

Life-threatening hemorrhage after liver radiofrequency ablation successfully controlled by transarterial embolization

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Abstract

A 59-year-old man underwent liver radiofrequency ablation under laparotomy for recurrent hepatic carcinoma located in the caudate lobe, however, near-fatal bleeding occurred 1 wk after the operation. The intraoperative ultrasound study during laparotomy revealed left hepatic artery pseudoaneurysm. Suture and packing with ribbon gauze was used to obtain hemostasis. A secondary hemorrhage followed 11 h later and hepatic angiography was performed immediately. Bleeding from the pseudoaneurysm in a branch of the left hepatic artery was found and the artery branch was embolized with coils. Other than slight bile leakage, post-embolization continued satisfactorily. Bleeding did not reoccur. The follow up visit 1 mo later found the pseudoaneurysm disappearing and no tumor recurrence.

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INTRODUCTION

Liver radiofrequency (RF) ablation has been accepted as a safe and useful therapeutic option for treatment of both primary and secondary hepatic neoplasms^[1]. The most common complication is bile leakage which necessitates abdominal drainage in about 3.3% of procedures^[2]. The hemorrhagic complication is very rare, but can be catastrophic, and lead to death^[3]. We encountered a case with massive bleeding following liver RF ablation treatment of a hepatic artery rupture. This report describes our experience in dealing with this type of complication.

CASE REPORT

A 59-year-old man who had received liver RF ablation 11 times previously was admitted to receive further liver RF ablation for treatment of a recurrent hepatic carcinoma. Liver RF ablation was performed in Jan 2011. He had hepatitis B-related liver cirrhosis. Child-Pugh score was class A. Coagulability was within the normal range (international normalized ratio, 1.06). At the time of liver RF ablation, 5 hepatic lesions were found. The α -fetoprotein level was elevated to 133 ng/mL. First we ablated 4 peripheral lesions, and the lesion located in caudate lobe was ablated finally (Figure 1). Liver RF ablation was done under laparotomy. Cool-tip RF electrodes (Radionics, Burlington, MA, United States) were placed in three different sites of the tumor. Then RF energy was applied for 15 min to each site. An abdominal

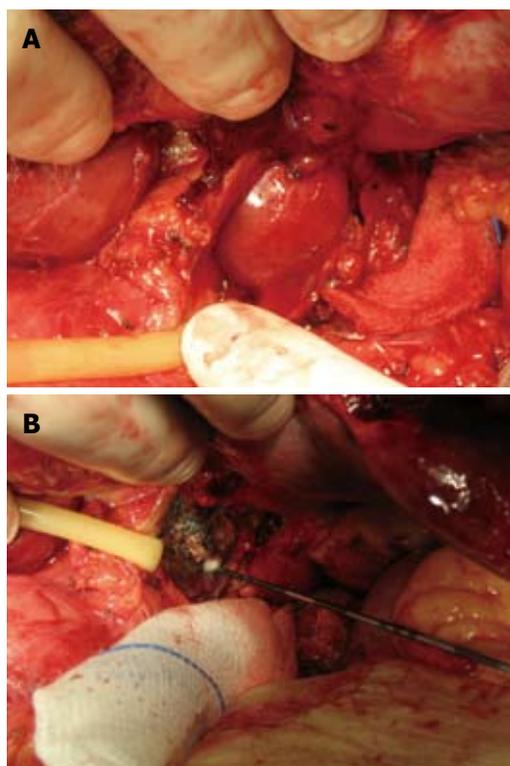


Figure 1 The exposure and radiofrequency ablation of the lesion in the caudate lobe under laparoscopy. A: The tumor found in the caudate lobe. The arrow indicates the lesion; B: The largest tumor in the Caudate lobe measuring 4 cm was treated with radiofrequency (RF) ablation, with RF electrodes were placed at the tumor site.

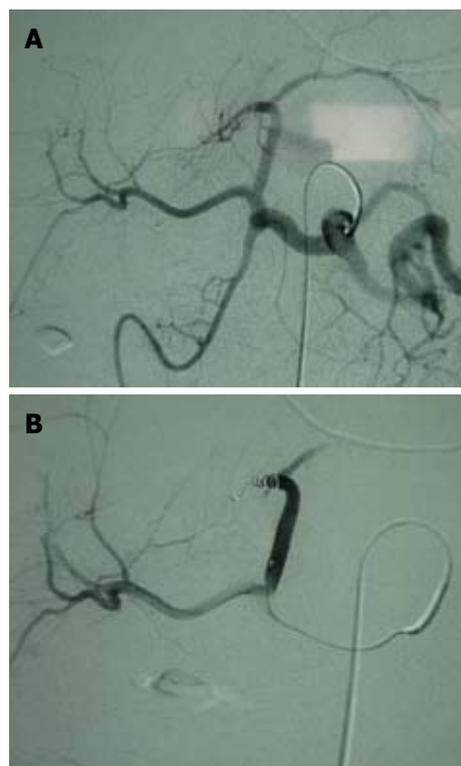


Figure 3 Hepatic angiography before and after coil embolization. A: Hepatic angiography revealed a pseudoaneurysm in the lower left hepatic artery; B: Hepatic angiography immediately after coil embolization. Coils were placed using a 2.1 Fr microcatheter into and proximal to the pseudoaneurysm. The pseudoaneurysm was then excluded.

