

# Needle fracture during endoscopic ultrasound-guided fine needle aspiration using a needle with a side hole



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## Bibliography

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## ABSTRACT

**Background and study aims** Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) is widely performed to obtain pathological evidence from several parts of the body. Major complications of EUS-FNA are bleeding, pancreatitis, and abdominal pain. Needle fracture is a rare complication of EUS-FNA and only a few relevant reports are available. Here, we report a case of needle fracture during EUS-FNA using a needle with a side hole. A 61-year-old man underwent EUS-FNA of the uncinate process of the pancreas to confirm malignancy. A 20-gauge needle with a side hole was used to puncture the mass from the first part of the duodenum. The needle fracture occurred at the side hole during the third passage, and the fragment remained in the pancreas. Fortunately, the patient did not exhibit any symptoms due to the needle fragment. This case indicates that repeated puncture using the same needle with a side hole might increase risk of needle fracture during EUS-FNA. It is important to inform clinicians about the potential risk of needle fracture, particularly given the increasing number of EUS-FNAs being performed.

## Introduction

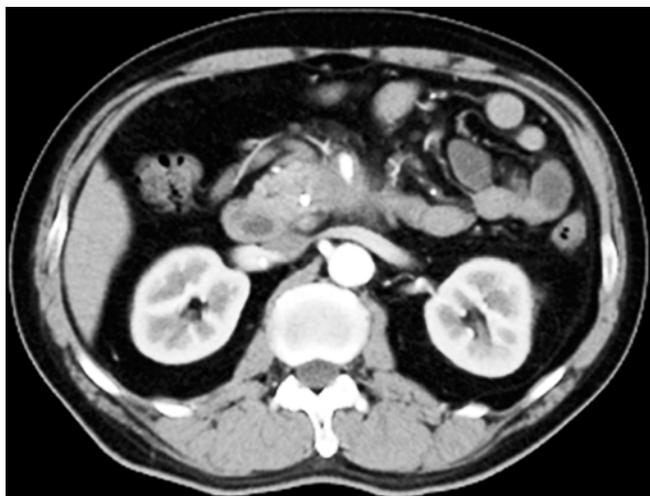
Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) was first reported by Vilmann et al. in 1992, and this procedure is now performed for pathological confirmation of several lesions in the clinical setting [1]. EUS-FNA shows a high diagnostic capacity and is currently considered as the best option to diagnose pancreatic tumors. EUS-FNA is also considered safe with an overall complication rate of 0.98% and procedure-related mortality of 0.02% [2]. Herein, we report the rare complication of a needle fracture during EUS-FNA using a needle with a side hole.

## Case report

A 61-year-old man was admitted to a local hospital because of fever and jaundice. Abdominal computed tomography (CT) showed a pancreatic tumor at the uncinate process causing biliary obstruction. Emergent endoscopic biliary drainage was performed following the diagnosis of acute cholangitis. After im-

provement of the acute cholangitis, pathological samples were obtained by brushing cytology during endoscopic retrograde cholangiopancreatography. However, only mild atypia was diagnosed from brush cytology. The patient was referred to our hospital for further treatment. The pancreatic mass entirely surrounded the superior mesenteric artery and was suspected to be a locally advanced pancreatic cancer (► **Fig. 1**). Therefore, pathological confirmation by EUS-FNA was performed before starting systemic chemotherapy.

Under conscious sedation, an EUS (GF-UCT260, Olympus Medical) was performed to obtain a tissue sample from the pancreatic mass in the uncinate process. The mass was 24 × 20 mm (► **Fig. 2a**). A 20-gauge needle with forward bevel (Echo Tip ProCore HD Ultrasound Biopsy Needle, Cook Medical) was used to puncture the pancreatic mass from the first part of duodenum. The endoscope was angulated and the elevator was used a lot during needle passage, however, the endoscope did not need over-torquing to view the mass. Although the tumor had no calcification, it was slightly hard and light resistance was needed to puncture the tumor. A suf-



► **Fig. 1** Abdominal computed tomography showing a pancreatic mass at the uncinate process, which entirely surrounds the superior mesenteric artery. A plastic stent was inserted in the bile duct.

efficient specimen was not obtained from the first or second passage according to the rapid onsite evaluation of cytology. Therefore, a third puncture was performed using the same needle (► **Fig. 2b**). When removing the device from the endoscope, it was observed that the tip of the needle was not present. Endosonography confirmed that the tip of the fractured needle remained in the pancreas (► **Fig. 2c**). No needle was visible endoscopically from the duodenal wall, and it was impossible to remove the fragment endoscopically. Pathological confirmation of the specimen was achieved from the third puncture. The needle fractured at the side hole (► **Fig. 3**). The fragment was detected radiographically when introducing an expandable metallic stent for the malignant biliary obstruction (► **Fig. 4a**). Abdominal CT also showed an 8-mm-long needle fragment at the uncinate process of the pancreas (► **Fig. 4b**, ► **Fig. 4c**). Although the fragment of the fractured needle could not be removed from the pancreas, the patient exhibited no symptoms and no changes in vital signs after the procedure.

