Case report

Med Ultrason 2024, Vol. 26, no. 1, 91-93
DOI: 10.11152/mu-4304

Water isolation technique combined with contrast-enhanced ultrasound guided puncture biopsy of pancreatic mass in 3 cases.

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Abstract

In many patients with pancreatic cancer the definite pathological diagnosis is limited due to the lack of safe needle entry routes, the high risk of conventional ultrasound-guided puncture and the low positive rate of single needle. To solve the situations in which there are no safe path for pancreatic biopsy, we used water isolation technology combined with contrast-enhanced ultrasound to perform puncture biopsy in 3 patients with pancreatic mass occupying under the guidance of coaxial needle in this study and remarkable results were achieved. The water isolation technique was used to avoid the damage to the important organs in front of the occupying area.

Keywords: water isolation; contrast-enhanced ultrasound; puncture biopsy; pancreatic mass

Introduction

Pancreatic cancer is the third leading cause of cancer-related death in the world, with a high degree of malignancy, hidden onset, important difficulties in early diagnosis, and a 5-year survival rate is less than 10% [1]. Early detection and diagnosis are very important for the treatment and prognosis. Ultrasound-guided biopsy had been widely used in clinical practice due to its advantages of real-time monitoring, safe operation, accurate positioning and high pathological diagnosis rate [2]. However, since the pancreas is a retroperitoneal organ, adjacent to important abdominal organs and large blood vessels, and most pancreatic tumors are lacking blood supply, many patients are limited in definite pathological diagnosis due to the lack of safe needle entry routes, the high risk of conventional ultrasound-guided puncture and the low positive rate of the sample from a single needle puncture. The experience of performing water isolation technology in other high-risk sites could avoid the occlusion of important organs and blood vessels on the target, fully expose the safe puncture path, and reduce the damage to neighboring organs [3]. Contrast-enhanced ultrasound (CEUS) can clearly show the high-perfusion area of tumor blood flow, and under its guidance, the puncture can avoid the inactive sites such as liquefaction and necrosis, and reduce the number of injection times, to increase the positive rate of single needle sampling and reduce the risk of complications [4]. This paper reports 3 cases of pancreatic space occupied by water isolation technology combined with contrast-enhanced ultrasound guided puncture biopsy.

Received 27.08.2023 Accepted 27.10.2023
Med Ultrason
2024, Vol. 26, No 1, 91-93
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Cases report

A total of 3 cases of patients with pancreatic space occupying lesions who underwent ultrasound-guided

Table I. Data of the 3 patients with pancreatic space occupying lesions

Gender	Age (years)	Location of the lesion	Number of needle insertions	Histopathological diagnosis
Female	50	The head and body of the pancreas	2	Small cell carcinoma
Male	54	Head of pancreas	2	Ductal adenocarcinoma
Male	71	Head of pancreas	1	Adenocarcinoma with squamous differentiation

needle biopsy using water isolation technology in the Ultrasound Department of the First Affiliated Hospital of Zhengzhou University from March 2021 to January 2022 were described (Table I).

Before examination, fasting for 8-12h, water prohibition for 4h, anticoagulant drugs for more than 7 days. All patients had completed blood routine, blood coagulation function, pancreatic function and other relevant examinations before surgery, and had no contraindications for puncture, and had signed relevant informed consent.

Siemens Healthineers ultrasonic instrument, C5-1 convex array probe, frequency 1 ~ 5MHz, 18G COOK gun biopsy needle (with 17G locator needle) and SonoVue as contrast medium were used.

The patients were in supine position, and routine ultrasound scan was performed to determine the approximate location of the pancreatic placeholder lesion to be punctured. The contrast agent (1.2 ml/ time) was injected into the anterior cubital vein mass, and then 5 ml 0.9% normal saline was injected to ensure that there was no residual contrast agent. The timing was started at the same time when the contrast agent was injected, and the characteristics, morphology and enhancement time of dynamic enhancement of normal pancreatic tissue and space occupying lesions were monitored and recorded in real time. This was to further define the place for pancreatic puncture biopsy, avoiding damage to important structures such as normal glands, pancreatic duct, and large blood vessels, and puncture to ineffective parts such as the liquefaction necrotic area.

The puncture site marked on the body surface before procedure was routinely disinfected and covered. Local anesthesia was performed on the skin and subcutaneous tissue of the puncture site using 2% lidocaine hydrochloride. Then, a 20 ml syringe was used to connect a 22G needle to inject 0.9% normal saline into the gastrointestinal area that blocked the pancreatic space occupying lesion. The injection volume was generally 10-20 ml until important organs such as the gastrointestinal tract are pushed to the periphery of the placeholder lesion to fully expose the safe puncture path. Under the real-time observation and guidance of the color Doppler ultrasound probe, the 17G coaxial needle was inserted into the pancreatic mass enhancement area, the needle core was pulled out, the 18G bullet-gun biopsy needle was inserted into the target area through the coaxial needle, the trigger of the puncture gun was pulled, and the operation was repeated 1-2 times to obtain samples from multiple angles. The tissue strips were placed in 10% formalin solution and sent for histopathological examination.

