

CASE REPORT

Post biopsy delayed liver hemorrhage successfully controlled by bedside CEUS-guided microwave ablation: A case report

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Abstract

We present a 60-year-old man suffering from delayed arterial hemorrhage post liver biopsy. Contrast-enhanced ultrasound was used to detect the bleeding point and to evaluate the efficacy of microwave ablation (MWA). The hemorrhage was controlled by MWA at the bedside. This is the first application of MWA for delayed hemorrhage.

KEYWORDS

bedside, delayed hemorrhage, liver biopsy, microwave ablation (MWA)

1 | INTRODUCTION

Percutaneous liver biopsy is an important tool in the diagnosis and evaluation of liver disease.¹ With image-guided assistance, percutaneous liver biopsy is widely used in clinical practice due to its safety and efficacy.² However, complications are unavoidable. In the case described here, angiographic embolization and surgery were unavailable. MWA was initially developed to achieve hemostasis in the liver and spleen in patients with shock and has shown high efficacy and success rates.^{3,4} We performed this innovative application of ultrasound-guided percutaneous MWA to the bleeding site to achieve hemostasis at the bedside.

2 | CASE DESCRIPTION

A 60-year-old man presented to the hospital for painless jaundice for more than 10 days. On admission, laboratory examinations revealed PT = 12 s, PLT = $343 \times 10^9/L$, TBIL = 194.7 $\mu\text{mol/L}$ and ALB = 36.7 g/L. Both hepatitis E virus antibody-IgM and antibody-IgG were positive.

MRI and ultrasound showed no abnormalities in the liver. Ultrasound-guided percutaneous liver biopsy was performed with a coaxial needle (COOK, 16 G). The patient had been on a long-term course of aspirin and clopidogrel and stopped for 11 days before the biopsy. Two tissue specimens were obtained. Three pieces of gelatin sponge were used to create embolisms along the coaxial needle tract. No active hemorrhage was observed immediately after the biopsy.

Twenty-two hours post biopsy, the patient suffered from hemorrhagic shock. His hemoglobin level dropped to 65 g/L after injection of fluids, vasoactive agents, and hemostatics. After red blood cell transfusion, emergency contrast-enhanced computed tomography (CT) revealed perihepatic hematoma, hematocele, and active hemorrhage in the right posterior lobe of the liver (Figure 1). Grayscale sagittal ultrasound at the bedside revealed a perihepatic hematoma and intraperitoneal hemorrhage (Figure 2). Contrast-enhanced ultrasound (CEUS) revealed that the contrast agent had spilled from the inferior surface of the liver (Figure 3). The original bleeding site was confirmed as the branch artery in the right posterior lobe by a combination of ultrasound and CT imaging 26 h post biopsy.

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FIGURE 1 A 60-year-old man with shock after liver biopsy. Contrast-enhanced computed tomography (CT) of the abdomen reveals a perihepatic hematoma and active hemorrhage in the right posterior lobe of the liver (arrow).

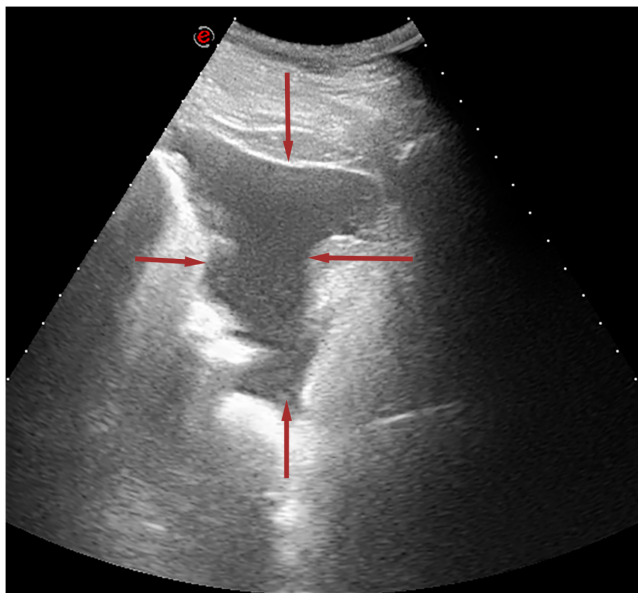


FIGURE 2 Grayscale sonogram of the liver with bedside color flow Doppler reveals perihepatic hematoma and intraperitoneal hemorrhage (arrow).

