

Massive abdominal hemorrhage after radiofrequency ablation of recurrent hepatocellular carcinoma with successful hemostasis achieved through transarterial embolization: a case report

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Abstract

Acute massive abdominal hemorrhage after radiofrequency ablation (RFA) for hepatocellular carcinoma (HCC) is an infrequent and severe complication. Delayed diagnosis and treatment may be life-threatening. We herein describe a 60-year-old man with a history of postoperative HCC. A new nidus of HCC was found in his right liver lobe after abdominal magnetic resonance imaging and intra-operative angiography. The patient then underwent computed tomography-guided RFA. However, 7 hours after RFA, he suddenly developed dizziness, nausea, abdominal distension, hematuria, a decreased blood pressure, and an increased heart rate. Diagnostic abdominal puncture produced bloody liquid, and angiography demonstrated hemorrhage in the right hepatic artery. Transarterial embolization was performed following the administration of an appropriate amount of tissue emulsion to embolize the source of hemorrhage. Following this treatment, the patient had no further bleeding. Neither the hemorrhage nor the HCC lesions had recurred after 3 months of follow-up.

Keywords

Radiofrequency ablation, transarterial embolization, hepatocellular carcinoma, hemorrhage, emergency, case report

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Introduction

Hepatocellular carcinoma (HCC) is the sixth most common cancer and the fourth leading cause of cancer-related death worldwide.¹ Relapse is the main cause of treatment failure. Repetitive surgery is still the most important treatment method in patients with recurrent HCC to achieve long-term survival.² However, this approach is only suitable in a small proportion of patients; it cannot be performed in those with multifocal intrahepatic or extrahepatic recurrence or a tumor located in an unresectable site. In recent years, local ablation therapy, including radiofrequency ablation (RFA), microwave ablation, and percutaneous ethanol injection, has been widely performed. Of these techniques, RFA has been extensively recognized as an effective treatment for HCC measuring ≤ 3 cm.³ During RFA, high-frequency energy heats the circumambient tissue *via* a needle, thus killing adjacent cells. RFA for HCC is usually selected when surgery is impracticable. Although RFA is characterized by less trauma and a precise curative effect, severe complications induced by RFA have been reported, such as hemorrhage, abscess formation, thermal injury to the viscera, and decompensation of cirrhosis.^{4,5} This technique can also lead to mortality in severe cases. There are few reports of transarterial embolization (TAE) in the treatment of massive abdominal hemorrhage following RFA of the liver. We herein present a case of massive abdominal hemorrhage after RFA for recurrent HCC in a 60-year-old man in whom successful hemostasis was achieved by TAE. This is the first such case reported worldwide.

Case presentation

A 60-year-old man was admitted to our hospital because of intermittent abdominal distension that had been present for 20 months and had become aggravated during the past

5 days. He had a history of decompensation of hepatitis B cirrhosis, hypertension, and type 2 diabetes. The patient had undergone interventional surgery and RFA successively in April 2017 following the diagnosis of HCC. Regular follow-up reexaminations by abdominal computed tomography (CT) showed no progression of the liver lesions. However, magnetic resonance imaging following this admission revealed an abnormal nodular signal in the right lobe near the roof of the liver and blood supply during the arterial phase (Figure 1(a)). The patient then underwent transarterial chemoembolization (TACE). Intraoperative angiography showed a nodular tumor in the right lobe of the liver, and end-arterial staining was obvious.

Based on the multidisciplinary evaluation findings, CT-guided RFA was selected as the best treatment option. Before the procedure, the doctors discussed the patient's condition and the risk of surgery with the patient and his family, and written informed consent was obtained. At 10:04 on 8 January 2019, the patient underwent real-time CT-guided RFA. He was placed in the supine position on the CT table. Following satisfactory tracheal intubation, the upper abdomen was fixed with a positioning scale. The CT scan was used to determine the needle insertion point, angle, and depth. Three points on the lesion were ablated. The drape was disinfected, puncture of the preset area according to the intended path and the tip of the needle to the preset target area were confirmed by CT scanning, and an RF electrode needle (16 cm/3 cm; Lide, Mianyang, Sichuan, China) was used to puncture the preset area according to the proposed path (Figure 1(b)). CT confirmed that the scope of the needle tip was within the lesion. Following 12 minutes of RFA, the needle was adjusted to the other preset points and ablation was continued. The preset effect was achieved by ablation of the lesion area under CT guidance, and the puncture

