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Pancreatic Head Mass: What Can Be Done ? Classification: The Clinical Point of View

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Summary

Surgeons frequently find pancreatic head mass when operating. The obvious difficulty is to make the correct preoperative differential diagnosis between chronic pancreatitis and pancreatic tumor. The first step is to reach a diagnosis, with some certainty, prior to the operation. The second step in the case of a tumor is the accurate staging and deciding whether or not it is resectable. On the one hand, time and cost must be considered; on the other hand, the therapy must be decided. Obtaining information about the characteristics of the pancreatic disease (nature, size, exact location) and establishing the tissue diagnosis preoperatively may simplify the decision to operate and the operation itself.
In the case of chronic pancreatitis, the aim of the operation is to eliminate pain and other symptoms, while in the case of cancer, the purpose is to remove the malignant tissue. In most patients, it is possible to identify the disease on the basis of previous examinations together with preoperative diagnostic techniques such as exploration, palpation and fine-needle aspiration biopsy.
Chronic pancreatic head mass should be operated upon with Beger's or Frey's procedure while pancreatic head tumors should be treated by means of head resection with the aim of preserving the pylorus or the Whipple procedure may be used. When the diagnosis is in doubt, a radical approach is thought to be best.
Our conclusion is that there is no diagnostic method capable of making a definitive differential diagnosis as to the nature of the pancreatic head mass. Further study is required as to the extent to which differential diagnosis should be investigated.

Epidemiology

Chronic pancreatitis and carcinoma of the pancreas are both relatively common. The incidence of chronic pancreatitis (4-6/100,000) and pancreatic tumor (10/100,000) has increased in recent decades. Although carcinoma of the pancreas accounts for only 2% of new cancer cases in the United States, it is the fifth leading cause of cancer-related death [1].

Chronic Pancreatitis

Many patients with chronic pancreatitis have a typical case history and the diagnosis relatively simple. The disease manifests itself at 40-50 years of age with recurring attacks of severe and often incapacitating upper abdominal and back pain, body weight loss, stenosis syndrome involving the common bile duct, the duodenum and the duct of Wirsung. Imaging procedures make the diagnosis of pancreatic diseases possible, but differential diagnostic problems arise due to the fact that chronic pancreatitis and pancreatic tumor often mimic each other.

Pancreatic Tumor

Patients with pancreatic tumor have a shorter case history frequently without any

predisposing factors and average 60 years of age or more. The cancer presents with painless jaundice and vague, poorly localised abdominal discomfort, often associated with weight loss, anorexia and fatigue. A possible mode of presentation in acute pancreatitis or pancreatic pseudocyst without an obvious etiologic factor is newly developed glucose intolerance [2]. Patients with pancreatic cancer especially cancer of the head of the pancreas, have elevated levels of pancreatic enzymes which can be measured as markers of pancreatic cancer.

Differential Diagnosis

Frequently both chronic pancreatitis or pancreatic carcinoma may present with the same symptoms. In either condition, most patients are thin, and even emaciated, and may appear to have malignant disease which should always be considered in the differential diagnosis [3]. A variety of non-invasive and invasive diagnostic methods are available to differentiate pancreatic cancer from chronic pancreatitis, and, used in combination, they can accomplish these goals with considerable accuracy. Despite remarkable technical advances in diagnostic procedures within the last decade, there is more potential for misclassification of adenocarcinoma of the pancreas, than for any other type of cancer because of the difficulty of an accurate diagnosis. Major differential diagnoses are proximal duct dilation or pancreatic carcinoma that has developed from pre-existing chronic pancreatitis [4, 5]. The definitive diagnosis can be difficult or impossible, even when the pancreas exposed at surgery. Direct biopsies are about 60% sensitive for malignancy. So many patients with carcinoma of the pancreas die because their disease is not detected until late in its course. Methods which can detect pancreatic neoplasms earlier, while still resectable, improve patient outcome.

