Advances in Surgical Management of Pancreatic Diseases

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KEY POINTS

- Preoperative risk stratification in pancreatic surgery allows rational selection of patients amenable for surgical therapy and prediction of postoperative morbidity.
- The Postoperative Morbidity Index is a novel tool that allows utility-based quantification of postoperative morbidity at the cohort level.
- Although minimally invasive pancreatectomy has been selectively applied at centers with expertise, there is insufficient evidence for its long-term equivalency or superiority compared with conventional open surgery.
- Borderline resectable pancreatic adenocarcinoma involves the regional mesenteric vasculature to a limited extent; resection for such tumors, although technically possible, is likely to result in positive surgical margins without preoperative therapy.
- The traditional paradigm of open pancreatic necrosectomy in infected pancreatic necrosis has been replaced by a surgical step-up approach, encompassing initial percutaneous drainage followed by minimally invasive approaches to necrosectomy.

INTRODUCTION

The surgical management of pancreatic diseases is rapidly evolving, encompassing advances in evidence-driven selection of patients amenable for surgical therapy, preoperative risk stratification, refinements in the technical conduct of pancreatic operations, and quantification of postoperative morbidity. These advances have resulted in dramatic reductions in mortality following pancreatic surgery over the last few

decades, particularly at high-volume pancreatic centers.[1] Diagnosis, evaluation, and operative treatment of such patients are increasingly undertaken in a multidisciplinary format. Surgical decision making is complex and challenging, and requires an intimate understanding of disease pathobiology, host physiology, technical considerations, and evolving trends in the field. This article focuses on select key developments in the surgical management and perioperative principles associated with contemporary pancreatic surgery.

PREOPERATIVE RISK STRATIFICATION IN PANCREATIC SURGERY

Preoperative risk stratification has emerged as a critical decision-support tool in the pancreatic surgeon's skill set to estimate patients' risks of complications following pancreatectomy. This process is essential for patient-centered care, shared decision making with patients, and true informed consent. The ability to provide personalized risk estimates for patients undergoing pancreatectomy, or any other operation, has been revolutionized with the introduction of the American College of Surgeons (ACS) National Surgical Quality Improvement Project (NSQIP), which collects high-quality, standardized clinical data on preoperative risk factors and 22 rigorously defined postoperative complications from more than 500 hospitals in the United States.[2,3] Using this platform, a universal and procedure-specific risk calculator encompasses several preoperatively known variables (eg, age group, sex, steroid use, diabetes, smoking history, body mass index) to estimate a composite and complication-specific risk profile (http://www.riskcalculator.facs.org).[4]

This multi-institutional ACS-NSQIP data set has been used by several groups to develop risk prediction models capable of predicting postoperative morbidity and mortality following pancreaticoduodenectomy (PD)[5] and distal pancreatectomy (DP)[6]; the espoused benefits of these simple risk estimation systems include appropriate patient counseling and preoperative expectation management, allowing comparison of risk-adjusted outcomes between different institutions, and optimizing patient physiology before major pancreatectomy. However, these models are subject to limitations inherent in the ACS-NSQIP data set, including the inability to (1) determine pancreatectomy-specific complications (eg, delayed gastric emptying [DGE], postoperative pancreatic fistula [POPF], biliary leak/fistula), (2) ascertain complications beyond the 30-day accrual period, or (3) account for hospital-specific variations in pancreatic surgery volume and the corresponding impact on postoperative complications.[7]

Accordingly, a recently proposed preoperative risk prediction model for PD has drawn on multinational data from 4 high-volume European pancreatic centers. Aptly named the Preoperative Pancreatic Resection (PREPARE) score, this model effectively discriminated patients into low-risk, intermediate-risk, or high-risk for major complications (ie, Clavien-Dindo complication grades III and IV[8]) based on 5 physiologic variables (heart rate, systolic blood pressure, hemoglobin and albumin levels, American Society of Anesthesiologists [ASA] score) and 3 operative variables (whether surgery was elective or not, type of surgical procedure, and whether the origin of disease was pancreatic or not). Notably, this score accounted for clinically relevant POPF (CR-POPF), was not restricted to 30-day complication data, and prospectively validated the derived PREPARE score in 429 patients across the participating institutions.[9]

Recognizing the inability of the universal ACS-NSQIP registry to account for pancreatectomy-specific variables and effectively predict pancreatectomy-specific morbidity, the ACS has championed the initiation of a hepatopancreatobiliary (HPB)-centered module to better capture key outcomes in this population; the so-called Pancreatectomy Demonstration Project (PDP).[10] The ACS-NSQIP PDP