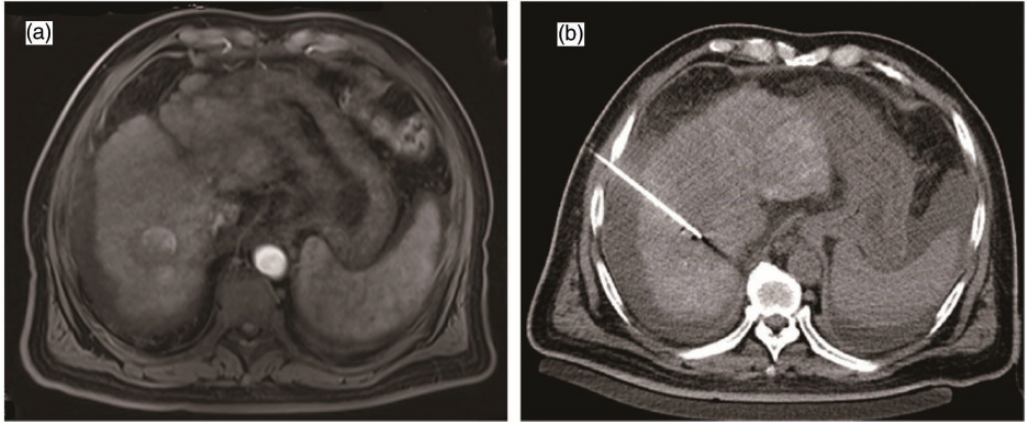


Figure 1. Abdominal magnetic resonance imaging showing a new nidus of hepatocellular carcinoma in the right liver lobe, after which computed tomography (CT)-guided radiofrequency ablation (RFA) was performed. (a) Abdominal contrast-enhanced magnetic resonance image showing an abnormal nodular signal in the right lobe near the roof of the liver and blood supply during the arterial phase. (b) The patient underwent CT-guided RFA. The RF electrode needle (16 cm/3 cm; Lide, Mianyang, Sichuan, China) punctured the preset area according to the proposed path, and CT confirmed that the scope of the needle tip was within the lesion.

route was ablated at the same time as needle withdrawal. At the end of the procedure, the wounds were dressed and the patient was resuscitated from anesthesia. He was returned to the ward at 12:28 without obvious discomfort.

At 18:26, the patient complained of dizziness, nausea, and abdominal distension. The doctor on duty immediately examined the patient, who presented with a painful and pale face. His blood pressure was 100/65 mmHg and heart rate was increased at 100 bpm. Urinalysis showed hematuria. An experienced doctor performed a diagnostic abdominal puncture that produced bloody liquid, which was considered to be abdominal hemorrhage. A large volume of rehydration fluid was rapidly administered by intravenous infusion, and red blood cells were given to supplement the blood volume. Hemostatic agents and symptomatic support therapy were also administered. At the same time, the emergency surgeon was consulted and emergency TAE was recommended to stop the bleeding.

After notifying the patient's family and obtaining written informed consent for the operation, the patient was rushed to the operating room and treatment began at 20:48. Celiac trunk angiography revealed extravasation of contrast media from the right hepatic artery branch (Figure 2(a)), and a hemorrhagic site was considered. A microcatheter was super-selectively intubated into the bleeding vessel, and after confirmation by angiography, tissue emulsion (0.5 mL of medical glue + 2 mL of iodized oil) was slowly injected into the microcatheter for appropriate embolization. The angiography review was satisfactory with no overflow of contrast agent (Figure 2(b)). Thoracic aortography was then performed, and no abnormalities in the intercostal arteries were found. The peritoneal puncture point was located under fluoroscopy; the puncture needle successfully punctured the peritoneal cavity, and bloody fluid flowed out. The guide wire was inserted, and the drainage tube was placed along the guide wire and

