Preoperative Biliary Drainage: Impact on Intraoperative Bile Cultures and Infectious Morbidity and Mortality After Pancreaticoduodenectomy

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Whether it is necessary to perform biliary drainage for obstructive jaundice before performing pancreaticoduodenectomy remains controversial. Our aim was to determine the impact of preoperative biliary drainage on intraoperative bile cultures and postoperative infectious morbidity and mortality following pancreaticoduodenectomy. We retrospectively analyzed 161 consecutive patients undergoing pancreaticoduodenectomy in whom intraoperative bile cultures were performed. Microorganisms were isolated from 58% of these intraoperative bile cultures, with 70% of them being polymicrobial. Postoperative morbidity was 47% and mortality was 5%. Postoperative infectious complications occurred in 29%, most commonly wound infection (14%) and intra-abdominal abscess (12%). Eighty-nine percent of patients with intra-abdominal abscess \((P = 0.003)\) and 87% with wound infection \((P = 0.003)\) had positive intraoperative bile cultures. Microorganisms in the bile were predictive of microorganisms in intra-abdominal abscess (100%) and wound infection (69%). Multivariate analysis of preoperative and intraoperative variables demonstrated that preoperative biliary drainage was associated with positive intraoperative bile cultures \((P < 0.001)\), postoperative infectious complications \((P = 0.022)\), intra-abdominal abscess \((P = 0.061)\), wound infection \((P = 0.045)\), and death \((P = 0.021)\). Preoperative biliary drainage increases the risk of positive intraoperative bile cultures, postoperative infectious morbidity, and death. Positive intraoperative bile cultures are associated with postoperative infectious complications and have similar microorganism profiles. These data suggest that preoperative biliary drainage should be avoided in candidates for pancreaticoduodenectomy. (J GASTROINTEST SURG 1999;3:496-505.)

KEY WORDS: Pancreaticoduodenectomy, biliary drainage, bile, bacteria, intra-abdominal abscess, wound infection

Marked elevation of serum bilirubin has previously been shown by some authors\(^1\)-\(^6\) but not others\(^7\),\(^8\) to be an important risk factor for development of morbidity and mortality following operative treatment of biliary tract obstruction. Likewise, preoperative biliary drainage has not consistently been shown to improve postoperative outcome in patients with biliary tract obstruction.\(^9\)-\(^13\) It is well documented that both endoscopic and percutaneous biliary drainage procedures are associated with infectious complications such as cholangitis and bacteremia.\(^14\),\(^15\),\(^16\),\(^22\) In this regard, pancreaticoduodenectomy is often accompanied by considerable postoperative morbidity despite a recent trend toward declining postoperative mortality.\(^21\)\(^-\)\(^31\) It has long been a concern of ours that preoperative biliary drainage may have a negative impact on the outcome following pancreaticoduodenectomy. Preliminary data from our own institution have demonstrated an association between preoperative biliary drainage and cumulative wound and intra-abdominal complications.\(^32\) However, studies in the literature specifically examining the effects of preoperative biliary drainage in patients undergoing pancreatic surgery for pancreatic and peripancreatic lesions are limited.
and their results are variable.* Therefore the purpose of this study was to determine the impact of preoperative biliary drainage on intraoperative bile cultures and postoperative infectious morbidity and mortality following pancreaticoduodenectomy.

MATERIAL AND METHODS

Patient Population

A total of 161 consecutive patients undergoing pancreaticoduodenectomy at Memorial Sloan-Kettering Cancer Center between January 1994 and January 1997 and from whom intraoperative bile cultures were obtained at the time of pancreaticoduodenectomy were identified from a prospectively collected pancreatic database. During the same time period, an additional 79 patients undergoing pancreaticoduodenectomy who did not have intraoperative bile cultures performed at the time of pancreaticoduodenectomy were identified from the prospectively collected pancreatic database.

Data Collection Variables

By retrospective chart review the following variables were collected: age, sex, history of jaundice, history of diabetes mellitus, preoperative biliary instrumentation, preoperative biliary drainage, preoperative pancreatic biopsy, history of fever and chills within 1 week of admission, preoperative total bilirubin level (mg/dl) on admission, pathologic diagnosis, intraoperative bile culture, type of pancreaticoduodenectomy performed, placement of an intraperitoneal drain(s) around the pancreaticojunostomy or biliary-enteric anastomosis, placement of an intraoperative gastrostomy or feeding jejunostomy, operative time, intraoperative blood loss, intraoperative transfusion of red blood cells, postoperative infectious complications (intra-abdominal abscess [IAA], wound infection, urinary tract infection, bacteremia, pneumonia, catheter infection, Clostridium difficile diarrhea/colitis), other complications, hospital stay, and postoperative deaths.

Preoperative Biliary Instrumentation and Drainage Procedures

Biliary instrumentation was defined as cannulation of the biliary tract and included endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography, and operative cannulation by common bile duct exploration. Biliary drainage was defined as formation of a conduit between the biliary tract and either the gastrointestinal tract or an external collection system. This included endoscopic biliary stents, percutaneous external biliary drains, percutaneous internalized biliary stents, percutaneous cholecystostomy tubes, and operative biliary drainage prior to pancreaticoduodenectomy. Operative biliary drainage included T-tube choledochostomy, choledochojejunostomy, and choledochojunostomy.

Intraoperative Bile Cultures

An intraoperative bile culture was obtained at the time of pancreaticoduodenectomy when the bile duct was surgically divided. Intraoperative bile specimens for bacteriologic examination were routinely cultured and observed for 72 hours using three aerobic media (chocolate agar, colistin nalidixic acid agar, and MacConkey agar) and three anaerobic media (anaerobic blood agar, phenylethanol agar, and kanamycin-vancomycin blood agar). Intraoperative bile specimens were generally not specifically cultured for mycobacteria or viruses. Because Candida species and other rapidly growing yeasts will eventually grow in the bacterial cultures, special yeast cultures were generally not performed. However, the bacterial culture plates were held and observed for 72 hours to look for Candida species and other rapidly growing yeasts.

Evaluation of Postoperative Morbidity and Mortality

IAA was suspected postoperatively in any patient having persistent fever in the absence of wound, urinary, or pulmonary complications, or the development of unexplained clinical deterioration. Patients suspected of IAA underwent computed tomography (CT) of the abdomen and pelvis in an attempt to identify any localized intra-abdominal collection of fluid and gas that was suggestive of IAA. IAA fluid was obtained for culture at the time of CT-guided aspiration and drainage, at the time of reexploration and drainage, or from intraperitoneal drains placed in proximity to the pancreaticojejunostomy or biliary-enteric anastomosis at the time of pancreaticoduodenectomy. Wound infections were diagnosed clinically, with or without a wound culture. They involved the skin and/or subcutaneous tissue of the incision and were characterized by either purulent drainage from the incision, microorganisms isolated from a wound culture, or clinical signs and symptoms of infection (i.e., pain and tenderness, localized swelling, or erythema). Pancreatic leak was defined by an elevated amylase level in fluid obtained from intraperitoneal drains placed in proximity to the pancreaticojejunostomy or biliary-enteric anastomosis at the time of pancreaticoduodenectomy.

*References 9, 12, 13, 15, 25, 26, 28, 33-39.