EVIDENCE-BASED REVIEW

Is Percutaneous Transhepatic Biliary Drainage Better than Endoscopic Drainage in the Management of Jaundiced Patients Awaiting Pancreaticoduodenectomy? A Systematic Review and Meta-analysis

Dimitri Dorcaratto, PhD, Niamh M. Hogan, MD, Elena Muñoz, PhD, Marina Garcés, PhD, Paolo Limongelli, MSc, Luis Sabater, MSc, and Joaquin Ortega, MSc

ABSTRACT

Purpose: To compare postoperative complications in patients who underwent pancreatoduodenectomy after either endoscopic or percutaneous biliary drain (BD).

Material and Methods: Data from studies comparing the rate of postoperative complications in patients who underwent endoscopic BD or percutaneous BD before pancreatoduodenectomy were extracted independently by 2 investigators. The primary outcome compared in the meta-analysis was the risk of postoperative complications. Secondary outcomes were the risks of procedure-related complications, postoperative mortality, postoperative pancreatic fistula, severe complications, and wound infection. For dichotomous variables, the odds ratio (OR) with 95% confidence interval (CI) was calculated.

Results: Thirteen studies, including 2334 patients (501 in the percutaneous BD group and 1833 in the endoscopic group), met the inclusion criteria. Postoperative and procedure-related complication rates were significantly lower in the percutaneous BD group (OR = .7, 95% CI = .52–.94, $P = .02$ and OR = .44, 95% CI = .23–.84, $P = .01$, respectively). No significant differences were observed when severe postoperative complications, postoperative mortality, postoperative pancreatic fistula, and wound infection rates were compared.

Conclusions: In patients awaiting pancreatoduodenectomy, preoperative percutaneous BD is associated with fewer procedure-related or postoperative complications than endoscopic drain.

ABBREVIATIONS

BD = biliary drain, ERCP = endoscopic retrograde cholangiopancreatography, PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses, RCT = randomized controlled trial

Currently, pancreatoduodenectomy is the only curative treatment for patients with periampullary malignant tumors, such as pancreatic adenocarcinoma, distal cholangiocarcinoma, and duodenal neoplasms. The use of preoperative biliary drain (BD) for all jaundiced patients eligible for pancreatoduodenectomy has been called into question by the results of several studies, including 1 multicenter randomized clinical trial (RCT) (1) as well as several retrospective studies (2–4) and meta-analyses (5,6), in which preoperative BD failed to demonstrate any reduction in postoperative complication rates. However, most authors agree that preoperative BD should be performed on patients presenting with cholangitis; on patients who have very high levels of bilirubin (some authors suggest above 15–17 ml/dl); on patients who have borderline

From the Hepatobiliary and Pancreatic Unit, General and Digestive Surgery Department (D.D., E.M., M.G., L.S., J.O.), Hospital Clínico Universitario de Valencia, Valencia, Spain; (Royal College of Surgeons in Ireland (N.M.H.), Dublin, Ireland; and Department of Medical, Surgical, Neurologic, Metabolic and Aging Sciences (P.L.), Second University of Naples, Naples, Italy. Received October 17, 2017; final revision received and accepted December 21, 2017. **Address correspondence to** D.D., Servicio de Cirugía General. Hospital Clinico Universitario de Valencia, Avenida de Blasco Ibañez 17, 46010 Valencia, Spain; E-mail: dorcaratto.dimitri@gmail.com

None of the authors have identified a conflict of interest.

J Vasc Interv Radiol 2018; ■:1–12

https://doi.org/10.1016/j.jvir.2017.12.027

resectable neoplasms requiring neoadjuvant therapy; or in centers where the waiting list for the surgical procedure is long (7,8). Effective, albeit temporary, resolution of malignant biliary obstruction can be achieved by either percutaneous BD or endoscopic drain, which in turn may be either endoscopic retrograde cholangiopancreatography (ERCP) or nasobiliary drain (9). The merits of selecting one method over the other for patients awaiting pancreatoduodenectomy remain controversial due to potential procedure-related or postoperative complications. Despite being the first preoperative BD method employed to treat preoperative jaundice, percutaneous BD has been overmatched by endoscopic drain. However, in the current literature, it is difficult to find reasons that justify this preference. The aim of this systematic review and meta-analysis was to compare postoperative complications in patients who underwent pancreatoduodenectomy after either percutaneous or endoscopic preoperative BD, to determine which method is preferable in the preoperative management of such patients.

