

Case Report

Detection of Lymph Node Metastasis Using PET/CT in Cholangiocarcinoma

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We herein describe a 71-year-old female case of cholangiocarcinoma. Computed tomography of the abdomen showed an infiltrating lesion with low attenuation and a dilatation of the intrahepatic bile duct in the lateral segment of the liver. Positron emission tomography and computed tomography (PET/CT) revealed that the area of increased metabolic activity was detected in the lateral segment and regional lymph nodes. The tumor was diagnosed to be intrahepatic cholangiocarcinoma with lymph node metastasis. The patient underwent a left hepatectomy, and segment 1 and a lymph node dissection. A histopathological examination showed a well differentiated adenocarcinoma which had metastasized to the dissected lymph nodes. The histopathological findings of the involved lymph nodes were same as those of the hepatic tumor. PET/CT imaging study would be useful in preoperative staging of cholangiocarcinoma.

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Introduction

Cholangiocarcinoma is a rare malignant tumor that is often found at an advanced stage. The overall prognosis for cholangiocarcinoma is still poor, with the 5-year survival rate ranging from only 8% to 47% after resection.¹ One of the reasons for the poor prognosis of cholangiocarcinoma is the difficulty in making a definitive diagnosis. Although several diagnostic imaging modalities have significantly been improved in recent years, definitive diagnosis is still sometimes difficult because of the various features of cholangiocarcinoma observed on different imaging modalities.

Positron emission tomography (PET) using fluorodeoxyglucose (FDG) imaging has been a useful tool for differentiating benign from malignant lesions. Several reports regarding evaluation of cholangiocarcinoma by means of PET have reported its usefulness for both the diagnosis and staging. For the past several years, the combined use of positron emission tomography and computed tomography (PET/CT) has grown, and it has now become a main stream of medical imaging modality. Current data indicate that PET/CT is more sensitive and specific than images obtained separately from PET and CT. The published results of PET/CT are still limited, but several studies have demonstrated the benefits of PET/CT. We herein report a case of cholangiocarcinoma with peripheral

lymph node metastasis in which the disease was accurately detected by PET/CT.

Case report

A 71-year-old female was referred to our hospital because of a dilatation of the left intrahepatic bile duct. On physical examination, no significant findings were noted. The patient's history was remarkable for mental retardation and alcoholism. The results of a biochemical examination at the time of admission were as follows (normal range in parentheses): aspartate aminotransferase—25 U/L (10-40 U/L), alanine aminotransferase—19 U/L (5-40 U/L), lactate dehydrogenase—165 U/L (115-245 U/L), alkaline phosphatase—285 U/L (115-359 U/L), gamma-glutamyl transpeptidase—63 U/L (<30 U/L), and total bilirubin—0.3 mg/dL (0.2-1.0 mg/dL). Blood glucose was 91 mg/dL. The serum concentration of CA19-9 was 120 U/mL (normal < 37 U/mL) and CEA was 3.1 ng/mL (normal < 5.0 ng/mL). Viral markers for hepatitis B were all negative, while hepatitis C virus antibody was positive.

Computed tomography (CT) of the abdomen showed an infiltrating lesion with low attenuation and a dilatation of the intrahepatic bile duct in the lateral segment of the liver (Figure 1). A contrast-

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Figure 1. Abdominal computed tomography showed a main tumor with low attenuation in the hilar area and a dilatation of the intrahepatic bile ducts in the lateral segment.

enhanced CT scan showed that the tumor could be recognized as a mass of hypoattenuation. No additional liver lesions or obvious lymphadenopathy were identified. A celiac angiography and magnetic resonance imaging were not performed because she could not be kept in a resting position for a long time. Gastroendoscopy and colonoscopy did not show any other malignant lesion in the upper or lower intestine. A PET/CT imaging study was performed on a PET/CT scanner (Discovery ST; GE Yokogawa Medical Systems, Tokyo). PET/CT imaging was started 40 min after intravenous injection of 129.4 MBq of ^{18}F -FDG through an anterior cubital vein. Blood glucose measured before injection was 126 mg/dL. The acquisition time was 2.5 min per bed position, with 1-7 bed positions covering whole body. The acquisition parameters for dual-detector helical CT were 140 kV, 30 mA, 3.75-mm slice thickness, and a pitch of 1.5. The PET/CT images were evaluated on Xeleris workstation (GE Yokogawa Medical Systems, Tokyo). PET/CT revealed an area of increased metabolic activity in the lateral segment of a lesion found on CT (Figure 2 A), and that lymph nodes could be detected in the peri-pancreatic area of the pancreas head and in the hepatoduodenal ligament (Figure 2 B and C). The maximum standardized uptake value (SUV_{max}) of the main lesion was 7.2. The remainder of the body showed no evidence of metastatic disease. The tumor was diagnosed to be intrahepatic cholangiocarcinoma with lymph node metastasis.

