Pancreatic Imaging

Mark Masciocchi, MD

KEYWORDS

• Neuroendocrine tumor • Islet cell tumor • Insulinoma • Gastrinoma • MEN1 • VHL • TSC • NF1

KEY POINTS

- Most pancreatic neuroendocrine tumors are not "hyperfunctioning."
- Imaging alone is not reliable for subtyping neuroendocrine tumors.
- Pancreatic neuroendocrine tumors are seen in genetic syndromes including multiple endocrine neoplasia I, Von Hippel-Lindau disease, tuberous sclerosis complex, and neurofibramatosis-1.
- There are numerous imaging mimics of pancreatic neuroendocrine tumors.
- Imaging may play a role in the future for predicting patients at risk for diabetes mellitus.

INTRODUCTION

The pancreas is composed of both exocrine and endocrine tissue. Although exocrine tissue predominates in the overall mass of the gland, the physiology of the islets of Langerhans is no less essential and imaging plays a critical role in the diagnosis and evaluation of entities involving both components. From an endocrine standpoint, the subject of pancreatic imaging is dominated by pancreatic endocrine neoplasms. The usefulness of different modalities depends in great deal on the particular clinical scenario. This article examines the advantages and disadvantages of different imaging methods in pancreatic endocrine imaging with attention to the best modalities for referring physicians in common situations. In addition to a detailed discussion of pancreatic neuroendocrine tumors, common imaging mimics, associated genetic syndromes, and endocrine insufficiency are examined.

MODALITIES

Ultrasound Imaging

Transabdominal ultrasound is low yield in pancreatic tumor detection owing to its limited sensitivity and specificity.[1,2] This is likely due to the depth of the organ, variable patient body habitus, and frequent obscuration by air within the stomach and bowel.

The author has nothing to disclose.
Department of Radiology, UMass Memorial Medical Center, University of Massachusetts Medical School, 55 Lake Avenue North, Worcester, MA 01655, USA
E-mail address: mark.masciocchi@umassmemorial.org

Endocrinol Metab Clin N Am ■ (2017) ■–■
http://dx.doi.org/10.1016/j.ecl.2017.04.006 **endo.theclinics.com**

Despite these limitations, incidental lesions may be detected on routine imaging for nonpancreatic indications and further characterization beyond solid or cystic components is usually not possible. In contrast, pancreas transplants are better assessed owing to a more superficial location, allowing for better penetration with high frequency transducers as well as the usefulness of Doppler evaluation to interrogate graft vessels (Fig. 1).

Unlike transabdominal ultrasound imaging, endoscopic ultrasound (EUS) imaging has excellent sensitivity, including small lesions measuring less than 3 cm thanks to higher spatial resolution.[1–5] However, sensitivity decreases precipitously toward the pancreatic tail.[6] Unfortunately, certain pancreatic endocrine neoplasms such as insulinoma have a higher incidence in the regions that are difficult to visualize on either endoscopic or transabdominal ultrasound imaging.[7] Regardless, for suspected lesions on other imaging modalities, EUS imaging allows for tissue diagnosis at the same time as imaging, an advantage that none of the other modalities offer.

Computed Tomography Scans

Cross-sectional imaging (computed tomography [CT] or MRI) is usually required to completely image the gland. Further, multiphasic imaging is usually appropriate in the case of neuroendocrine tumors[8–12] (Fig. 2). This is especially important when there is high suspicion for a lesion and combining with EUS imaging improves sensitivity.[13] Although it confers a considerable radiation dose, CT has the advantage of high

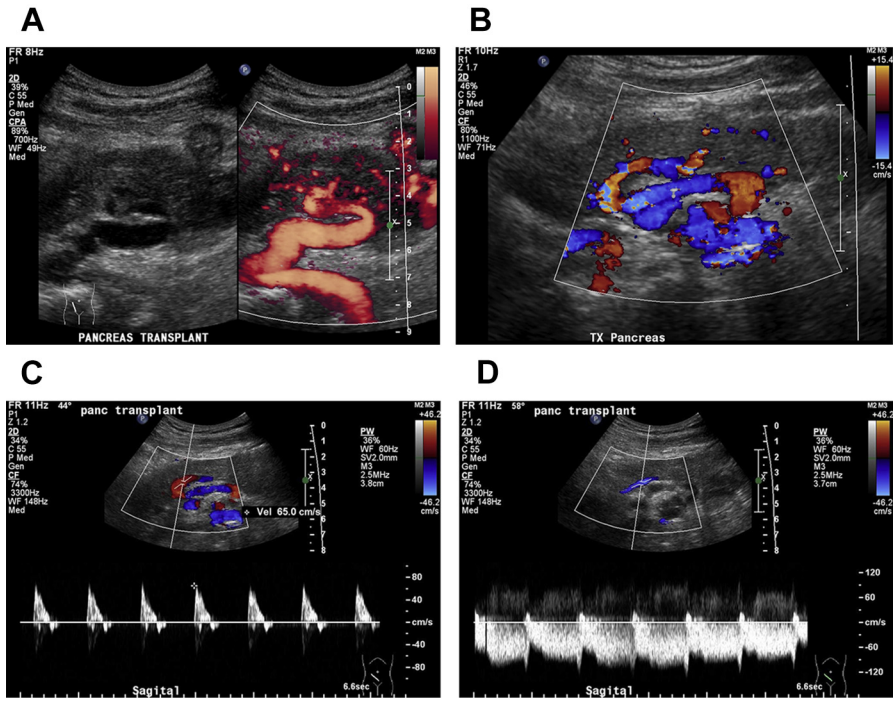

Fig. 1. Pancreas transplant ultrasound imaging. (*A*) Grayscale and power Doppler imaging showing the graft and anastomosis to the iliac vessels. (*B*) Color Doppler image displaying directional flow. Individual vessels are interrogated using spectral Doppler imaging to show (*C*) arterial and (*D*) venous waveforms.