Water isolation technology combined with CEUS guided by coaxial needle puncture biopsy of pancreatic space occupying lesions in 3 patients was successful, and no serious complications such as bleeding, infection and pancreatic leakage occurred during and after surgery. The histopathological findings were as follows: pancreatic small cell carcinoma, ductal adenocarcinoma, and adenocarcinoma with squamous differentiation (fig 1).

Discussion

Different pancreatic tumors showed no characteristic signs under conventional ultrasound, and for some lesions complicated with fibrosis, inflammation, necrosis, etc., conventional ultrasound-guided biopsy and puncture are prone to inaccurate sampling and positioning, resulting in false negative diagnosis, and increasing the number of punctures increases the risk of complications. CEUS could display the microcirculation perfusion and enhancement level of pancreatic lesions and surrounding normal glands in real time and in a dynamic way, clearly identify the adjacency relationship between lesions and peripancreatic blood vessels, and show the location, size, and edge of unclear targets by conventional ultrasound [5]. The optimal puncture path was designed to avoid the liquefaction necrotic area and guide puncture sampling more clearly than conventional ultrasound, thus reducing the number of repeated biopsies and reducing the incidence of complications [6].

In conclusion, water isolation technology combined with contrast-enhanced ultrasound guided puncture biopsy of pancreatic space occupying lesions by coaxial needle can clearly display the target, achieve one needle injection, multi-angle sampling, improve the sampling positive rate and reduce the risk of complications, and is a better puncture biopsy scheme.

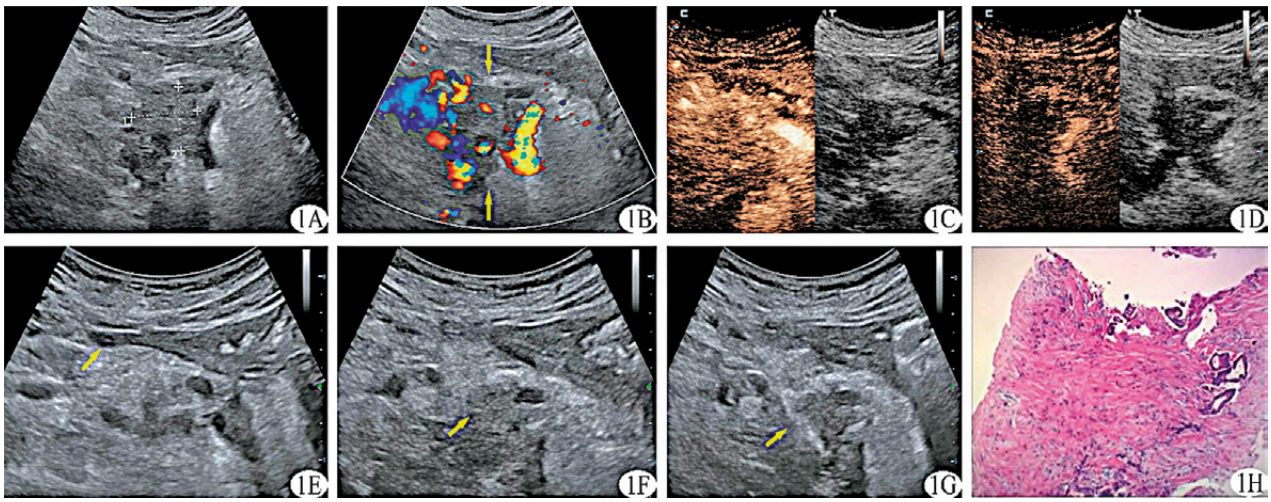

Fig 1. A 54-year-old man with a space-occupying lesion in the head of the pancreas underwent water isolation combined with CEUS guided needle biopsy and was pathologically diagnosed as ductal adenocarcinoma of the head of the pancreas. A) conventional ultrasound showed hypoechoic lesions on the head of pancreas; B) CDFI images showed point-line blood flow signals around the lesion and point-like blood flow signals inside the lesion; C) CEUS showed low enhancement in the arterial phase of the lesion; D) CEUS showed that the delay phase of the lesion decreased significantly; E) about 15 ml 0.9% normal saline was injected by 22G fine needle around the gastrointestinal tract that shielded the pancreatic placeholder lesion under ultrasound guidance, and the safe puncture path was exposed. The arrow showed the tip of the fine needle; F) under the guidance of ultrasound, the 17G coaxial needle was inserted into the intended puncture lesion, and the arrow indicated the tip of the needle; G) the needle is sent to the 18G automatic biopsy gun through the coaxial needle for biopsy, and the arrow shows the position of the needle tip; H) histopathological findings evidenced ductal adenocarcinoma of the head of pancreas.

Acknowledgements: This research was supported by the Key Scientific Research Project of Colleges and Universities Fund in the Henan Province (23A320050; 23A360018), Medical Science and Technology Project of Henan Province (LHGJ20210283; LHGJ20210348).

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