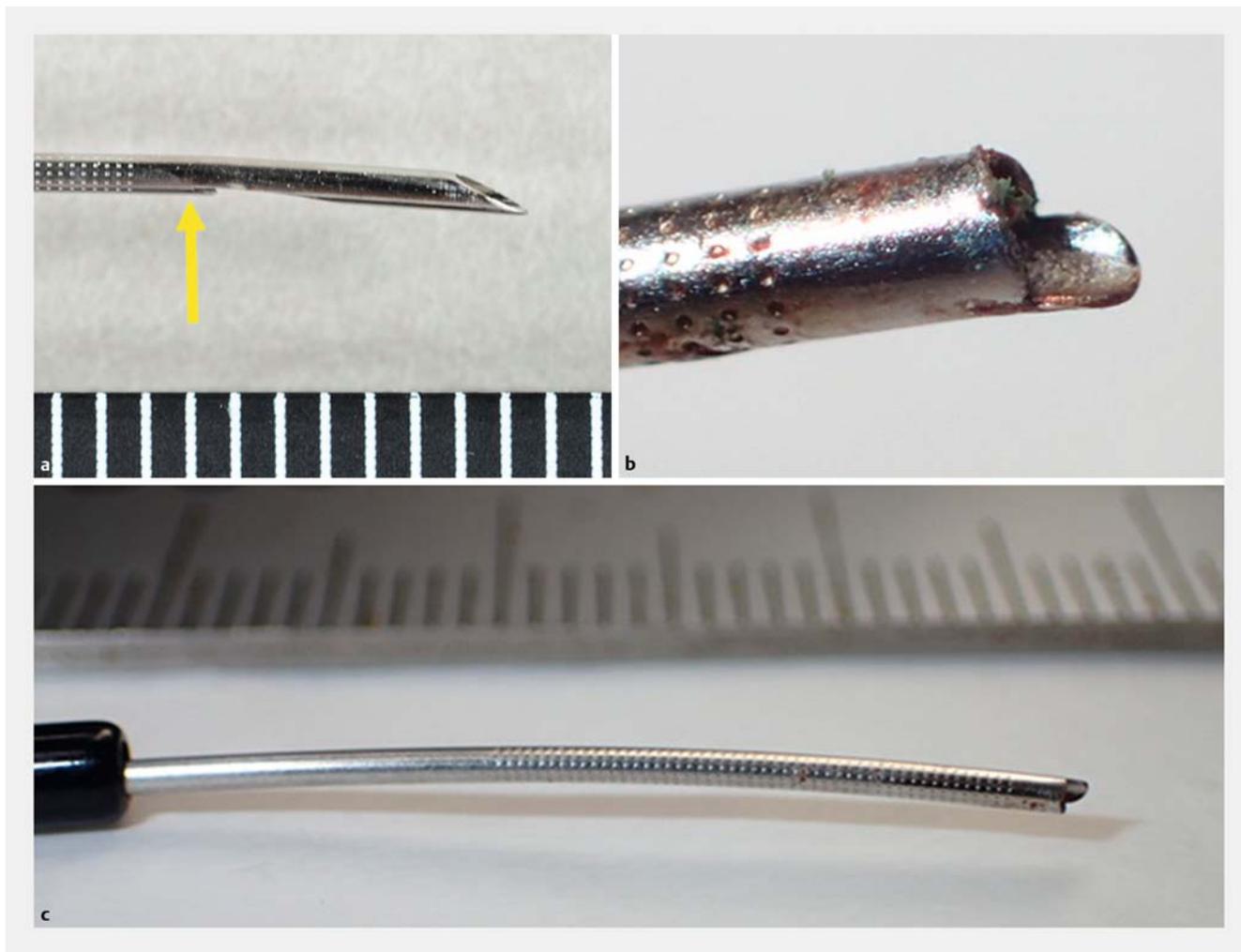
## Discussion

EUS-FNA is widely performed for pathological diagnosis of pancreatic, gastric submucosal, and mediastinal tumors. Recently, pancreaticobiliary interventions have also been performed using EUS [3]. Therefore, EUS-FNA needle use is increasing. Several types of EUS-FNA needles are currently commercially available. EUS-FNA is commonly performed with 19-, 22-, and 25-gauge needles. Recently, a 20-gauge needle has been developed to achieve tissue diagnosis. There are also several shapes of EUS-FNA needles that have a side hole to collect the specimen. Some of these needles have a forward or inverse bevel, and there is also a EUS-FNA needle that has a shark core shape at its tip.

