

Role of Imaging in Diagnosing and Staging Pancreatic Cancer

Presented by Mahmoud Al-Hawary, MD

Abstract

Imaging is a key component of diagnosis and staging of pancreatic cancer. CT, MRI, and endoscopic ultrasound are the most used and approved imaging modalities. The updated NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines) for Pancreatic Adenocarcinoma feature a recently published Pancreatic Ductal Adenocarcinoma Radiology Reporting Template endorsed by the Society of Abdominal Radiology and the American Pancreatic Association. The goal of the template is to standardize the reporting of the imaging findings and to improve communication among the various team members treating patients with pancreatic cancer, to ensure appropriate patient management.

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Pancreatic cancer is an aggressive disease with a high mortality rate. It is the fourth most common cause of cancer-related death in the United States, and its incidence is increasing, explained Mahmoud Al-Hawary, MD, Associate Professor of Radiology, and Director, GI Radiology Service, Abdominal Radiology Division at the University of Michigan Comprehensive Cancer Center, and a member of the NCCN Pancreatic Adenocarcinoma Panel. Patients with complete and incomplete, or margin-positive, resection have progressively decreasing survival rates.

“A complete surgical resection with negative margins remains the main hope of improved survival and cure of tumor,” Dr. Al-Hawary noted. “Unfortunately, only 15% to 20% of patients have potentially resectable disease at presentation.” Accurate diagnosis and appropriate staging on cross-sectional imaging will lead to appropriate treatment arm allocation. Adequate imaging and reporting of pertinent findings will ensure that potentially resectable patients are offered curative surgery and patients at high risk of residual microscopic disease

are excluded from surgery, sparing them from the side effects of complex surgeries.

A known limitation of the routine verbose reporting of cross-sectional imaging studies in complex pathologies such as pancreatic adenocarcinoma is the potential lack of completeness of the pertinent imaging findings or use of inappropriate terminology that is not mutually understandable by all members of the treating team. This limitation can be easily overcome by adapting a recently published template for reporting imaging findings that is incorporated in the updated NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines) for Pancreatic Adenocarcinoma.

Imaging Modalities for Pancreatic Cancer

Available imaging modalities include endoscopic ultrasound, CT, and MRI with cholangiopancreatography (MRCP). Updates to this year’s guidelines include intraoperative ultrasound as a diagnostic adjunct during staging laparoscopy, serial CT for locally advanced or metastatic disease, and MRI of known sites of disease to determine therapeutic benefit.

Endoscopic ultrasound uses a high-resolution probe placed in the stomach adjacent to the pancreatic tumor, which allows visualization of even small tumors. This modality also offers the potential for tissue sampling for preoperative diagnosis.

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“This could be a one-stop shop, but the main limitation is the restricted field of view of the scope that may not visualize the entire length of the peripancreatic vessels and the adjacent abdominal organs to best assess vascular involvement and exclude metastasis, which is common in this highly aggressive cancer. This makes endoscopic ultrasound complementary to CT,” Dr. Al-Hawary explained.

CT is the most widely used modality for diagnosis and staging of pancreatic cancer due to the fairly wide availability of multidetector CT (MDCT). MDCT angiography allows acquisition of very thin imaging slices with high spatial resolution showing small details. This modality can be used to assess potential vascular involvement that bears on surgical planning and can be used to ensure that no metastatic disease is present.

MDCT angiography technique includes biphasic CT acquisition in the pancreatic phase and the portal venous phase. This allows for visualizing the tumor and evaluating its appearance, size, and location; the involvement of adjacent vessels; extrapancreatic extension; and metastasis.

A subset of tumors are not visible via cross-sectional imaging because of their small size and similar density to the surrounding pancreatic parenchyma. These tumors are indirectly assessed through secondary signs. The radiologist should therefore be alert to subtle findings, such as contour bulge, focal atrophy, or pancreatic duct dilatation.

Several studies have shown that MRI has similar specificity and sensitivity to MDCT for staging of pancreatic ductal adenocarcinoma. However, MRI is not widely used due to lack of wide availability, needed expertise, higher cost, and limited spatial resolution compared with CT, Dr. Al-Hawary said. “CT scan is also the preferred modality by surgeons because scans are easier for them to review,” he continued.

The best role for MRI is problem-solving for isoattenuating pancreatic lesions and characterizing indeterminate hepatic lesions seen on MDCT. Also, MRCP allows an unparalleled view of the biliary and pancreatic duct. Dilatation of both ducts can be well visualized by MRCP. This dilatation, also known as the “double duct sign,” is highly specific for pancreatic adenocarcinoma. “If there is a high index of suspicion for pancreatic mass, IV [intravenous] contrast must be used with MRI to evaluate for masses that

can be missed without the administration of the IV contrast,” Dr. Al-Hawary noted.

“Imaging can stratify patients based on presence of tumor contact and degree of tumor contact with the vessel, to determine resectability,” he added. Vessel involvement is graded using a 4-point scale based on circumferential contiguity of tumor to the vessel. If the tumor has more than 50% contact (grades 3 and 4), the tumor is usually classified as not resectable and the patient would not benefit from immediate surgery due to high risk of leaving tumor in the patient, he advised.

On cross-sectional imaging, the degree of tumor contact with the vessel is assessed by vessel circumference, presence of vessel narrowing, or contour deformity. Neoadjuvant therapy can be used to try to shrink the tumor in some patients and improve the chances of surgical resection. For both arteries and veins, contact with more than 180° of the vessel circumference and a teardrop or other vessel deformity signal vascular invasion.

How to Report Findings

A template for reporting radiologic findings should adjust for the variability in expertise and definition of disease among different practitioners, Dr. Al-Hawary explained. There is a frequent lack of complete reporting of pertinent imaging findings in these complex cases.

“We need a standardized template for radiology reporting using universally accepted and agreed-on terminology. If you don’t understand the language, the report is useless. We have to make sure we are using the same language,” Dr. Al-Hawary stated. “Many studies have shown that clinicians prefer templates so that they can easily extract information relevant to the patient management.”

Experts in the field of abdominal radiology, surgery, and medical oncology recently published a consensus statement on the necessary acceptable requirements for adequate diagnostic examination and basic complete imaging findings necessary for accurate disease extent staging.¹ The template has 3 parts: arterial assessment, venous assessment, and local and distant tumor extension (adjacent organs, lymph node status, and metastasis).

This template should improve patient care, unify reporting in clinical trials, and aid in analysis of trial

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results across institutions. The template includes factors related to vascular involvement and metastatic evaluation that were not typically reported previously, Dr. Al-Hawary commented. The template is now included in the NCCN Guidelines for Pancreatic Adenocarcinoma and can be downloaded at NCCN.org. The information reported in the template can be used with the NCCN Guidelines recommendations to determine appropriate management.

“We want to make sure each patient receives the best care. For patients with pancreatic ductal ad-

enocarcinoma, optimal imaging techniques and adequate reporting of imaging findings that is complete, pertinent, and accurate are essential for proper disease extent evaluation,” Dr. Al-Hawary concluded.

Reference

1. Al-Hawary M, Francis IR, Chari ST, et al. Pancreatic ductal adenocarcinoma radiology reporting template: consensus statement of the Society of Abdominal Radiology and the American Pancreatic Association. *Gastroenterology* 2014;146:291–304.