After discussion with several radiologists and surgeons, CEUS-guided percutaneous MWA was performed to coagulate the bleeding zone at the bedside. Coagulation was performed with a microwave antenna (XR-A2018W; Greatwall Medical, Jiangsu, China) twice under CEUS guidance, using 60 kW for 5 and 2 min, respectively (Figure 4). Successful hemostasis was observed on CEUS both immediately and 30 min after MWA (Figure 5). All of the ultrasonography for the patient was done at the bedside. From definitive diagnosis to complete preparation for ablation, this method can be simply and effectively finished within

10 min. The patient showed stable vital signs and improved hemodynamics on the following days. The liver biopsy results indicated cholestatic hepatitis. The patient gradually recovered and was discharged 3 weeks later.

3 | DISCUSSION

The incidence of major hematoma resulting from liver biopsy requiring hospitalization is 0.48% to 0.5%.^{5,6} Only a few cases of delayed hemorrhage have been reported in the English-language literature.^{7–12} The use of aspirin does not significantly increase the risk of bleeding during the perioperative period,¹³ but the patient had stopped using it for 11 days anyway.

CEUS, which is more sensitive than Color Doppler imaging, is often used to detect active bleeding after liver biopsy.¹⁴ The common bleeding sites are located on the route through which the needle-track passes, including the intercostal vessels, omenta, and puncture points on the diaphragmatic surface of the liver. We suspect the reason for delayed hemorrhage was that the intrahepatic artery had been damaged during biopsy and the intrahepatic hematoma gradually grew. However, blood was unable to outflow from the needle track due to embolization with the gelatin sponge pieces. Over time, the intrahepatic hematoma ruptured due to increasing pressure.

Delayed intrahepatic hematoma can be managed conservatively with close monitoring if it is not life-threatening.¹¹ Unfortunately, the current patient's hemoglobin dropped to 65 g/L, and emergency CT revealed active bleeding after conservative management; clearly, conservative treatment failed. Finding the most suitable method to control active bleeding was key.

It is suggested that hemorrhage of the intrahepatic artery should be initially managed with angiographic embolization, and surgical intervention should be arranged if embolization fails.⁹ However, the patient in this case was hemodynamically unstable, and it would have been time-consuming to transfer him from the ward to the angiographic suite or operation theater. Additionally, the patient was too frail to tolerate surgery under general anesthesia. MWA has been successfully used to manage needle track bleeding for a patient in shock due to the unavailability of angiographic embolization and laparotomy.⁸ MWA has also successfully managed massive portal venous bleeding with portal hypertension and active liver hemorrhage due to trauma.^{15,16} Compared with radiofrequency ablation, MWA more quickly increases temperature, has a smaller heat-sink, and creates a larger zone of coagulation.¹⁷ MWA can be managed visually under CEUS guidance, successfully achieving hemostasis in several severe cases.^{8,15,16} The patient's recovery and discharge from

FIGURE 3 Contrast-enhanced ultrasound reveals contrast agent spilling from the inferior surface of the liver (arrow). The original bleeding site was confirmed as the branch artery in the right posterior lobe of the liver by the combination of ultrasound and CT imaging.

