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Case Report

Mycotic pseudoaneurysm of the hepatic artery as a complication of radiofrequency ablation of hepatic metastases ☆☆☆☆

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ABSTRACT

Image-guided radiofrequency ablation is frequently used to treat small hepatocellular carcinoma and metastases. Complications associated with this thermal-based technology for liver cancers arise via direct mechanical injury by the electrodes or collateral thermal damage to surrounding structures. This case report describes an unusual presentation of hepatic arterial mycotic pseudoaneurysm as melaena after percutaneous image-guided radiofrequency ablation for liver metastases in a patient with a previous surgical history of hepaticojejunostomy for cholangiocarcinoma. The patient had a lifesaving procedure to treat the hepatic pseudoaneurysm with transarterial glue embolization.

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Case Report

This case report has followed the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Introduction

Radiofrequency ablation (RFA) is an established image-guided thermal ablation technique to treat small primary and secondary liver cancers when a patient is not suitable for surgical resection, especially if the tumors are inoperable due to their number and distribution [1]. RFA is an effective treatment for small hepatocellular carcinomas <2 cm with similar overall survival rates when compared with surgical resection [2]. Vascular complications of image-guided RFA can be due to direct mechanical injury caused by the electrode or collateral thermal damage during ablation. Arterial hemorrhage, pseudoaneurysm, arteriovenous fistula, hepatic and portal vein thrombosis and hepatic venous infarction have been previously reported [3].

Hemobilia, (bleeding into the biliary tree), is an unusual and frequently occult cause of upper gastrointestinal bleeding. It is usually iatrogenic or traumatic in origin. Hepatic artery aneurysms account for nearly 10% of all cases of hemobilia and are usually due to atherosclerosis, trauma or biliary inflammation in the setting of cholestasis [4]. This case report describes an unusual presentation of hemobilia presenting as melaena, secondary to a mycotic hepatic artery pseudoaneurysm as a result of a complication from image-guided RFA performed on a patient with previous biliary surgery.

Case Presentation

A 53-year-old female with a history of papillary intraductal cholangiocarcinoma had previously undergone right hemihepatectomy with biliary reconstruction using a Roux-en-Y hepaticojejunostomy. A follow-up computed tomography (CT) scan at 5 years demonstrated 2 small slow-growing liver lesions, measuring at 25 mm and 10 mm, respectively, consistent with metastases (Fig. 1a and b). She was subsequently referred for image-guided RFA.

The patient underwent image-guided RFA (Fig. 2a and b). The 25mm lesion was treated with a 4 cm LeVeen needle electrode consisting of 3 overlapping ablations with a total treatment time of 20 minutes 30 seconds. The 10 mm lesion was treated with a 3 cm LeVeen needle electrode involving two overlapping ablations with a total treatment time of 10 minutes 59 seconds. There were no immediate complications, and the patient was discharged home the next day.

The patient was readmitted 11 days post-RFA with melaena and rectal bleeding. An urgent oesophago-gastro-duodenoscopy revealed gastric fundal varices but without stigmata of recent hemorrhage. Despite this, the initial impression was that the varices were the source of bleeding. The bleeding stopped spontaneously. Later, the patient developed sepsis with rigors, fever, and elevated acute phase proteins (CRP 181 mg/L). *Streptococcus viridans* and *Escherichia coli* were isolated in blood cultures. An abdominal CT scan performed at porto-venous (PV) phase showed focal hepatic necrosis with locules of gas at the RFA site, consistent with an abscess formation within the zone of ablation (Fig. 3). She improved steadily after commencement of intravenous antibiotics.

