series; studies with fewer than 10 patients in either group; reviews, editorials, letters and case reports; studies of hilar, intrahepatic or benign strictures; studies in which EUS-GBD was performed for acute cholecystitis or only after

failed EUS-CDS; pediatric or animal studies; and reports not published in English. When several reports described overlapping populations, the most recent report with PSM data was retained.

Information sources MEDLINE (via PubMed), Scopus and the Cochrane Library. Additional sources were the reference lists of eligible articles and relevant reviews, the PubMed “similar articles” feature and a manual search for conference abstracts [specify the meetings or journal supplements searched].

Main outcome(s) Technical success, defined as successful stent placement in the bile duct (EUS-CDS) or the gallbladder (EUS-GBD), and clinical success, as defined by each study. Bilirubin thresholds and assessment times differed across studies, so each study's definition was extracted rather than harmonized to the TOKYO criteria 2024.

Additional outcome(s) Overall adverse events, bleeding, cholangitis, stent migration and recurrent biliary obstruction, as defined by each study (AGREE classification or ASGE lexicon, with differing early and late windows). Continuous outcomes were summarized descriptively.

Data management All retrieved records were imported into Rayyan for automated and manual de-duplication and for screening. Two reviewers (A.A. and K.J.L.) independently screened titles and abstracts, then full texts; discrepancies were resolved by consensus or by a third reviewer (S.W.P.). A.A. and K.J.L. extracted study characteristics and arm-level outcome data into a spreadsheet. For PSM studies, matched-cohort data were extracted; pre-matching data were used only in a sensitivity analysis.

Quality assessment / Risk of bias analysis As all included studies were non-randomized, risk of bias was assessed with the Risk Of Bias In Non-randomized Studies of Interventions (ROBINS-I) tool. Seven domains were rated, and an overall judgment was derived for each study. Two reviewers (A.A. and K.J.L.) assessed each study independently; disagreements were resolved by discussion and, when necessary, with a third reviewer (S.W.P.). No formal certainty-of-evidence (GRADE) rating was performed.

Strategy of data synthesis Dichotomous outcomes were pooled as risk ratios (RRs) with 95% confidence intervals (CIs), with EUS-CDS as the reference. Inverse-variance random-effects models used restricted maximum likelihood

estimation of τ^2 and conventional Wald CIs. Quantitative synthesis was restricted to randomized trials and PSM cohorts; the non-PSM conference abstract was summarized descriptively. A continuity correction of 0.5 was applied to studies with a zero-event arm, and double-zero studies were not pooled. Outcome-specific available-case denominators were used, and matched groups were treated as independent. Outcomes reported by at least two studies were pooled. Heterogeneity was assessed with Cochran's Q, τ^2 and I^2 . Publication bias was not assessed because fewer than 10 studies were available. Analyses were performed in Python 3.12 (NumPy and SciPy).

Subgroup analysis Exploratory study-level comparison by clinical setting: drainage after failed ERCP versus first-line drainage.

Sensitivity analysis All sensitivity analyses were defined after data extraction (post hoc): modified Hartung–Knapp CIs for all pooled outcomes (variance scale constrained to at least 1, t distribution with $k - 1$ degrees of freedom); leave-one-out analyses for outcomes reported by at least three studies; technical success including the pre-matching cohort of Siranart et al., whose matching was restricted to technically successful patients; and stent migration excluding Debourdeau et al., whose observation window differed.

Language restriction Only reports published in English were included.

Country(ies) involved Republic of Korea; Morocco.

Other relevant information The review was conducted and reported in accordance with the PRISMA 2020 statement. This protocol describes the methods as applied, and analyses defined after data extraction are identified as post hoc. Amine Achemlal and Kyong Joo Lee contributed equally as first authors.

Keywords EUS-guided gallbladder drainage; EUS-guided choledochoduodenostomy; malignant distal biliary obstruction; lumen-apposing metal stent; systematic review; meta-analysis.

Dissemination plans The results of this systematic review and meta-analysis will be submitted for publication in a peer-reviewed international gastroenterology journal.

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