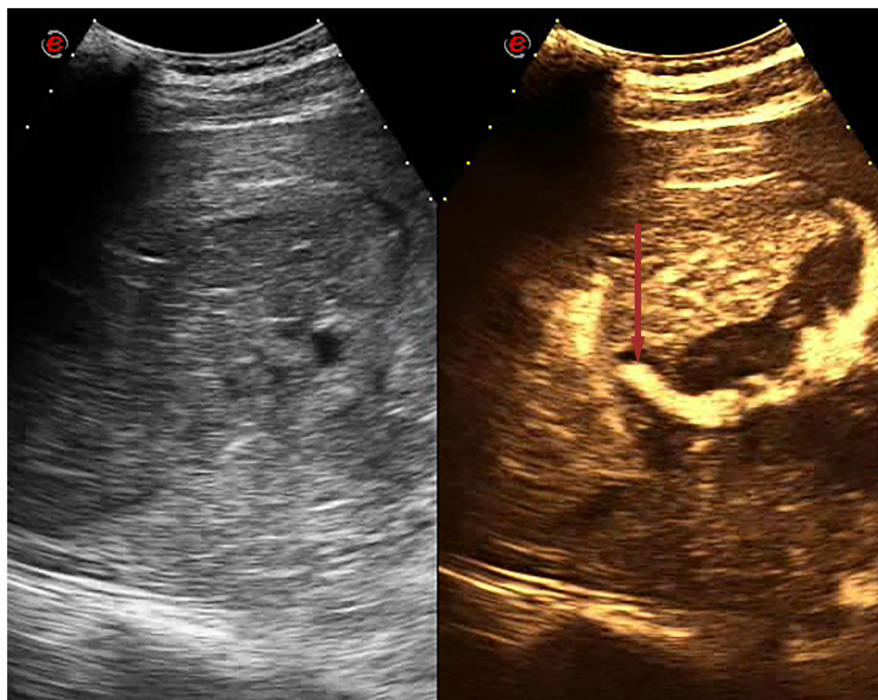
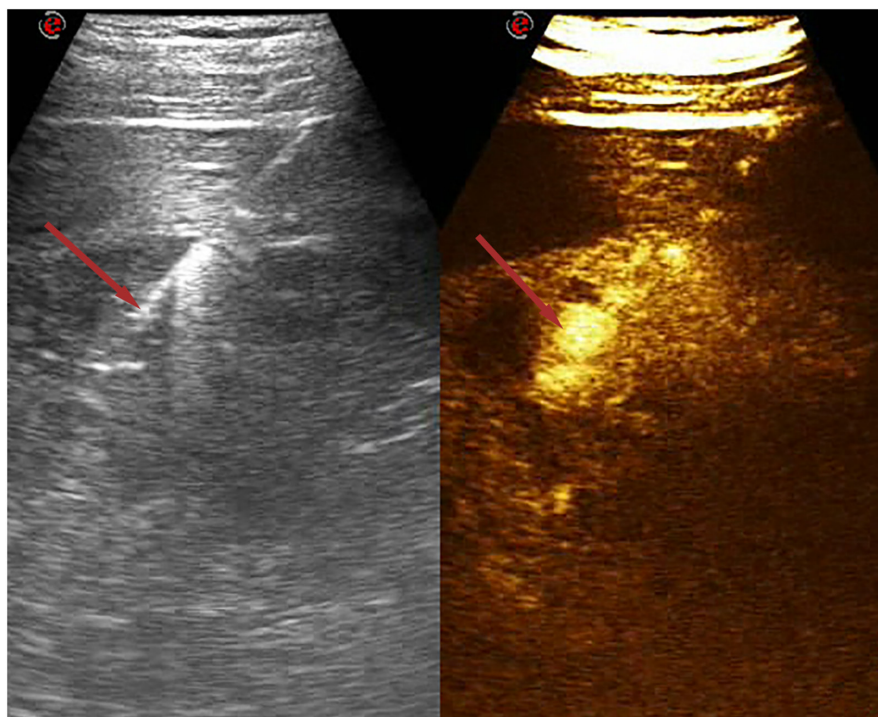


FIGURE 4 CEUS-guided percutaneous MWA performed with a microwave antenna targeting the bleeding artery (arrow).



the hospital confirmed that our treatment was suitable. To the best of our knowledge, this is the first application of CEUS-guided percutaneous MWA at the bedside for delayed arterial and non-track hemorrhage after liver biopsy.

