

Preoperative Evaluation of a Pancreas Mass

Diagnostic Options



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KEYWORDS

• Pancreas • Imaging • Guideline

KEY POINTS

- CT scan is the optimal modality for the initial evaluation of solid pancreatic masses, to include local and distant staging and surgical planning.
- MRI/MRCP is the preferred modality for cystic pancreatic lesion assessment, and can be used without contrast to follow up incidental lesions.
- EUS is an excellent tool for examining pancreatic lesion and can detect, sample, and assess resectability of solid pancreatic masses. EUS is also used in conjunction with MRCP in evaluating cystic lesions. It permits examination of morphology fluid analysis and FNA of any mural nodules.

INTRODUCTION

With an aging population and constantly advancing technology, the use of medical imaging will likely continue to increase, albeit at a varied pace.^{1,2} As modern abdominal imaging equipment advances, pancreatic lesion detection improves. Most of these lesions are incidental, and present a conundrum to the clinician and create great anxiety to the patient until a final diagnosis is made. For the practicing physician, the plethora of diagnostic options can be overwhelming. The relevant question at hand is what is the most efficient (in terms of cost and time for the patient and health care system) algorithm to follow and to arrive at a timely and accurate diagnosis.

The diagnostic work-up of known or suspected pancreatic cancer has been well-published, most recently in an excellent review by Feldman and Gandhi.³ It is not the purpose of this article to re-review the work-up of pancreatic malignancy, but rather to try and present a logical approach to the initial evaluation of a pancreatic

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lesion to get the most information possible with the least amount of testing, and to avoid duplicative measures.

IMAGING OPTIONS

Imaging tests that best depict pancreatic lesions include computed tomography (CT); ultrasound (US), transabdominal (TAUS) or endoscopic (EUS); MRI; and PET, usually in combination with CT (ie, PET-CT).

Computed Tomography

CT scanning is the workhorse for pancreatic abnormalities; it provides excellent anatomic detail, and does so consistently. Thin-slice rapid acquisition, cubic voxel resolution less than 1 mm, and uncommon artifacts contribute to its prowess as an imaging tool. In addition, the ability to easily reformat the axial-acquired images in multiple planes is favored, particularly by surgeons and interventionalists, who generally prefer coronal plane imaging. Although the benefits to CT are many, the downsides are few but not insignificant. CT scanning requires ionizing radiation, and typical pancreas protocol CT scans are three-phase studies (precontrast, arterial phase, and portal venous phase imaging).³ In addition, iodinated intravenous contrast is required in nearly all pancreatic protocols and may be contraindicated in the setting of moderate to severe allergy or renal failure.

Ultrasound

An even more ubiquitous (and radiation free) imaging test is US, with ever-evolving applications and devices. TAUS has the potential to depict the pancreas, pancreatic duct, and associated lesions. The challenge with TAUS in pancreatic disease is the structures that the US beam must pass before it gets to the pancreas itself. Frequently, the stomach and any other bowel is filled with gas and obscures the pancreas, as can excess abdominal wall adipose tissue. Experienced sonographers and radiologists can avoid some of these pitfalls with water to distend the stomach, varied positioning, etc, but their use is limited. In addition, it is difficult to ensure that the entire gland was imaged on any given examination. If, however, there is a specific lesion that is being followed, TAUS may be the appropriate modality.

Endoscopic Ultrasound

EUS has become the primary modality to investigate patients with pancreatic lesions and clinical symptoms. It provides excellent anatomic detail and, as opposed to non-invasive radiologic imaging, it can acquire tissue, or fluid from cystic lesions, in real time. Although it is operator dependent there is a good supply of well-trained endoscopic sonographers. Although minimally invasive, EUS does require deep sedation and thus patients must be appropriately evaluated with a pre-operative medical assessment.

MRI

The most comprehensive of abdominal examinations is MRI. With its superior contrast resolution, depiction of fluid-containing structures, and lack of radiation, MRI offers a robust and complete pancreas examination, especially for younger patients. As opposed to CT, MRI obtains multiple complimentary sequences in addition to multiple phases of contrast enhancement. Diffusion-weighted imaging, a sequence that capitalizes on the decreased random motion of water molecules to depict highly cellular tumors, is helpful in detecting otherwise occult tumors (**Fig. 1**).⁴

A summary of the previously described imaging modalities is highlighted in **Table 1**.

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