Pancreatic Head Mass

There is a subgroup of these patients with pancreatic head mass, in whom the complexity of differential diagnosis is enhanced. The majority of pancreatic tumors (70%) are localized to the pancreatic head and chronic pancreatitis seems to prefer the head region as well thus causing pancreatic head mass. The largest portion of resectable pancreatic tumors is present in the pancreatic head. This expression is widespread in clinical practice but not so extensively present in the literature. It reflects a disparity involving two different diseases, chronic pancreatitis and carcinoma of the pancreas, with specific diagnostic and therapeutical aspects.

Pancreatic cancer is frequently associated with secondary inflammatory changes, and since pancreatic carcinoma may develop from chronic pancreatitis [6], the changes are very important due to the increased riskof developing pancreatic cancer. Chronic pancreatitis has been suggested as a risk factor for pancreatic carcinoma, and can mimic pancreatic carcinoma as well [7]. Gulik *et al.* reported a 6% incidence of chronic pancreatitis among 220 pancreato-duodenectomies performed as a result of suspected pancreatic head carcinoma [8]. In a larger series of patients who underwent resection for chronic pancreatitis, cancers were found in 4/64 cases[9] and 4/250 cases [10], but the number of patients who underwent pancreatic head resection due to false positive tumor diagnosis is not known.

The management and prognosis in the case of chronic pancreatitis or carcinoma of mass in the pancreatic head region is different. The diagnosis is still problematic. The aim of diagnostic efforts in the case of “head mass” is:

- to choose conservative therapeutic measures
- to determine interventional and surgical treatment
- to avoid the misdiagnosis either chronic pancreatitis or pancreatic cancer.

Unnecessary laparotomies in the case of pancreatic cancer are avoided since resectability can be correctly predicted with a computed tomography scan and laparoscopy in more than 80% of the cases [11], but no preoperative diagnostic procedures can completely differentiate between pancreatic head mass caused by chronic pancreatitis or that caused by tumor. Sometimes the diagnosis can be impossible at surgery and "blind" resection must be done to avoid missing a suspected tumor [12]. If the misdiagnosis occurred in the former case, a pancreatectomy should be performed without real indication and in the latter case more frequently pancreato-duodenostomy is the procedure of choice, with the omission of radical operation.
This paper discusses the limitation of diagnostic methods and how newer techniques may be of value in differential diagnosis. During the course of pancreatic diseases, the most commonly performed relevant studies among imaging procedures are listed in order of percentage as follows.

Computed tomography: 70-100%

It can detect the changes of shape and size of the pancreas and the irregularities of the pancreatic ducts, and has a more important role in detecting changes earlier, than any other imaging procedure. Computed tomography sensitivity has been reported to be between 70-90% and specificity has been reported to reach 80-100%, respectively. The sensitivity of computed tomography (like that of ultrasound) depends on the stage of the disease, but it is higher than that of ultrasound. The computed tomography scan with intravenous contrast is the initial diagnostic imaging procedure of choice for patients with suspected pancreatic cancer. Although not absolutely diagnostic of pancreatic cancer, in the absence of tissue histopathology it can be highly suggestive, if there are no obvious liver metastases.

Ultrasound: 80-90%

The specificity and sensitivity of ultrasonography in advanced cases can achieve 90% but it is low in the early stages. It can detect calcifications and ductal dilation, fluid collections can be demonstrated, but it may not be useful in differentiating neoplasms from surrounding chronic pancreatitis. However, it is the most sensitive test for excluding gallstones.

Endoscopic retrograde cholangiopancreatography (ERCP): 20-40%

It has considerable value in patients together with normal and atypical computed tomography and in making a differential diagnosis of pancreatic cancer using cytology [13]. The sensitivity of ERCP for the diagnosis of ductal cancer approaches 95% [14]. A major role for ERCP is palliative therapy of cholestasis by stenting of the malignant bile duct stenosis. ERCP has not lost its importance due to the possibilities of transpapillary biopsy or brush cytology.