The patient underwent a left hepatectomy, and segment 1 (resection of Spiegel lobe) and a lymph node dissection along the common hepatic artery, in the hepatoduodenal ligament, and at the posterior surface of the pancreas head. Swollen lymph nodes along the common hepatic artery and in the hepatoduodenal ligament were detected. Lymph nodes in the paraaortic region were not dissected because there were no swollen lymph nodes. A gross examination of the resected specimen showed a white, fibrous, infiltrating tumor measuring 6.0 cm in maximal diameter (Figure 3). A histopathological examination showed a well differentiated adenocarcinoma which

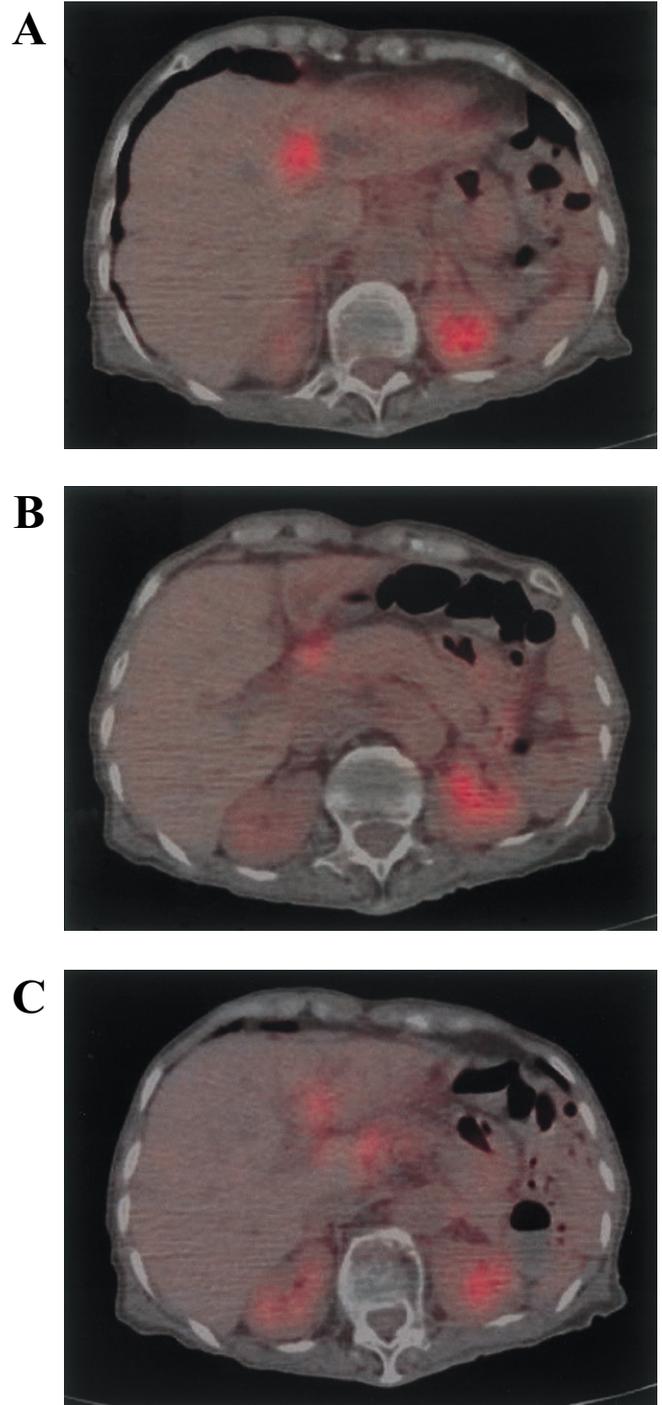


Figure 2. PET/CT imagings. **A.** PET/CT revealed increased glucose metabolic tumor in the hepatic hilar. **B.** PET/CT detected lymph nodes on the surface of the pancreas head. **C.** PET/CT showed lymph nodes in the hepatoduodenal ligament.

had metastasized to the dissected lymph nodes at the posterior surface of the pancreas head and in the hepatoduodenal ligament. The histopathological findings of the involved lymph nodes were same as those of the hepatic tumor. The stage of the tumor was IIIB according to the rule by American Joint Committee on Cancer.

