A 60-year-old African American man with a history of coronary artery disease and right lower extremity deep venous thrombosis that had been treated with rivaroxaban presented to the ED with pleuritic right-sided chest pain and shortness of breath, diaphoresis, and palpitations for 1 day. He was afebrile and had a heart rate of 145 beats per minute, respiratory rate of 22 breaths per minute, BP of 145/70 mm Hg, and oxygen saturation of 95% on room air. His physical examination was unremarkable. Laboratory studies revealed a mild leukocytosis of 10,500 and an elevated troponin of 1.741. ECG showed sinus tachycardia, left ventricular hypertrophy, and new ST depressions in leads II, III, and aVF. A chest CT scan for pulmonary embolism showed small bilateral pulmonary emboli without evidence of right heart strain. Incidentally, the CT scan revealed several hypodense liver lesions and a 2.2 cm hypodense lesion in the pancreas that was concerning for malignancy.

He was admitted to the medical ICU (MICU) and started on a heparin infusion. His vital signs and symptoms improved over the next several hours. The patient provided additional history that, approximately 2 months earlier, he was admitted for drainage of a liver lesion at an outside facility and that the fluid cytologic result was negative for malignancy. A point-of-care ultrasound (POCUS) examination of the right upper quadrant was performed by the MICU team and revealed several hypoechoic and anechoic lesions in the liver (Video 1). During the POCUS examination, the MICU team noted an approximate 1-cm subcutaneous nodule on the lateral aspect of the right upper quadrant abdominal wall. The subcutaneous nodule was firm, non-mobile, non-tender, and non-erythematous. The patient stated that the subcutaneous nodule developed after drainage of the liver lesion, and he noted that the nodule was increasing in size. The MICU team performed a POCUS examination of this nodule (Video 2).

**Question:** How would you characterize this subcutaneous nodule based on its sonographic appearance: benign or concerning for malignancy?
**Answer:** The nodule is small (1-1.5 cm), round, and hypoechoic with heterogeneous echogenicity. Though the superficial and deep borders of the nodule appear well-defined, the nodule appears to be infiltrating laterally (screen left and right) into the adjacent tissue planes, raising concern for malignancy. Furthermore, the nodule lacks features that are suggestive of a simple cyst, lipoma, or abscess, making a benign cause less likely. Other ultrasound examination features that are known to suggest malignancy, but that are not seen here, include size >4.6 cm and increased vascularity on color flow Doppler. A history of increasing size and antecedent drain placement at the nodule site suggest possible tumor seeding and raise the suspicion for malignancy.

**Discussion**

The MICU team POCUS examination of the subcutaneous nodule changed the approach to working up this patient and spared him a more invasive biopsy procedure. Prior to performing the POCUS examination, the subcutaneous nodule was suspected to be scar tissue or a seroma caused by the recent drainage of the liver lesion. However, the ultrasound examination revealed a solid, heterogeneous nodule with infiltrative borders, which raised concern for malignancy.

An ultrasound-guided core needle biopsy of the subcutaneous nodule was performed at the bedside. The biopsy of the subcutaneous nodule stained positive for CK7, CK5/6, and CA19-9 and was consistent with poorly differentiated adenosquamous carcinoma of the pancreas. In the patient’s case, the subcutaneous nodule was a metastasis from tumor seeding where a liver drain was placed recently. Tumor cell seeding along a percutaneous needle tract has been well-described in pancreatic cancer with an incidence of approximately 1.4%.\(^1,2\)

Superficial soft tissue tumors occur in approximately 3 of 1,000 people per year in the United States; <1% of these lesions are malignant.\(^3,4\) Approximately 40% of malignant soft tissue lesions are due to metastases.\(^3,4\) Data from case series have shown that ultrasound examination is useful for the initial assessment of soft tissue lesions and can help determine the need for biopsy.\(^3-7\)

**Discussion**

Common benign soft-tissue lesions, such as lipomas and abscesses, have distinct characteristics and can be identified reliably by ultrasound examination.\(^5,8\)

