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Case Report
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Percutaneous Computed Tomography-Guided Coaxial Core Needle Biopsy of the Pancreas with the Detour Technique: A Case Report

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Abstract

Percutaneous Computed Tomography (CT) - guided biopsy is a well-established procedure to acquire tissue from various organs. It can also be used as an alternate method to biopsy the pancreas once other attempts have failed to obtain tissue for histopathological tests, and well-trained and experienced interventional radiologists can perform the procedure precisely. To demonstrate our experience with the detour technique, we present the case of a 68-year-old woman with a pancreatic uncinate process tumor noted on abdominal CT who was diagnosed by percutaneous CT-guided pancreas biopsy.

Introduction

Pancreatic cancer is one of the most common causes of cancer deaths worldwide. Among the histologic types, pancreatic adenocarcinoma is a highly aggressive malignancy which typically presents as unresectable disease at the time of diagnosis, with a 5-year survival rate below 10%. Therefore, solid pancreatic masses should be carefully examined to confirm whether or not they are cancerous [1].

Several methods are available for a pancreatic biopsy, including image-guided, endoscopic-guided and surgical biopsies. At present, Endoscopic Ultrasound Fine-Needle Aspiration (EUS-FNA) or Biopsy (EUS-FNB) are widely used due to their better diagnostic accuracy and lower risk of developing peritoneal carcinomatosis. In addition, their use has been recommended for pancreatic tumor tissue acquisition in practice guidelines [2,3]. However, when the lesion is difficult to approach (i.e. pancreatic uncinate process, pancreatic tail), scant tissue is obtained with the fine needle or the EUS is not accessible, percutaneous CT-guided core needle biopsy has a satisfactory diagnostic accuracy of 82.2% to 98.1% [2] and it is a good alternative to EUS methods.

The objective of this case report was to illustrate the detour technique and results of percutaneous CT-guided coaxial core needle biopsies of a solid pancreatic lesion.

Case Presentation

A 68-year-old woman with a history of type 2 diabetes mellitus and hypertension presented to our hospital because of yellow skin, general weakness and unintentional weight loss over the past 3 weeks. She denied nausea, vomiting, bowel habit change, abdominal pain or fever, and her family history was free of pancreatic or biliary malignancy. A physical examination showed icteric sclera. A hemogram was within normal limits, and biochemistry tests showed: AST/ALT 253/354 u/L, bilirubin-(total/direct) 12.9/11.6 mg/dL, ALK-P 706 U/L, and lipase 1871 U/L.

Abdominal CT revealed a 3-cm ill-defined mass in the pancreatic uncinate process involving the common bile duct and pancreatic duct, causing upstream biliary and pancreatic duct dilatation. Under the suspicion of obstructive jaundice and malignancy, we suggested biliary drainage and tumor biopsy, and subsequently performed endoscopic retrograde biliary stenting for bile drainage and EUS-FNB. The pathology of the EUS biopsy showed chronic inflammation.

Due to a high suspicion of pancreatic malignancy, we performed a percutaneous CT-guided pancreas core needle biopsy. Her pre-procedural hemostasis profile within 3 days was unremarkable. The procedure was performed with the patient in the supine position with hemodynamic and pulse oximeter monitoring. Based on the pre-procedural CT, we chose a left lateral biopsy route as the most straightforward approach with a relatively low risk. Under CT guidance, a 17-gauge

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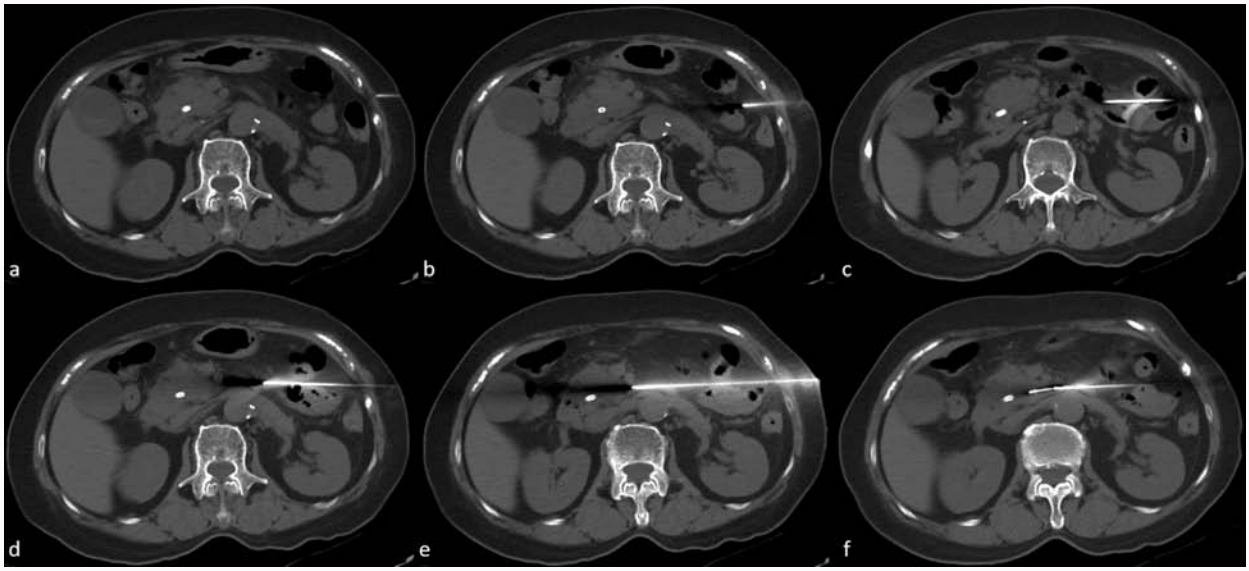