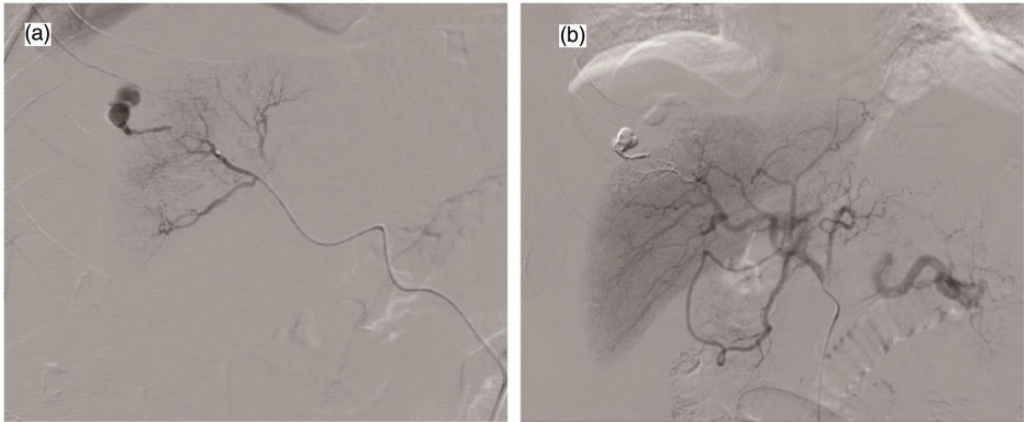


Figure 2. Angiography demonstrated hemorrhage in the right hepatic artery. Transarterial embolization was performed to embolize the source of hemorrhage. (a) Celiac trunk angiography revealed extravasation of contrast media from the right hepatic artery branch. (b) Tissue emulsion (0.5 mL of medical glue + 2 mL of iodized oil) was injected along the microcatheter for appropriate embolization, and the angiographic review was satisfactory with no overflow of contrast agent.

remained unobstructed. The procedure went smoothly and the patient showed no obvious discomfort. After surgery, the sheath tube was left in place and bandaged, and the abdominal drainage tube was fixed. The patient returned to the ward at 21:49 and was transferred to the intensive care unit to stabilize his vital signs. Two weeks later, the patient was discharged. He was followed up for 3 months, and no further hemorrhage or HCC lesions were observed.

This study did not require an ethics review because of its retrospective design.

Discussion

CT-guided RFA has been used for the treatment of small recurrent HCC.⁶ The safety and effectiveness of RFA have been confirmed. Clinical studies have revealed good survival after RFA in patients with HCC, and these results are comparable with surgical outcomes, especially for single HCC measuring ≤ 3 cm.^{2,3} Although the effects of RFA are localized, some complications have been reported, such as hemorrhage, cardiac tamponade,

and pneumothorax.⁷⁻⁹ However, acute massive hemorrhage is a very infrequent and severe complication. The incidence of acute massive hemorrhage is only 0.32% to 1.60%.¹⁰ Most bleeding is mild and transient, and conservative treatment is effective. Bleeding in some patients may be serious, and delayed diagnosis and treatment may be life-threatening. Thus, timely management is essential.

In this study, we have reported a case of massive abdominal hemorrhage after RFA for recurrent HCC and the achievement of successful hemostasis following TAE. Seven hours after RFA, the patient suddenly developed dizziness, nausea, abdominal distension, and hematuria with a decrease in blood pressure and an increase in heart rate. Diagnostic abdominal puncture revealed bloody liquid. Angiography demonstrated hemorrhage in the right hepatic artery. Therefore, TAE was performed following administration of an appropriate amount of tissue emulsion to embolize the source of hemorrhage. After surgery, the patient was transferred to the intensive care unit for stabilization of his vital signs. Two weeks later, the patient was

discharged. He was followed up for 3 months, and no further discomfort was observed.

Diagnostic peritoneal puncture, angiography, and TAE were the keys to successful treatment of acute abdominal hemorrhage in this case. TAE is reportedly the preferred treatment for iatrogenic hemorrhage.¹¹ Patients with hemodynamic instability are at higher risk during anesthesia and surgery. Because TAE is minimally invasive, it has a higher success rate and lower incidence of complications than surgical or laparoscopic options.

Goto et al.¹⁰ showed that abdominal hemorrhage is usually associated with mechanical damage induced by electrodes penetrating blood vessels or thermal damage during RFA. A large tumor size and thrombocytopenia are important risk factors for abdominal hemorrhage. Location of the lesion close to blood vessels increases the risk of bleeding. If hemorrhage occurs, the success rate of hemostasis depends on thrombocyte function and coagulation activity. Therefore, it is very important to preoperatively evaluate the bleeding risk to prevent hemorrhagic complications following RFA. Close assessment of clinical symptoms, monitoring of vital signs, and laboratory testing should be conducted immediately after therapy. Furthermore, diagnostic angiography should be conducted when patients show signs of bleeding.

Hemorrhage is an infrequent and severe complication of RFA. Treatment by TAE, as in the present case, may provide an effective emergency strategy for the management of massive abdominal hemorrhage after RFA of the liver.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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