At day-15 post RFA, there was further severe gastrointestinal hemorrhage with melaena and rectal bleeding (hemoglobin level fell to 7.8 g/dL despite 4 units of packed red

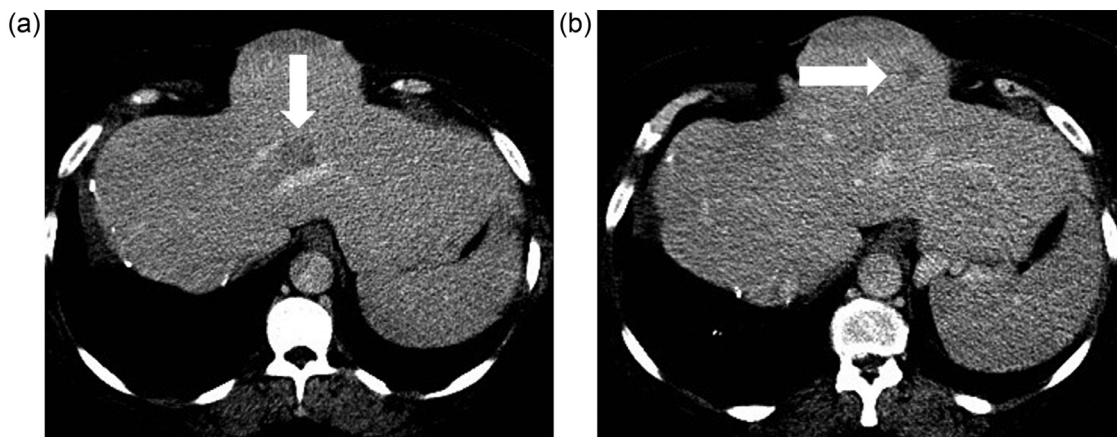


Fig. 1 – Contrast enhanced CT liver demonstrating 2 lesions in (a) central location (vertical white arrow) and (b) superficial location (horizontal white arrow) in keeping with recurrent colorectal metastases. The abdominal morphology of the liver is due to an abdominal wall herniation from previous surgery.

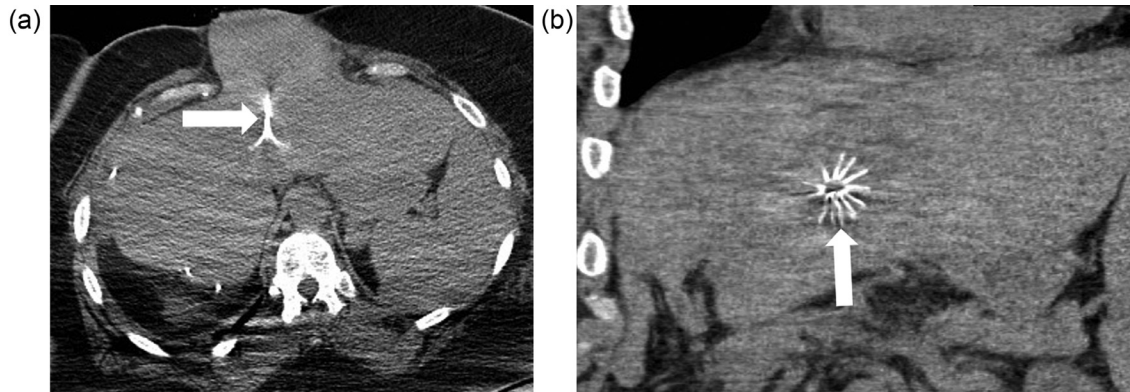


Fig. 2 – Non contrast-enhanced CT with RFA electrode (white arrow) sited in the central metastasis in the (a) axial and (b) coronal section.