The overall complication rate of EUS-FNA is reported to be 0.98% [2]. Major complications consist of bleeding, pancreatitis, and abdominal pain. Rare complications, such as infection and tumor seeding, have been noted. There are very few reports documenting equipment malfunctions with EUS-FNA. Siddiqui et al. reported 16 cases of malfunctioning equipment including needle bending and loss of handle maneuverability, but needle fracture was not included [4]. There are limited reports describing needle fracture as a complication during EUS-FNA. Adamowicz et al. reported needle fracture during EUS-FNA of suspicious thoracic lymph nodes [5]. A 22-gauge needle without a side hole was used to puncture the rigid lymph node from the esophagus. The needle fracture occurred during removal after a second passage. The distal part of the needle was pinned in the esophagus wall; therefore, the fractured needle was removed endoscopically with a polypectomy snare. The length of the collected fractured needle was approximately 4 cm. El Hajj II et al. reported a needle fracture during EUS-FNA of a pancreatic head mass [6]. A 22-gauge needle without a side hole was used to puncture a mass with significant induration from the duodenum. The needle fracture occurred during removal after the third passage. The needle was extruding from the duodenal wall and was removed using an alligator jaw forceps. In this case, the fractured needle was also approximately 4 cm in length. DeWitt et al. reported a needle fracture during an attempted rendezvous for an inaccessible pancreatic duct in a patient with pancreaticojejunal anastomotic stricture after a



► **Fig. 2** a Endoscopic ultrasound revealed a 24 x 20-mm low echoic mass. b A 20-gauge needle was used to puncture the mass. c The fragment of fractured needle was visualized by EUS.



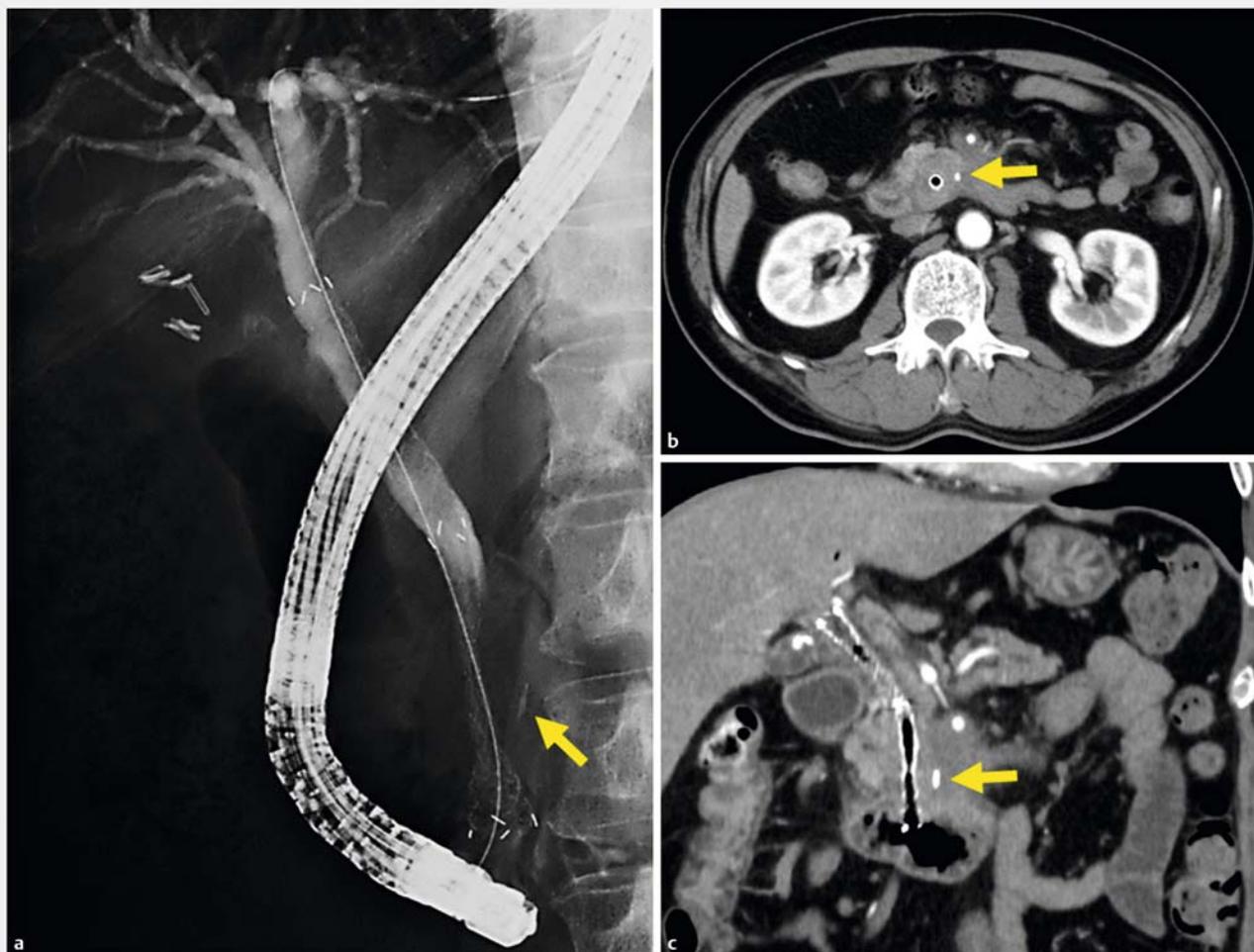
► **Fig. 3** a A 20-gauge needle with a forward bevel. b, c The needle was fractured at the site of the side hole.