Angiographic embolization and surgical intervention are performed prior to arterial bleeding.¹⁸ Venorrhaphy and ligation are performed prior to portal bleeding.¹⁹ Although MWA is not routinely performed for the

treatment of hemorrhage, it is an alternative to control bleeding at the bedside in some high-volume institutes. MWA can be considered for controlling intrahepatic point bleeding, but not for the rupture of a large area, such as a scratch of the liver surface by a needle tip. To prevent biliary injury, MWA is not recommended for controlling the bleeding near the grade 1–2 portal vein. According to unpublished data collected from our center, MWA is

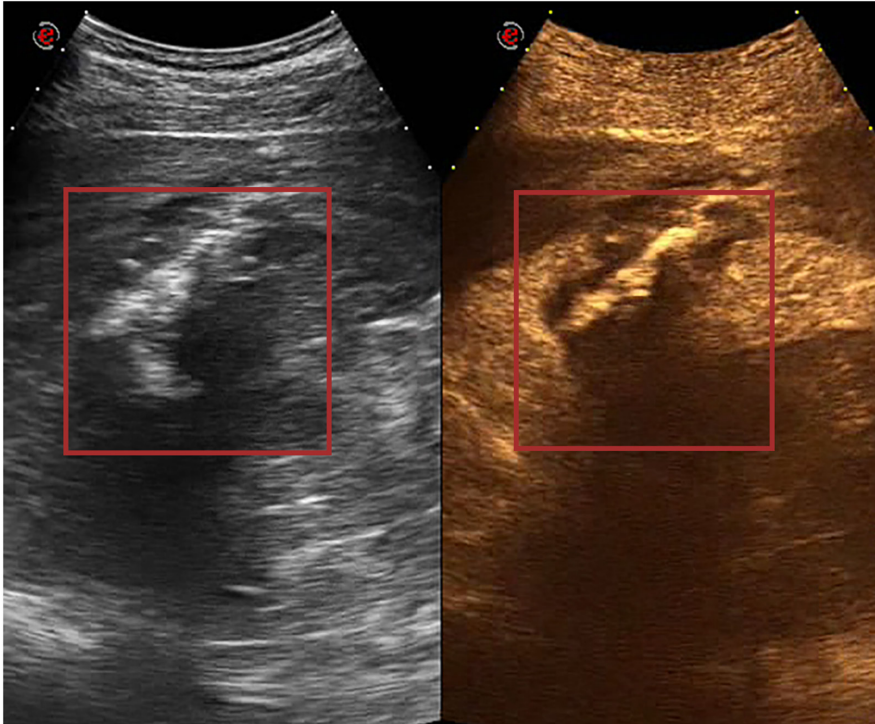


FIGURE 5 CEUS shows no sign of active hemorrhage. No contrast agent is seen to spill from the original bleeding vessel or the inferior surface of the liver after MWA. The bleeding zone has been fully coagulated (rectangle).

performed three times in needle track bleeding during the MWA of hepatocellular carcinoma. Angiographic embolization or surgical intervention should be performed if MWA fails.

In conclusion, the success of this first bedside application reflects the validity and applicability of MWA, especially when angiographic embolization and surgical intervention are unavailable. Further studies are warranted to better characterize the efficacy of percutaneous MWA in treating active arterial bleeding.

AUTHOR CONTRIBUTIONS

Lanxia Zhang: Writing – original draft; writing – review and editing. **Yuxuan Wu:** Data curation; resources. **Xuqi He:** Data curation; resources. **Liwen Zhao:** Data curation; resources. **Kai Li:** Project administration; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

There is no conflict of interest during the submission process.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

CONSENT

Written informed consent was obtained from the patient for the publication of his information.

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