Ultrasound-guided percutaneous pancreatic tumor biopsy in pancreatic cancer: a comparison with metastatic liver tumor biopsy, including sensitivity, specificity, and complications

JUNICHI MATSUBARA, TAKUJI OKUSAKA, CHIGUSA MORIZANE, MASAFUMI IKEDA, and HIDEKI UENO

Hepatobiliary and Pancreatic Oncology Division, National Cancer Center Hospital, 5-1-1 Tsukiji, Chuo-ku, Tokyo 104-0045, Japan

Background. The aims of this study were to investigate the diagnostic value and safety of ultrasound-guided percutaneous pancreatic tumor biopsy (pancreatic biopsy) in patients with suspected unresectable pancreatic cancer, and to compare the data with those obtained by metastatic liver tumor biopsy (liver metastases biopsy). Methods. Data were collected retrospectively from 388 patients (398 procedures) for whom a final diagnosis was available and who underwent ultrasound-guided pancreatic or liver metastases biopsy with a 21-gauge needle (core biopsy) or a 22-gauge needle (fine-needle aspiration biopsy: FNAB). The sensitivity, specificity, and accuracy of pancreatic and liver metastases biopsies were evaluated. Biopsy-related complications were collected and analyzed. Results. Data from 271 pancreatic and 112 liver metastases biopsy procedures were available. For pancreatic core biopsy and FNAB, the sensitivity, specificity, and accuracy were 93%, 100%, and 93%, and 86%, 100%, and 86%, respectively, all of which were comparable to those of liver metastases biopsy. The complication rate in pancreatic biopsy was 21.4%, including a 4.4% incidence of post-biopsy ephemeral fever. The complication rate in liver metastases biopsy was 38.7%, including an 8.0% incidence of ephemeral fever. Fever and infection occurred more frequently among patients who underwent liver metastases biopsy (4.4% vs. 11%: \( P = 0.038 \)). In pancreatic biopsy cases, a prebiopsy high serum total bilirubin level was a statistically significant predictor of ephemeral fever. Conclusions. Ultrasound-guided percutaneous pancreatic biopsy is an effective and safe modality for confirming the pathologic diagnosis in patients with unresectable pancreatic cancer.

Key words: pancreatic cancer, biopsy, sensitivity, complications, fever

Introduction

The majority of patients with pancreatic cancers have metastatic or locally advanced disease at the time of diagnosis, and are not candidates for surgical resection. In such patients with unresectable disease based on imaging findings, it is important to verify the histopathologic diagnosis of cancer before starting nonsurgical treatment, so as to exclude patients with pseudotumors or benign diseases from inappropriate aggressive therapies such as chemotherapy and radiotherapy. It is also important to distinguish pancreatic cancer with predominantly exocrine differentiation from others, such as cancer with endocrine differentiation or lymphoma, because their treatment strategy and tumor biology are completely different.

Pancreatic biopsy is a common procedure for obtaining histological specimens for diagnosis of a pancreatic mass. It can be performed endoscopically, intraoperatively, or percutaneously with computed tomographic (CT) or ultrasound (US) guidance. In our department, US-guided percutaneous pancreatic tumor biopsy (pancreatic biopsy) is the preferred method in patients whose tumors are suggested to be unresectable from preoperative abdominal imaging, because it allows accurate placement of the biopsy needle tip during real-time imaging and is less invasive than an endoscopic procedure or diagnostic laparotomy.

However, the diagnostic value and safety of US-guided percutaneous pancreatic biopsy have not yet been fully evaluated in patients with unresectable pancreatic cancer. In the present study, we aimed to assess the sensitivity, accuracy, complication rate, and risk factors of this procedure in comparison with US-guided
metastatic liver tumor (liver metastases) biopsy, a common diagnostic procedure both in Japan and in other countries.

