Multidetector row helical CT of the pancreas: value of three-dimensional images, two-dimensional reformations, and contrast-enhanced multiphasic imaging

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Abstract Multidetector row helical computed tomography (MD-CT) scanning is performed for the evaluation of pancreatic tumors. Three-phase contrast study is performed using 2.5-mm collimation, and the images are reconstructed at 1.25-mm intervals. CT angiography and pancreatic duct images using two- or three-dimensional techniques are reconstructed from the volumetric data. MD-CT can perform multiphasic scanning rapidly with an optimal temporal window. CT angiography obtained with MD-CT can delineate peripancreatic vasculature with high spatial resolution and sufficient vascular enhancement. Pancreatic duct images can provide important information in assessing pancreatic disease. MD-CT has the potential to improve detection and preoperative assessment of pancreatic tumors.

Key words Pancreatic tumor · Multidetector row helical CT · CT angiography · Two-dimensional reformation · Three-dimensional image

Introduction

Helical computed tomography (CT) is a commonly used imaging modality for the evaluation of pancreatic tumors. Compared with single-slice helical CT, current multidetector row helical CT (MD-CT) technology has increased the speed of scanning, permitting routine use of very thin collimation with a greater volume coverage.1 The volumetric data allow the creation of three-dimensional images or two-dimensional reformations with higher longitudinal spatial resolution. The acquisition of data during multiphase intravenous (IV) contrast administration is possible in a shorter duration, and even greater arterial, pancreatic parenchymal, and portal venous enhancement can be achieved.

The purpose of this article is to present the advantages of contrast-enhanced multiphasic imaging, CT angiography, and pancreatic duct images scanned with MD-CT in the diagnosis of pancreatic tumors.

Acquisition protocols

CT scanning is performed using a multidetector row 8-channel helical CT unit (Light Speed QX/I; GE Medical Systems, Milwaukee, WI, USA). Unenhanced images of the upper abdomen initially are obtained by using 7-mm collimation to define the extent of the pancreas. One hundred milliliters of iopamidol (300 mg/ml; Iopamiron; Nihon Schering, Osaka, Japan) is administered intravenously at a rate of 3 ml/s with a power injector (Autoenhance A-50; Nemoto Kyorindo Manufacturing, Tokyo, Japan). Three-phase contrast study is performed using 2.5-mm collimation with a moderate high quality mode (pitch, 5:1) through the entire liver and pancreas with a breath-holding acquisition. Arterial phase imaging is performed 25 s after the initiation of IV acquisition.

Fig. 1a–f. Findings in a 64-year-old man with pancreatic adenocarcinoma. Multidetector row helical computed tomography (CT) scans obtained during arterial phase (a), pancreatic phase (b), and portal venous phase (c) reveal the tumor as a hypoenhanced lesion in the pancreatic body (arrows). The maximal tumor-to-parenchymal attenuation difference is seen during the pancreatic phase, as compared with that during the arterial and portal venous phases. d Curved reformation image of splenic and portal veins reveals a tumor obstructing the proximal portion of the splenic vein (arrow). e Volume-rendered vascular image of the portal venous vasculature reveals dilatation of paragastric collateral vessels. f Curved reformation image of pancreatic duct shows a hypodense pancreatic mass (arrow) obstructing the pancreatic duct. Note the normal appearance of the proximal pancreatic duct (arrowhead) and dilatation of the distal pancreatic duct with parenchymal atrophy (curved arrow).