Surgery for pancreatic neoplasms: How accurate are our surgical indications?

David Jérémie Birnbaum, MD, PhD,[a] Sébastien Gaujoux, MD, PhD,[a,b,c] Julie Berbis, MD, PhD,[d] Safi Dokmak, MD,[a] Pascal Hammel, MD, PhD,[b,e] Marie Pierre Vullierme, MD,[f] Philippe Lévy, MD,[b,e] *and* **Alain Sauvanet, MD,[a,b]** *Clichy, Paris, and Marseille, France*

Background. *Accurate preoperative diagnosis is critical for the determination of appropriate surgical indications. The aim of this study was to assess the accuracy of preoperative diagnosis and indications for operative therapy for presumed pancreatic neoplasms.*

Methods. *From 2005 to 2013, 851 patients underwent pancreatectomies for presumed pancreatic neoplasms. A formal preoperative diagnosis was established during a multidisciplinary tumor board and compared to the final pathologic examination. The preoperative diagnosis and its accuracy were assessed according to demographics, symptoms, and diagnostic workup.*

Results. *Tumors were benign in 8% of patients (n = 67), premalignant in 43% (n = 370), and malignant in 49% (n = 414). The mean number of preoperative examinations was 3.2; 27% (n = 144) of patients had computed tomography, magnetic resonance imaging, endoscopic ultrasonography, and fine needle examination all performed together. Preoperative diagnosis was confirmed in 89% of patients (n = 754). The morbidity and mortality rates were 65% and 1%, respectively. Of the 97 patients (11%) with a misdiagnosis, operative resection was ultimately relevant (premalignant, malignant tumor, or symptomatic benign tumor) in 51 (6%) but inappropriate in 46 (5%). The rate of misdiagnosis was increased for cystic lesions and in patients under 50 years of age. For lesions <2 cm, diagnostic accuracy was increased when computed tomography, magnetic resonance imaging, endoscopic ultrasonography, and fine needle examination were all performed together.*

Conclusion. *Misdiagnosis can lead to an inappropriate resection in 5% of patients with presumed pancreatic neoplasms. For lesions difficult to characterize, such as small and cystic lesions, association of several modalities of preoperative workup could help to decrease the rate of inappropriate operative care. (Surgery 2017;162:112-9.)*

From the AP-HP, Hôpital Beaujon, Department of Hepato-Pancreato-Biliary Surgery,[a] Pôle des Maladies de l'Appareil Digestif (PMAD), DHU Unity, Clichy, France; the Université Paris Diderot,[b] Paris, France; the Institut National de la Santé et de la Recherche Médicale,[c] Centre de Recherche Biomédicale Bichat Beaujon (CRB3)/INSERM U773, Clichy, France; the AP-HM, Hospital Timone, EA3279 Self-perceived Health Assessment Research Unit and Department of Public Health,[d] Aix-Marseille University, Marseille, France; the AP-HP, Hôpital Beaujon, Department of Gastroenterology,[e] Pôle des Maladies de l'Appareil Digestif (PMAD), DHU Unity, Clichy, France; and the AP-HP, Hôpital Beaujon, Department of Radiology,[f] Clichy, France

Pancreatic tumors, especially pancreatic cystic neoplasms, are diagnosed with increasing frequency, often as *incidentalomas*, because of the widespread use of cross-sectional imaging.[1] Diagnosis, which encompasses a wide spectrum of both solid and cystic neoplasms with benign, premalignant, or malignant behavior,[2] is rarely thought to be challenging; however, diagnostic accuracy has been poorly studied.[3-5]

Pancreatic cystic neoplasms represent a heterogeneous group of lesions that include mainly intraductal papillary mucinous neoplasms (IPMN), mucinous cystic neoplasms (MCN), solid pseudopapillary neoplasms (SPPN), and the rare cystic neuroendocrine tumors (NET).[2] Their imaging characteristics can be confusing. Preoperative distinction between benign, premalignant, and malignant lesions is often difficult, leading frequently to inappropriate aggressive indications and/or inadequate resections.[6,7]

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Reprint requests: Alain Sauvanet, MD, Department of Hepato-biliary and Pancreatic Surgery, Hospital Beaujon 100, Bd du Général Leclerc, Clichy 92110, France. E-mail: alain.sauvanet@aphp.fr.