pancreaticoduodenostomy [7]. A 19-gauge needle without a side hole was used to puncture the dilated pancreatic duct from the gastric wall, and EUS-guided pancreatography confirmed chronic pancreatitis. Due to the tight stricture of pancreaticojejunal anastomosis, repeat punctures were needed. The needle fractured after the third pancreatic duct puncture. The needle fragment remained within the pancreas, and no needle was visible endoscopically from the gastric wall. The fractured needle was removed surgically during pancreaticogastrostomy reconstruction. The length of the fractured needle was also approximately 4 cm. These reports indicate that needle fracture occurred when the same needle repeatedly punctured a rigid target. Furthermore, in the previous reports of needle fractures, the needles did not have side holes and were broken approximately 4 cm from their tips. In our case, the needle was broken during the third passage of EUS-FNA. As measured from the abdominal CT, the length of the broken needle was approximately 8 mm, which suggests that it was broken at the site of the side hole where the needle is structurally the weakest (► **Fig. 3**). Strain is usually placed on the needle when performing EUS-FNA for pancreatic uncinated lesion. Moreover,

we hypothesize that the side hole made the needle weaker and that in our case, the repeated passages led to for the needle fracture in our case.

Needle biopsy is widely performed in various situations, and there are some reports of needle fracture in other fields. For example, the Japan Society of Respiratory Endoscopy conducted a survey examining complications associated with endobronchial ultrasound-guided transbronchial needle aspiration [8]. The survey results showed that needle fracture occurred in 15 out of 7,345 procedures (0.2%). Furthermore, in a report of CT-guided percutaneous biopsy of bone lesions, one needle fracture was documented among 186 procedures (0.5%) [9]. Although the frequency of needle fractures during EUS-FNA is unknown, clinicians should be made aware of the potential risk of this complication.

In our case, the fragment of fractured needle remained in the pancreas of the patient who was suffering from advanced pancreatic cancer. Surgical removal of the fragment was not attempted because it was considered too invasive for this patient. However, the fragment could have been removed if the patient had suffered from a benign disease and had a long life expect-



► **Fig. 4** **a** The fragment of the fractured needle was detected radiographically during endoscopic placement of a metallic stent. **b** Axial view of the abdominal computed tomography showing the fractured needle fragment. **c** Coronal view of the abdominal computed tomography showing the fractured needle fragment.

tancy. If the tip of the fractured needle remains inside the enteral lumen, a snare or forceps is useful for removing it. In the case of CT-guided biopsy of the thoracic spine, the needle-in-needle technique for percutaneous retrieval of a fractured needle was reported [10]. However, this technique is too difficult to perform in the case of EUS, and surgical removal is required when the fractured needle cannot be retrieved endoscopically.

## Conclusion

This is the first report of a needle fracture that occurred at the side hole of an EUS-FNA needle. When repeatedly puncturing a rigid target, exchanging the needle may help to avoid needle fracture. It is important to inform clinicians about the potential risk for needle fracture, especially given the increased number of EUS-FNAs being performed.

## Competing interests

None

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