Introduction

Endoscopic ultrasonography (EUS) is widely used to diagnose pancreatic diseases because its spatial resolution is superior to that of other modalities. Recent innovation of ultrasound technology allowed characterization of a lesion depicted by EUS on the basis of their vascularity.

Utility of contrast-enhanced EUS in diagnosis of pancreatic tumors

1. Contrast-enhanced Doppler EUS

Doppler EUS with and without contrast enhancement allows characterization of pancreatic tumors on the basis of their vascularity. The hypovascularity is a typical feature of ductal carcinoma on Doppler EUS. However, Doppler EUS is limited in dynamic perfusion imaging with contrast agents. Doppler mode cannot depict very slowly flowing microscopic vessels and parenchymal perfusion. Moreover, Doppler used with ultrasound contrast agents is prone to artifacts such as blooming, which makes the visualized blood vessels wider than when conventional B mode imaging is performed.

2. Contrast-enhanced harmonic EUS

Recently, EUS system specific for contrast harmonic imaging has been developed to evaluation of vascularity of the lesions using ultrasound contrast agents. The use of this EUS system enabled us to observe images of microcirculation and parenchymal perfusion without Doppler-related artefacts in the pancreatobiliary system. Contrast-enhanced harmonic EUS can differentiate diagnose pancreatic carcinomas as hypovascular masses with a high sensitivity (89-96%) and specificity (64-88%).

Relationship between contrast-enhanced EUS and EUS-FNA

1. Depiction of the target of EUS-FNA

EUS-guided fine needle aspiration (EUS-FNA) is also a tool for characterizing a solid mass that is detected by
EUS, with a high sensitivity and specificity. However, EUS-FNA has limitations in obtaining samples from some subtle solid lesions depicted by EUS. Improved depiction of the lesions by contrast-enhanced harmonic EUS facilitates the yield of EUS-FNA.\textsuperscript{7,9}

2. **Complementary diagnosis of lesions with false negative EUS-FNA findings**

In addition, we sometimes hesitate making decisions between surgery and follow-up in patients whose EUS-FNA findings are negative, because false negative EUS-FNA cannot be excluded. Therefore, when contrast-enhanced EUS shows a typical pattern of carcinomas, even when the EUS-FNA findings are negative, surgical resection or pathological re-evaluation by EUS-FNA of the tumor should be recommended.\textsuperscript{8,9}

**Conclusion**

Contrast-enhanced EUS improves the ability of EUS in diagnosing pancreatic diseases, and help making decision of their treatment.

**References**

Hemoptysis with Intra-abdominal Lymphadenopathy

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Age and Gender: 47 years old, Male

Chief Complaints: Hemoptysis 4 months ago

Present Illness:
A 47-year old man complaining of hemoptysis for 4 months was admitted to our hospital. A month before admission, he was examined at a local hospital due to increasing amount of hemoptysis and a chest CT scan showed a 44-mm-sized mass in the middle lobe of right lung and a 40-mm-sized soft-tissue mass in the porto-caval space in the upper abdomen. He was recommended to take Amoxicillin-Clavulanate for suspicious combined pneumonia and to admit for further evaluation of abnormal findings.

Past History:
Surgical treatment for otitis media 13 years ago
A 25 PY ex-smoker quit smoking 4 years ago

Family History: His mother died of stomach cancer

Physical Examination and Laboratory Findings:
No abnormal lung sound
No abnormal finding on abdominal exam.
WBC 7.05×10³/μL, Hemoglobin 14.9 g/dL, Hematocrit 42.7%, Platelet 229×10³/μL
PT (sec) 0.94, INR, APTT (Activated Partial Thromboplastin Time) 33.7 sec
Protein 7.7 g/dl, Albumin 4.5g/dl, Cholesterol 159 mg/dl, Bilirubin 0.6 mg/dl
AST 17 U/ℓ, ALT 29 U/ℓ, ALP 75 U/ℓ
CEA 0.9 ng/ml
Sputum AFB/OB/Fungus - all negative

Endoscopic and Radiologic Findings:
A 44-mm-sized mass in the middle lobe of right lung and multiple around 40-mm-sized soft-tissue masses in the abdomen were observed at CT scan.

Hospital Progress:
Positron emission tomography CT and Endoscopic ultrasound-guided fine needle aspiration