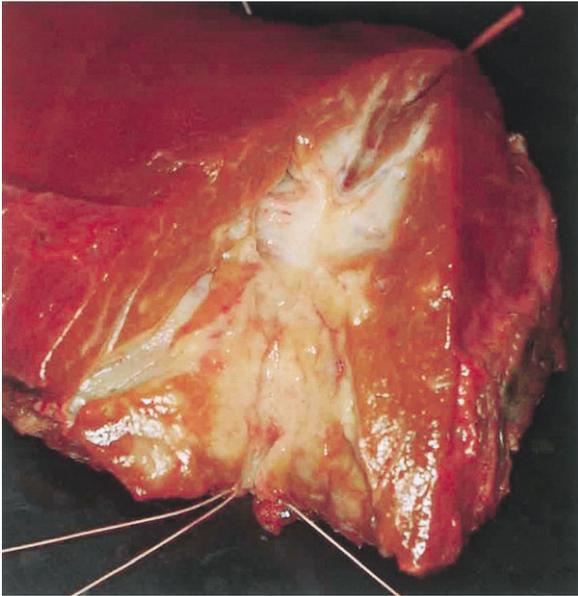


Figure 3. The cut surface of the tumor in the excised liver specimen. The tumor, measuring 6.0 cm × 3.0 cm, was a milk white invasive tumor.

The postoperative course was satisfactory, and to date, no apparent recurrence has been noticed for 13 months after surgery.

Discussion

The use of PET/CT is currently showing rapid worldwide growth. With the emergence of PET/CT, the discussion on the difference between functional/molecular imaging and anatomical imaging has now become irrelevant because they are clearly complementary. The combination of both functional and morphologic cross-sectional imaging is therefore considered a new road map for imaging studies with CT adding the anatomic details that PET lacks.² The PET/CT imaging results in a higher diagnostic accuracy than PET imaging alone, and appears to provide relevant information in the staging and therapy monitoring of many tumors.³⁻⁶ Moreover, PET/CT scanners acquire data from the whole body fields in less than 30 minutes, thus resulting in a comfortable examination. Although this patient could not maintain a resting position because of mental retardation and alcoholism, PET/CT could detect her primary lesion and lymph node metastases within a short time.

The effectiveness of PET/CT has been reported for the noninvasive differentiation of extrahepatic bile duct strictures.⁷ PET/CT provided a high accuracy for the noninvasive detection of perihilar cholangiocarcinoma in extrahepatic bile duct stricture. Some studies found that a late imaging time for PET better discriminated between tumor and inflammation.^{8,9} In our case, we suspected the primary tumor to be cholangiocarcinoma because SUV_{max} of the primary

tumor was increased from 6.4 on early scan to 7.2 on delayed scan.

Although various therapies for cholangiocarcinoma have been reported, the only potentially curative treatment for cholangiocarcinoma remains a surgical resection.¹ In cholangiocarcinoma, lymph node metastasis and a curative resection have been reported to be prognostic factors.¹⁰⁻¹² It is therefore very important to determine the stage of the disease before surgery. According to PET studies for cholangiocarcinoma, there is a consensus that PET is helpful for detecting lymph-node and distant metastases in cholangiocarcinoma.¹³⁻¹⁵ However, other investigators questioned its usefulness in detecting regional lymph node metastases.¹⁶ In this case, PET/CT can clearly detect the primary lesions of cholangiocarcinoma and lymph node metastasis. Although this case was an advanced cholangiocarcinoma, surgical resection was done on the basis of no distant metastasis and no swollen lymph nodes in the paraaortic region.

In conclusion, PET/CT imaging study is considered to be useful in the preoperative staging of cholangiocarcinoma. Further study is thus called for to establish the usefulness of PET/CT in the diagnosis and staging of cholangiocarcinoma.

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