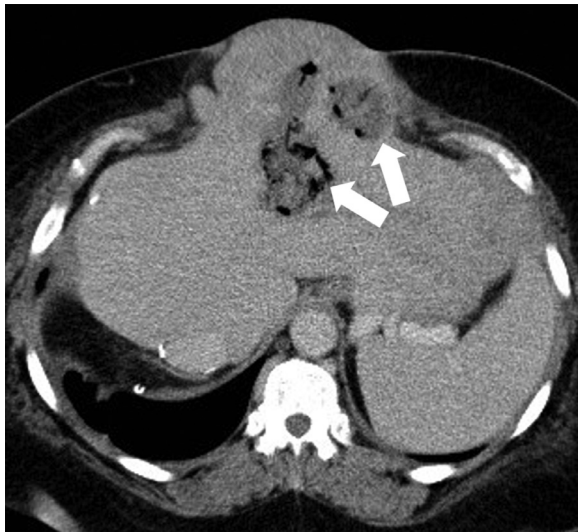


Fig. 3 – Locules of gas (white arrows) shown on the contrast-enhanced CT scan during porto-venous phase 11 days post-RFA, the appearances are suggestive of an abscess formation from infected zone of ablation.

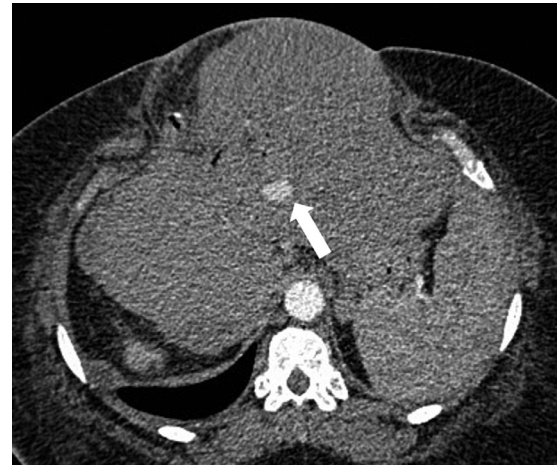


Fig. 4 – Arterial phase contrast-enhanced CT 2-week post-RFA in axial view, demonstrating focal blush at the postero-inferior aspect of the ablated central lesion which is in keeping with a pseudoaneurysm.

cell transfusion). The results of a further oesophago-gastro-duodenoscopy were negative. A CT angiogram during the arterial phase demonstrated a new 20 × 16 mm avidly enhancing lesion adjacent to the abscess, consistent with a mycotic pseudoaneurysm (Fig. 4) causing the clinically observed hemobilia leading to gastrointestinal hemorrhage. The patient underwent immediate catheter angiography. The pseudoaneurysm was seen to fill from small branches of the left hepatic artery. These arteries were super-selectively catheterized and successfully embolized with Glubran cyanoacrylate glue (Fig. 5a and b). Subsequent follow-up imaging confirmed no evidence of residual or recurrent disease in the zone of ablation for a period of 8 years. The patient died recently at 8 years postablation from disseminated malignancy.

Discussion

This case report describes a patient who underwent image-guided RFA of liver metastases and subsequently developed a hepatic abscess in the zone of ablation, resulting in formation of a hepatic mycotic pseudoaneurysm. While hepatic pseudoaneurysms post-RFA have been reported [5–8], none were mycotic. Liver abscesses leading to mycotic hepatic artery pseudoaneurysm have been described in the setting of amoebic abscess [9] and as a result of blunt trauma [10], but not as complication post-RFA. Hepatic pseudoaneurysms are associated with a rupture rate ranging between 44% and 88% [11] and often presents with severe gastrointestinal hemorrhage.

RFA is a minimally invasive technique and is increasingly used in management of hepatic malignancy. Many clinical studies have demonstrated its safety and efficacy [12].

