

CONTINUING EDUCATION PROGRAM: FOCUS...

## Endoscopic ultrasound of pancreatic tumors

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### KEYWORDS

Digestive endoscopic ultrasound;  
Multi-detector helical CT (MDCT);  
Pancreatic tumors;  
Pancreatic cysts

**Abstract** Computed tomography (CT) and endoscopic ultrasound (EUS) are the two most effective techniques for the assessment of pancreatic cancers. CT has revolutionized the field of tumor imaging in pancreatic cancer and is now a well-established imaging technique for diagnosis and staging. However, EUS still plays an important role in several situations, especially when the diagnosis is uncertain or when histopathological confirmation of the lesion is needed. Similarly, regarding cystic lesions, magnetic resonance imaging and CT have very good performances but are often inadequate because the diagnosis can be difficult to establish, while the consequences for the patient are major. New biopsy needles, the use of elastography and ultrasonographic contrast agents, and confocal laser endomicroscopy can also provide additional and essential information to improve diagnosis confidence of pancreatic lesions with EUS.

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Pancreatic adenocarcinoma accounts for 90% of all pancreatic cancers. Pancreatic adenocarcinoma is the fourth most common cause of death in the United States, and 5-year survival rates do not exceed 3.5% [1]. Despite progress in chemotherapy, surgery is the only curative treatment, but surgery is only possible in about 15% of patients and long-term survival is only 15–20%. Furthermore, surgery for pancreatic cancer is a major intervention with high morbidity and mortality. For these reasons, early diagnosis and accurate staging are essential.

Initially developed in the 1970s, digestive endoscopic ultrasound (EUS) emerged in the 1980s [2] in particular for the investigation of the pancreatic parenchyma, for which abdominal ultrasound or computed tomography (CT) show insufficient sensitivity [3]. The introduction of linear-array echo-endoscopes in the 1990s made it possible to perform

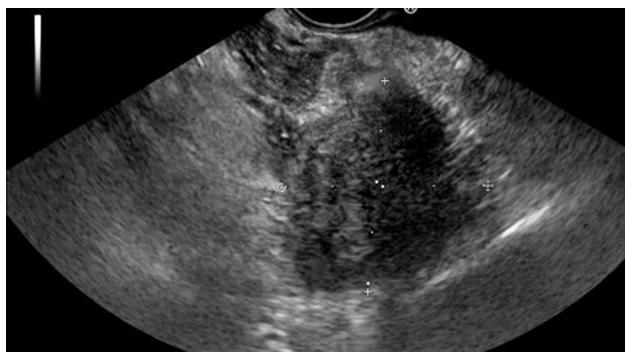
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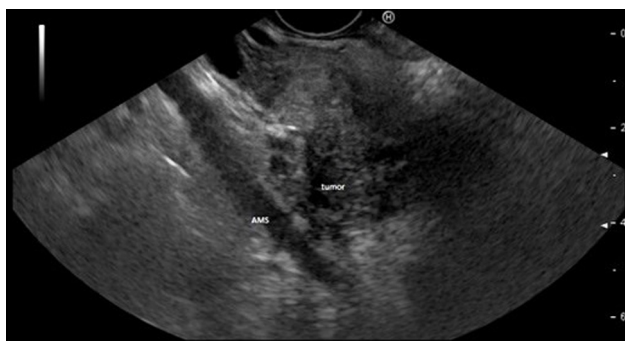
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endoscopic ultrasound-guided fine-needle aspiration biopsy (EUS-FNA). The instrument comprises a miniaturized linear or radial transducer attached to the tip of a flexible endoscope with an endoscopic camera for luminal imaging. The frequency can vary from 5 to 20 MHz to offer the best compromise between image resolution and depth of field. The examination is performed under general anaesthesia, often without intubation. In the majority of cases, the patient is placed in left lateral decubitus position and the console is placed either at the patient's head or feet.

EUS has many clinical applications, including pancreatic tumors. Adenocarcinomas are hypoechoic and are often poorly delimited (Fig. 1). However, the development of multi-detector helical CT has revolutionized pancreatic imaging, with up to 97% sensitivity and close to 100% predictive value on non-resectability criteria in pancreatic tumors [4]. Several studies have compared the diagnostic performance, staging accuracy and resectability prediction of EUS versus CT in pancreatic cancer. These studies are often discordant with regard to their quality criteria, methodology and results [5,6]. The emergence of multislice imaging has limited, or even offset, the higher sensitivity of T and N staging and the preoperative assessment offered by EUS (Figs. 2 and 3). However, some studies suggest that EUS has higher sensitivity for periampullary tumors and pancreatic lesions smaller than 2 cm [7]. In light of its excellent performance for diagnosis and staging, in addition to its simplicity and accessibility, CT should be preferred as a first-line procedure in a patient with a suspected pancreatic lesion.



**Figure 1.** Endoscopic ultrasound shows fairly large pancreatic lesion.



**Figure 2.** Staging of a lesion of the pancreatic head (SMA: superior mesenteric artery).



**Figure 3.** Pancreatic lesion located near the splenomesenteric junction.

Nevertheless, EUS has an important place in the diagnosis and management of pancreatic tumors.

## Place of EUS in staging of pancreatic solid tumors

### Diagnosis and staging

Approximately 50% of pancreatic cancers are detected after they have already spread. The presence of secondary sites accessible to transcutaneous needle biopsy without major technical difficulties (e.g., hepatic metastases) will provide histological evidence of malignancy and allow palliative chemotherapy to be initiated. In this situation, then, there is no place for EUS.

Pancreatic tumors with no signs of vascular invasion on CT can be treated by surgery. This is because the excellent diagnostic and staging performance of CT can obviate the need for EUS in the case of highly suggestive lesions with no vascular involvement on CT [8]. However, some authors suggest that EUS should be used for initially resectable tumors in order to avoid major surgical intervention and to provide a second staging assessment [9,10]. Nonetheless, it is important to bear in mind that this should not significantly delay the surgery.

For confirmed, locally advanced pancreatic tumors, CT staging is usually enough to contraindicate surgery [11]. However, biopsy will probably be necessary to plan for palliative chemotherapy. In spite of the very good overall performance of CT, there are some situations where EUS plays an important role in the diagnosis of pancreatic tumors. For instance, when there are atypical parenchymal changes (enlargement of the pancreatic gland, dilatation of pancreatic ducts with no clearly visible obstruction, etc.), or in case of small, difficult to characterize lesions, EUS provides further information and enables a biopsy to be performed if necessary [12]. Although their overall performance is good, the different examinations are less accurate in case of chronic calcific pancreatitis or recent pancreatitis [13].

Ultimately, CT is usually sufficient for diagnosis and staging and should be the initial test. EUS has a fairly limited role in this situation and may be proposed mainly if there is uncertainty over the diagnosis or to confirm the absence

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