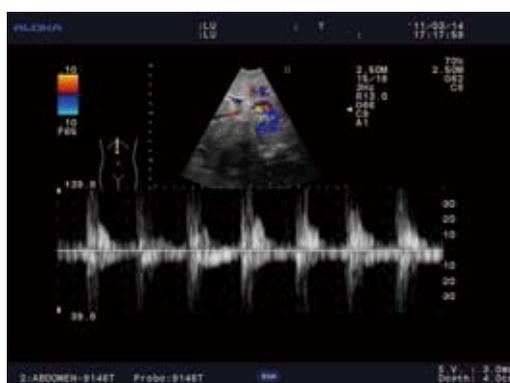


Figure 2 Intraoperative ultrasound study showed a hepatic artery pseudoaneurysm within the hematoma.

tube was placed under the left hepatic lobe. Near-fatal bleeding developed 1 wk after RF ablation.

Vital signs were unstable; the patient presented with acute hemorrhagic shock immediately. The hemoglobin level decreased by 6 g/dL and the patient was transferred immediately to the operating room. Explorative laparotomy was carried out. More than 4000 mL blood was lost in the abdominal cavity, active bleeding from the caudate lobe was identified. A hepatic artery pseudoaneurysm measuring 15 mm maximum in diameter was observed in the hematoma using intra-operative ultrasound (Figure 2). The bleeding site was first sutured

and then packed with ribbon gauze for hemostasis, vital signs returned to normal and the patient was moved to intensive care. Eleven hours later, fresh blood appeared in the abdominal tube, the drainage was more than 100 mL/h, heart rate increased subsequently, the patient was moved to the angiographic suite.

Angiography revealed bleeding from the pseudoaneurysm in a branch of the left hepatic artery (Figure 3A). A microcatheter (2.0 Fr, Progreat; Terumo Corp, Tokyo) was advanced into the pseudoaneurysm through a 5-Fr catheter. Subsequently, five microcoils (Tornado Embolization Microcoils; Cook Medical Inc, Bloomington, IN) were deployed into and proximal to the pseudoaneurysm through the left hepatic artery. Immediately after coil embolization, the pseudoaneurysm was excluded successfully (Figure 3B). Other than a little bile leakage, the patient recovered smoothly after left hepatic arterial embolization. A contrast enhanced computed tomography (CT) study acquired 1 month later revealed that the pseudoaneurysm had disappeared. No tumor enhancement was apparent in the ablated site. The coils used for embolization were visualized (Figure 4). The serum α -fetoprotein level remained within the normal range (6 ng/mL).

DISCUSSION

Liver RF ablation is an effective minimally invasive therapy used to treat primary and secondary hepatic car-



Figure 4 Computed tomography scan acquired 1 mo later. The image revealed that the pseudoaneurysm had disappeared. No tumor enhancement was apparent at the ablated site. The coils used for embolization were visualized.

cinoma^[4-6]. In this case, the enhanced imaging of tumors in CT scan was not obvious, suggesting a poor arterial supply. Therefore, we chose RF ablation as the primary treatment rather than transarterial chemo-embolisation. However, the results described in this case report emphasize that hepatic artery rupture may occur after liver RF ablation especially lesions located in caudate lobe and near the hepatic porta.

Hepatic artery rupture is usually associated with intrahepatic abscess, cholangiolithiasis and penetrating trauma^[7,8]. Hepatic arterial pseudoaneurysm develops after hepatic artery rupture. Hepatic artery pseudoaneurysms caused by RF ablation were reported previously^[9,10]. Hepatic artery pseudoaneurysm arises from the accumulation of blood contained in an aneurismal sac compressed by the liver parenchyma. Rupture of the hepatic artery and subsequent hemorrhage is the cause of death in most patients^[9,10]. This is our first experience of hepatic artery rupture in 840 liver RF sessions (0.12%, 1/840) performed during April 2000-Mar 2011. Direct puncture of the hepatic artery by the RF electrode may cause hepatic artery rupture. The thermal injury caused by RF energy may also cause hepatic artery necrosis. The possibility that delayed hemorrhage may develop after liver RF ablation must be kept in mind^[9].

An intra-operative ultrasound study and hepatic angiography were useful in detecting the hepatic artery pseudoaneurysm^[11,12]. Hepatic angiography is considered the gold standard for diagnosis of hepatic artery injury^[13]. We performed emergency hepatic arterial embolization using coils. Hepatic arterial embolization is now the first choice treatment for hemorrhagic pseudoaneurysms because it entails less morbidity and mortality than occur after surgical intervention^[14,15]. Experience of hepatic vein pseudoaneurysm caused by RF ablation and managed with stent-graft placement was reported recently^[16]. Embolization is reportedly successful in 75% of cases, with a bleeding rate of about 20%.

Laparotomy is an important procedure to control massive bleeding in such an emergent situation. Otherwise there is no opportunity to carry out coil embolization. Due to the severe adhesion of hepatic porta, it is

very difficult to dissect the left hepatic artery. Packing with ribbon gauze for hemostasis is a valuable and safe choice but has only a temporary effect. Coil embolization was identified to be the critical treatment for bleeding caused by hepatic pseudoaneurysm. So packing with ribbon gauze and embolizing the hepatic pseudoaneurysm sequentially through angiography is proven to be the ideal strategy of treating such potentially fatal bleeding.

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