Patients and methods

Patients

We conducted a retrospective review of US-guided pancreatic or liver metastases biopsies performed during a 5-year period from January 1999 through December 2003. All patients were inpatients in whom preoperative abdominal imaging (dynamic CT or angiography) suggested that their pancreatic tumors were unresectable. Tumors encasing the celiac or superior mesenteric arteries or obstructing or bilaterally invading the portal vein were considered to be unresectable. Exclusion criteria were postoperative recurrence and pathological confirmation of cancer from biliary cytology, ascites cytology, or exploratory laparotomy.

For patients with both pancreatic tumor and liver metastases, the decision about which organ was to be targeted for biopsy was made by physicians on the basis of visualization of the lesion by transabdominal US, the patient’s anatomy, and the physician’s preference. The technique used for biopsy and the incidence of complications were reviewed from the clinical records. Coagulation measurements were performed before biopsy when the patient’s history or presentation suggested an increased risk of bleeding, and we did not perform a biopsy if the results showed a bleeding tendency. We did not routinely use antibiotics prophylactically. A blood culture was routinely performed if patients had fever of ≥38.0°C after biopsy. All patients provided written informed consent for the biopsy procedures.

Biopsy techniques

In the case of both pancreatic biopsy and liver metastases biopsy, we used a convex probe or a linear-array probe, both of which were equipped with a guide attachment, and we performed biopsy with continuous real-time monitoring. The most appropriate approach was chosen after local sterilization with povidone-iodine, which was also used as the contact medium for the US probe. Local anesthesia was administered in all cases. The medial approach was always used for pancreatic biopsies. For liver metastases biopsies, in principle, the intercostal approach was used for tumors located in the right lobe and the medial approach for tumors in the left lobe. In pancreatic biopsies, the needle occasionally passed through the stomach. All patients who underwent pancreatic biopsy fasted from the night before the biopsy until after the biopsy itself to obtain good visualization of the pancreatic mass and to reduce the risk of peritonitis as a complication.

We used two types of needle, a 21-gauge needle (Sonopsy-C1; Hakko, Tokyo, Japan) for tissue core biopsy to obtain both pathologic and cytologic materials, and a 22-gauge needle (15 cm PTCD needle; Top, Tokyo, Japan) for aspiration biopsy to obtain cytologic material. The physician who performed the biopsy selected the more appropriate needle on the basis of US imaging and tumor size. The number of passes varied, but one or two passes were common. Biopsy material obtained from one pass was always checked macroscopically for adequacy before making the next pass.

When we performed core biopsies with the 21-gauge needle, the needle was advanced gently and withdrawn within the tumor lesion several times to obtain enough tissue for histologic diagnosis. Tissue core specimens were immediately preserved in 10% formalin, then the residual mucus was expressed onto glass slides, thin smears were prepared, and these were immersed in 95% ethanol. The needle tip was also cleansed in heparin-containing saline, and the wash-through fluid was examined cytologically.

We performed fine-needle aspiration biopsy (FNAB) with the 22-gauge needle. Once the needle had been placed within the lesion, the stylet was removed and suction was applied to the needle with a 20-ml disposable syringe. During the application of suction, the needle was gently advanced and withdrawn in the lesion several times. The aspirates were expressed onto glass slides and the needle tip was cleansed, as in the case of core biopsies.

Each pathologic diagnosis was determined by two or three pathologists specialized in pancreatic cancer and other cancers. A core sample was defined as tissue with preserved histologic structure. The final diagnosis was determined on the basis of autopsy or the clinical course of the patient. A diagnosis of benign pancreatic tumor was made together with a follow-up of at least 1 year during which there was no evidence of malignancy. The clinical course of the patient was used to confirm the histologic and cytologic diagnoses of malignancy.

Complications

We examined the clinical records of all patients in this study, and identified all complications such as pain, fever, and some infections. We defined pain as the need for additional analgesics after biopsy. Fever was classified into two categories: ephemeral fever and persistent fever. Ephemeral fever meant that patients had fever of ≥38.0°C within 24 h after the biopsy, but just once and never again (without antibiotics). Persistent fever meant that patients had fever of ≥38.0°C of unknown origin for more than 2 days after the biopsy, without any clini-