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Misdiagnosis can lead to overtreatment, thus exposing patients to potential perioperative mortality and morbidity as well as long-term pancreatic insufficiency. Conversely, a limited resection for a presumed benign neoplasm that is later discovered to be malignant can compromise long-term survival. Surprisingly, despite the risks of over or undertreatment, the factors predisposing to preoperative misdiagnosis and inappropriate indications for operative intervention have been poorly studied.

We compared the preoperative suspected diagnoses of 851 patients who underwent pancreatic resection for a suspected pancreatic neoplasm over a 9-year period to definitive pathology to identify at-risk situations and risk factors for inappropriate operative treatment.

MATERIAL AND METHODS

Inclusion criteria and data collection. After approval by our institutional review board (IRB 12-055), 851 consecutive patients who underwent pancreatic resection between 2005 and 2013 for a suspected pancreatic neoplasm were reviewed. All suspected pancreatic neoplasms, both solid and cystic according to cross-sectional imaging, were considered. Only tumors located in the pancreatic parenchyma were included.

Operative treatment for chronic pancreatitis was excluded because resections are infrequent in this disease. Operations for presumed duodenal, biliary, and ampullary neoplasms were also excluded, because their exploration relies mainly for the diagnosis on side-viewing duodenoscopy, and biopsy or brushing cytology are routine in this setting.

Clinical presentation, preoperative workup, suspected diagnosis, postoperative course, and pathologic diagnosis were obtained from a prospective database with an additional retrospective review of the complete medical record. Families were defined as affected by familial pancreatic cancer if 2 or more first-degree relatives had pancreatic cancer out of context of a known cancer syndrome.[8]

Preoperative workup and indications for operation. A minimal routine workup included at least a 3-phase, contrast-enhanced, multidetector, computed tomography (CT) within 6 weeks of operation. Magnetic resonance imaging (MRI) with MR cholangiopancreatography, somatostatin receptor scintigraphy and/or fluorodeoxyglucose positron emission tomography (FDG-PET), or endoscopic ultrasonography (EUS), in addition to fine needle aspiration (FNA) or cyst fluid aspiration, were left to the surgeon's discretion.

Indications for operative resection were discussed in a multidisciplinary, pancreatic tumor board (surgeons, radiologists, gastroenterologists, and pathologists) who recorded the consensual, presumed preoperative diagnosis in each patient's chart. Procedures and postoperative management were carried out as reported.[9,10]

Parenchyma-sparing pancreatectomy (enucleation, central pancreatectomy) was considered for patients with a presumed benign neoplasm and favorable anatomic localization.[6,9] Any suspicion of malignancy was an indication for formal anatomic hemi-pancreatectomy (pancreatoduodenectomy or distal pancreatectomy). Serous cystadenoma (SCA) was considered as benign and resected only when symptomatic. MCN and SPPN were routinely resected. IPMN were resected according to international recommendations.[11,12]

Postoperative course and follow-up. Postoperative mortality included deaths occurring before hospital discharge or within 90 days. Morbidity included complications after operative intervention until discharge and/or readmission and was graded according to the Clavien-Dindo classification.[13] Postoperative pancreatic fistula, hemorrhage, and delayed gastric emptying were defined according to the International Study Group of Pancreatic Surgery (ISGPS).[14,15] Follow-up was based on clinical, radiologic, and laboratory assessments and updated on outpatient evaluation, postoperative visits, and correspondence.

Pathologic analysis. In the following analysis, the "malignancy" group referred to undebatable operative indications and included any lesions harboring either carcinoma in situ, invasive, or metastatic features (ie, pancreatic ductal adenocarcinoma [PDAC], malignant IPMN, including in situ carcinoma, mucinous cystadenocarcinoma, functioning NET except insulinoma, nonfunctioning NET $\geq$ 2 cm or with a positive lymph node or metastatic disease, pancreatic metastases, sarcoma, and cholangiocarcinoma). The "potentially malignant" group included low-grade IPMN, MCN, nonfunctioning NET <2 cm without positive nodes or metastatic disease, insulinoma, and SPPN.

The "nonmalignant lesions" group included simple cysts and SCA. Patients who underwent operation due to suspicion of pancreatic neoplasms but eventually had inflammatory disease (chronic pancreatitis, pseudocysts, autoimmune pancreatitis) on pathologic examination were also included in the nonmalignant lesions group.