MATERIALS AND METHODS

This study was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (10) and Cochrane Collaboration guidelines (11). The research was performed according to the World Medical Association Declaration of Helsinki. No institutional review board approval was required for this literature review.

Study Selection

Studies were considered suitable for inclusion in the meta-analysis based on the following criteria: retrospective or prospective studies that compared at least 2 drainage methods (percutaneous/endoscopic BD) in patients who underwent preoperative BD before pancreatoduodenectomy (not as a palliative procedure) and that reported the incidence of postoperative complications per patient group; and studies that assessed pancreatoduodenectomy, both for oncologic and non-oncologic purposes (ie, treatment of chronic pancreatitis or other inflammatory conditions of the duodeno-pancreatic region). Only case series with more than 5 patients in each group were considered.

Exclusion criteria were as follows: studies that included pancreatic resections other than pancreatoduodenectomy or pylorus-preserving pancreatoduodenectomy (ie, total pancreatectomy, distal pancreatectomy, and enucleation); studies with irretrievable or unclear data; review articles, commentaries, conference proceedings, abstracts, editorials, or meta-analysis; studies that used duplicated data; and experimental animal studies. No language, publication status, or date restrictions were applied.

Search Strategy

A systematic search was carried out using validated methods of the Cochrane Collaboration (11). Electronic databases including PubMed/MEDLINE, EMBASE Databases, Web of Science, the Cochrane library, and Google Scholar were searched for the keyword "preoperative biliary drain." Articles published before November 2017 were included. Reference lists of identified studies as well as the "similar article" lists of the PubMed database were scrutinized to reveal additional sources. Corresponding authors of published articles fulfilling the criteria but who did not report the comparison of the postoperative complications rates between percutaneous and endoscopic preoperative BD groups were contacted twice by e-mail, asking them to provide the required data. Studies were excluded if authors did not reply or if the data requested were not available.

Data Extraction

Data were extracted independently by 2 investigators (D.D., N.H.). Discrepancies were resolved by consensus. The following data were abstracted from each study: study group, year, and number of included patients. The primary outcome considered in the study was the postoperative complication rate. Secondary outcomes were procedure-related complications, postoperative mortality, postoperative pancreatic fistula, severe complications (grades 3–5 according to the Clavien-Dindo classification) (12), and wound infection rates. The outcomes compared in the meta-analysis and their definitions are summarized in **Table 1**. Patients who underwent preoperative nasobiliary drain were included in the endoscopic group. To avoid the possibility of biases induced by the inclusion of nasobiliary drain in the endoscopic group, a subanalysis excluding the articles that reported the use of nasobiliary drains was also performed (**Fig 1**).

Used worldwide, the Clavien-Dindo classification of postoperative complications is a scale that categorizes postoperative complications based on their clinical effect on patient wellbeing and on the resources and techniques used to solve them (12). Grade 1 and 2 complications are those that can be managed without surgical or interventional radiology procedures and are not life threatening. Grade 3, 4, and 5 complications require surgical and/or interventional procedures and can threaten life (grade 4) or cause death (grade 5). Grades 1 and 2 are therefore considered "minor" complications; grades 3, 4, and 5 are considered "major" complications.

Methodological Quality Assessment

A methodological quality assessment of included studies was performed using the Newcastle-Ottawa Score (NOS) for assessing the quality of nonrandomized studies in meta-analyses (13). In this classification, studies are judged on 3 broad perspectives: the selection of the study groups; the comparability of the groups; and the ascertainment of either the exposure or outcome of interest for case-control or cohort studies, respectively. Four items are analyzed in the Selection category, 2 items are analyzed in the Comparability score, and 3 items are analyzed in the Outcome category. The maximum score is 9 (**Table 2**).