Lipomas, which are the most common benign soft tissue lesion, typically have smooth margins, an oval (specifically wider than taller) or lobulated shape, a diameter <5 cm, lack of acoustic shadowing, minimal or absence of flow on color Doppler, and slow or absent growth.\(^7\) Lipomas can be hypoechoic, isoechoic, or hyperechoic, relative to the surrounding soft tissue.\(^6\) Many lipomas contain characteristic “wavy” echogenic lines. IM lipomas are rare, and such findings likely warrant further investigation.\(^9\) A nodule diameter >5 cm or a history of rapid growth generally warrants histologic evaluation.

Soft tissue abscesses are irregular in shape with borders ranging from well-defined to poorly defined and echogenicity ranging from anechoic to hyperechoic.\(^10\) Visualization of hyperechoic debris that is mobile within the lesion when gentle pressure is applied with the transducer is highly suggestive of abscess.\(^10\) Abscesses often are surrounded by areas that demonstrate a cobblestone appearance indicative of edema. Not surprisingly, clinical context of infectious signs or symptoms dramatically raise the suspicion that a soft tissue lesion is an abscess.

Features noted to suggest malignant cause include large size (>4.6 cm), increasing size (by history or comparison with prior imaging), infiltrative or ill-defined margins, deep location, penetration through tissue planes, and increased vascularity on color Doppler.\(^3,5\) Video 2 demonstrates the hypoechoic, heterogeneous nature of the patient’s soft-tissue lesion, which appears to cross tissue planes and lacks vascularity by color flow Doppler. Ultrasound examination is often used to guide percutaneous needle biopsy of superficial soft tissue nodules to determine the diagnosis. It is a procedure with low risk of complications and diagnostic yield as high as 95%.\(^11\)

**Video 1** shows several irregularly shaped anechoic lesions with additional solid-appearing hypoechoic lesions within the liver with normal surrounding tissue. Although POCUS is a useful tool for the detection of intrahepatic lesions, it cannot make a definitive diagnosis because of significant overlap of the sonographic appearance of different types of liver lesions. The ultrasound appearance of a liver abscess, for example, is variable and not specific.\(^12\) Abscesses often have an irregular shape, can appear as solitary or
multiple lesions, and can range in echogenicity from anechoic to hyperechoic. Early abscesses often cannot be distinguished from malignant lesions, even with comprehensive ultrasound examinations performed by radiology.

The literature that describes malignant liver lesions also reports many overlapping features. Some features suggest specific types of cancer. For example, features that would suggest distant metastases vs a hepatic tumor include multiple lesions, multi-lobar involvement, irregular borders, necrosis or hypoechoic nature, and absence of cirrhosis. Conversely, hepatocellular carcinoma, especially if advanced, typically has increased vascularity with dilated intratumoral sinusoids, mosaic pattern, septum formation, and peripheral sonolucency (or halo) and often occurs in the setting of cirrhosis. On the other hand, cholangiocarcinoma is likely to be associated with peripheral bile duct dilation, absence of cirrhosis, irregular borders, and variable echogenicity.

In summary, we present a case of pancreatic cancer with a subcutaneous metastasis due to tumor cell seeding after a percutaneous drain placement in a metastatic liver lesion. The POCUS examination raised our clinical suspicion of a malignant subcutaneous lesion and led to an ultrasound-guided core needle biopsy of the lesion that was performed at the bedside. The POCUS examination spared the patient a more invasive liver biopsy and confirmed the diagnosis of metastatic pancreatic cancer.

Reverberations
1. Ultrasound examination rapidly and accurately can identify superficial skin and soft tissue lesions that may be malignant.
2. Ultrasound findings of soft tissue lesions that suggest malignancy include size >4.6 cm, infiltrative or ill-defined margins, deep location, penetration through tissue planes, and increased vascularity on Doppler.
3. Ultrasound guidance can be used to biopsy skin and soft tissue lesions at the bedside.

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