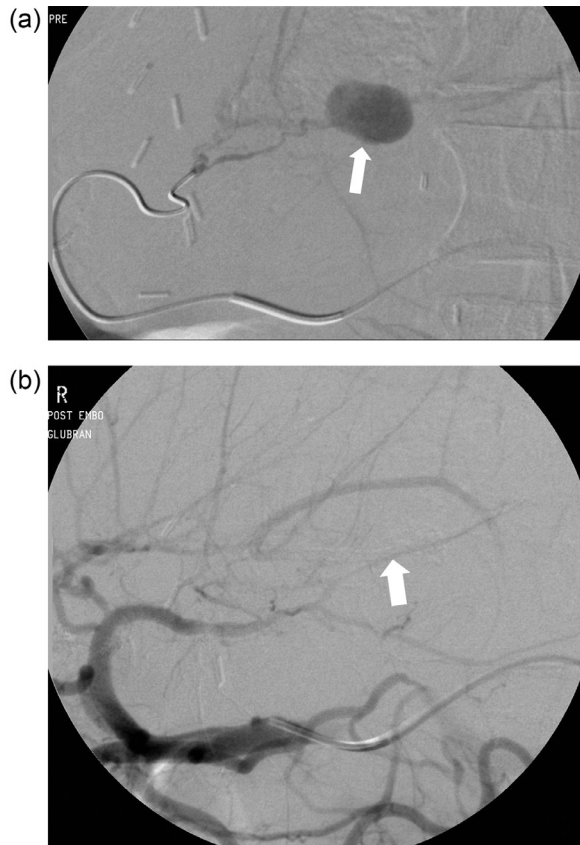


Fig. 5 – (a) Selective hepatic angiography confirming the pseudoaneurysm as shown on CT. (b) successful obliteration of the pseudoaneurysm after glue embolization.

Hepatic RFA is associated with a complication rate of 3.1% [13]. Vascular complications (such as hemobilia [14] and pseudoaneurysms [15]) occur between 0.5% and 1% [16]. Tumor seeding and abscess formation occurs in 0.3%–2% of cases [15–18].

The mechanism of abscess formation after RFA is not fully understood. The patient described in this case report may have been at a higher risk of abscess formation due to a colonized biliary tract as a result of prior bilio-enteric anastomosis. Such anastomoses have been described as a risk factor for bacterial contamination in the postablation necrotic zone [15], possibly leading to an abscess [19]. RFA thermal injury to a colonized biliary tree may contribute to this risk [12].

Pseudoaneurysms are often from iatrogenic trauma as a result of hepatobiliary or vascular surgery [20]. However, the pathogenesis of mycotic aneurysms has not been clearly described. There are 4 proposed causative mechanisms for infective pseudoaneurysm [21], the commonest cause is as a result of intraoperative infection. For the patient described who had a previous hepaticojejunostomy, the hepatic artery may have been damaged by the thermal effect and the zone of ablation may subsequently have become infected by *S. viridans* and *E. coli* from the patient's pre-existing biliary tree colonization.

Prophylactic antibiotic use, while empirically attractive in reducing infective complications [22], does not prevent abscess formations posthepatic RFA [23]. Abscess formation

occurs despite antibiotic use in complex patients with a history of bilio-enteric anastomosis or diabetes mellitus [24]. A high index of clinical suspicion is required after image-guided ablation in patients with known enteric anastomosis, due to the risk of bacterial colonization and seeding into the zone of ablation.

There is an overlap between the signs and symptoms of abscess development and transient fever associated with postablation syndrome. With postablation syndrome, pyrexia is reported to be relatively low grade and self-limiting, usually resolving by 2 weeks [15].

The mycotic pseudoaneurysm was initially not detected at Day-11 CT post RFA because the scan was performed during the PV phase. Triple phase CT is a scanning technique that includes noncontrast enhanced, arterial and PV phases. The arterial phase is crucial for assessing the vasculature surrounding the zone of ablation for a prompt diagnosis of pseudoaneurysm, so that timely and life-saving selective catheter embolization may be performed.

Conclusion

Mycotic hepatic artery pseudoaneurysm formation post-RFA is a rare but potentially life-threatening complication. A high index of clinical suspicion and arterial phase CT is required for this diagnosis in patients presenting with sepsis and occult GI bleeding post-RFA, especially those with a pre-existing bilio-enteric anastomosis. This case highlights the importance of both clinical and imaging findings in effectively managing the potential complications of RFA.

Ethical Approval

No ethical approval was required as the study was not classified as research under the United Kingdom National Health Service Health Research Authority.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

Consent for publication

Consent for publication was obtained for every individual person's data included in the study.

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