Fine-needle aspiration biopsy: 30-50%

Percutaneous core biopsies for fine-needle-aspiration cytology is highly specific (90%) and has a high positive predictive value Reported sensitivity and negative predictive values for pancreatic cancer are generally lower (ranging from 60-70%), and thus a negative aspirate cannot exclude malignancy. Adjunctive techniques such as flow cytometry and image cytometry can improve the efficacy [15]. Because of its low sensitivity, negative predictive value and potential complications, most pancreatologists believe that percutaneous biopsy has little or no role in evaluating good risk patients having a clinically resectable mass. There is a definite role for fine-needle aspiration in poor risk patients for whom a major pancreatic resection is not possible, but who are candidates for palliative chemoradiation therapy.

Upper gastro-intestinal endoscopy: 30-40%
Endoscopic ultrasound: 20-40%

At present, it can be regarded as the most sensitive procedure for detecting those with early chronic pancreatitis and small pancreatic tumors particularly in the head of the pancreas, not presently diagnosable with conservative techniques. It is a promising and very reliable method of preoperative T staging [11]. Endoluminal (intra-Wirsung) [16] ultrasonography is useful in the diagnosis of pancreatic diseases.

Magnetic resonance imaging: 1-5%

The overall accuracy of magnetic resonance imaging in assessing extrapancreatic tumor spread, lymph node metastases, liver metastases and vascular involvement was 95.7%, 80.4%, 93.5% and 89.1%, respectively [17].

Magnetic resonance cholangiopancreatography: 1-3%

In contrast to invasive ERCP, it is non-invasive and safer, but ERCP is preferable when a therapeutic procedure is necessary [18].

Positron emission tomography: 1-3%

It is suitable as a tool for differential diagnosis. Positron emission tomography shows an overall sensitivity of 85% and a specificity of 84%. The diagnostic accuracy of positron emission tomography is very dependent on serum glucose levels [19].

Pancreatoscopy: 1-2%

It has been reported to be associated with high success rates (75-90%). This technique has been proposed to distinguish between chronic pancreatitis and pancreatic cancer. Endoscopic brush-cytology of biliary and pancreatic strictures can also confirm cancer [20].

Cytology, brush cytology

Although specific, it lacks sensitivity, and thus a negative aspirate cannot exclude malignancy. Adjunctive techniques such as flow cytometry, determination of ploid status, or evaluation of the K-*ras* mutation can increase the sensitivity of cytology [21, 22].

Laparoscopic technique

It is suitable in establishing the operability of pancreatic tumors, and gives the possibility of performing ultrasonographically guided fine-needle aspiration biopsy, which provides a rapid, safe diagnosis [23].

The biochemical studies

It involves the analysis of multiple assays of tumor-associated antigens including oligosaccharides which can help in the diagnosis.

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This is one of the more important. The specificity may vary from as low as 73% to more than 95%, false negative results are frequent in patients with a Lewis blood group negative phenotype, in addition false positive assays can occur in patients with chronic pancreatitis and cirrhosis [24]. Changes in the quantity of elastase 1 also appear to be of diagnostic value. Multivariate tumor marker analysis could become an important screening method in cases involving an uncertain differential diagnosis between pancreatic cancer and chronic pancreatitis [25].

K-ras gene

More than 80% of pancreatic carcinomas contain mutations of the K-ras gene.

Screening duodenal fluid for these mutations may lead to early detection of these cancers and assist in establishing a diagnosis of pancreatic carcinoma [26]. Some pancreata without cancer, however, may also harbour K-ras mutations, and non-mutated K-ras is observed in 15% of pancreatic carcinomas, potentially limiting the specificity of K-ras based tests [27, 28]. Detection of mutations of the K-ras gene in cells shed in pancreatic secretions may improve the still difficult differential diagnosis of chronic pancreatitis versus pancreatic carcinoma [11].

Key words Adult; Diagnosis, Differential; Female; Human; Male; Pancreatitis; Pancreatic Neoplasms

Abbreviations ERCP: endoscopic retrograde cholangiopancreatography

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