Figure 1: CT-guided coaxial core needle biopsy with the detour technique in a 68-year-old woman with a pancreatic uncinate process tumor. a) Non-enhanced axial CT image showed 17-gauge coaxial needle inserted in the subcutaneous layer. b-e) Non-enhanced axial CT images showed the coaxial needle advanced in a stepwise manner into the pancreatic uncinate process mass by delicately changing its angulations to avoid non-target organ penetration. f) After the coaxial needle successfully reached the pancreatic uncinate process mass, the biopsy needle was fired into the lesion.

coaxial needle was inserted and advanced in a stepwise manner to the target pancreatic lesion (Figure 1). Two core biopsy specimens were collected using an 18-gauge biopsy needle and sent for histopathology. No immediate complications (such as retroperitoneal hematoma or iatrogenic bowel penetration) were detected on post-procedural CT. Results of the CT-guided biopsy showed pancreatic adenocarcinoma, moderately differentiated. The final diagnosis was established as pancreatic uncinate process adenocarcinoma with involvement of the common bile duct and pancreatic duct, T2N0M0, Stage Ib.

She received perioperative chemotherapy with six cycles of the S-1, Leucovorin, Oxaliplatin and Gemcitabine (SLOG) regimen, followed by Whipple's procedure 3 months later. The resection pathology was shown to be adenocarcinoma, moderately differentiated. She recovered well and was discharged on the 12th day post-operatively. Chemotherapy was continued with another six cycles of SLOG, and she is currently being followed up at our gastroenterology out-patient clinic.

Discussion

For a CT-guided pancreatic biopsy, Su et al. [2] described six major direct fat-traversing routes. Other indirect approaches including transhepatic, transgastric, transvenous, and transcaval routes have also been reported [4,5]. In our case, we chose a route via the left lateral aspect of the abdomen with a coaxial technique other than the six major routes mentioned in previous literature [2].

Pre-procedural route planning is essential, and direct paths that do not traverse organs should be considered prior to other routes that traverse intervening vital structures. During the procedure, the biopsy route is determined by an imaginary line composed of one to three short straight linear craniocaudal, ventrodorsal or lateromedial sections of various lengths and angulation. The coaxial needle is then advanced in a stepwise manner into the target under CT guidance. In addition to biopsy route planning, an important key in successful percutaneous CT-guided biopsy is the force applied by the operator to the coaxial needle tip as it is advanced to the target and feedback of the tissue from the needle tip [6]. After a learning curve period, an experienced interventional radiologist can differentiate differences in friction and reaction force on the coaxial needle tip as it passes through skin and fat and by solid organs, hollow organs, and vessels. The blunt tip of the introducer needle can pave the way for the planned route in fat by pushing aside intervening bowel loops and preserving vital organs or great vessels [7].

Using a coaxial system for the biopsy is another crucial factor, as this has been shown to not only improve the diagnostic accuracy rate to 98.1% [8], but also to allow for feasible and prompt management in cases of bleeding, even though procedure-related bleeding is very rare [2,8]. If bleeding does occur, the 17-gauge introducer needle can serve as a shuttle for tract embolization with Gelfoam strips. Tumor cell seeding through the biopsy tract under a coaxial system is rare, because the introducer needle acts as an outer sheath to lower the risk of seeding [9].

Conclusion

Percutaneous CT-guided coaxial core needle biopsy for a pancreatic tumor using the detour technique can allow the needle to be advanced to the target lesion without causing any injuries to bowel loops when taking the left lateral route. Moreover, this technique can also obtain adequate tissue for preoperative diagnostic confirmation.

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