



Case Report

Massive hematemesis after radiofrequency ablation of metastatic liver tumor with successful hemostasis achieved through transarterial embolization

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ARTICLE INFO

Keywords:

Radiofrequency ablation
 Gastric cancer
 Liver metastasis
 Hematemesis
 Hepatogastric fistula
 Transarterial embolization

ABSTRACT

Hemorrhagic complications are the most common major complications that occur after radiofrequency ablation, but hematemesis as a complication after radiofrequency ablation for hepatic tumor has not been mentioned before. A hepatogastric fistula as a delayed complication is also rare. We present the case of a 77-year-old man with severe hematemesis that occurred 2 months after radiofrequency ablation of a liver metastasis of gastric cancer. A ruptured hepatic artery pseudoaneurysm and a hepatogastric fistula were confirmed through serial imaging examinations. The current case is reported in combination with 2 rare major complications after radiofrequency ablation of a liver tumor.

1. Introduction

The liver is one of the most common sites of metastasis from gastrointestinal cancer, including gastric cancer. Radiofrequency ablation (RFA) is widely accepted as an effective and alternative treatment of hepatocellular cancer (HCC) and liver metastasis in selected patients. Studies have concluded that RFA is less invasive and can be an alternative treatment for hepatic metastasis from gastric cancer [1], particularly for patients who are not candidates for hepatic resection; it can also provide competitive overall survival and disease-free survival [2].

Among the major complications of RFA, hemorrhagic complications are the most common. Focusing on post-RFA complications, Mulier et al. reviewed the literature on 1432 patients and determined that the most common complication was abdominal hemorrhage, with 24 (1.6%) instances being identified, one of which was fatal [3]. Thermal damage to the gastrointestinal wall—although rare, occurring in less than 1% of cases—can cause perforation. The majority of cases of colonic perforation occurred in patients with a history of prior colonic resection, most of whom had fibrotic adhesions affixing the colon to the liver [4]. However, nearly no RFA-related major complications have been reported in the population of patients who have received gastric surgery [1,2].

Herein, we report the case of a 77-year-old man with subtotal gastrectomy for gastric cancer. Delayed major complications after RFA occurred, including a hepatogastric fistula and hepatic artery rupture, with the presentation of serious hematemesis.

2. Case report

A 77-year-old man had a history of coronary artery disease post percutaneous coronary angioplasty, hypertension, and diabetes mellitus. He was diagnosed gastric adenocarcinoma and underwent radical subtotal gastrectomy in 2007. Regular follow-up abdominal computed tomography (CT) and endoscopic exams showed normal findings. In 2010, follow-up CT revealed a 4.5-cm maximum diameter mass in segment III of the liver (Fig. 1), close to the liver capsule. Liver metastasis of gastric cancer was diagnosed. Multidisciplinary evaluation was performed. Percutaneous image-guided thermal ablation was chosen because his multiple comorbidities were considered as risk factors for anesthesia and surgical interventions. Pretreatment laboratory data revealed a hemoglobin (Hgb) level of 13.5 g/dL, platelet count of 121,000/mL, normal international normalized ratio of 1.06, and prothrombin time of 11.2 s. Real-time ultrasound (US) guidance percutaneous RFA was performed under local anesthesia by using a 17-gauge cooled-tip electrode (Cool-tip; Covidien, Mansfield, MA, USA) with a 3-cm exposed tip. To achieve an optimal safety margin, overlapping ablation was performed in 2 different directions. The left path of the electrode was kept 1 cm away from the liver capsule during ablation to avoid thermal injury to the stomach (Fig. 2a). Radiofrequency energy was applied using the internal program of a generator automatically as 10-minute and 8-minute pulsed energy ablation cycles separately in each direction until echogenic gas bubbles covered the entire tumor (Fig. 2b). At the end of the procedure, the electrode path was cauterized to minimize bleeding and tract seeding and was

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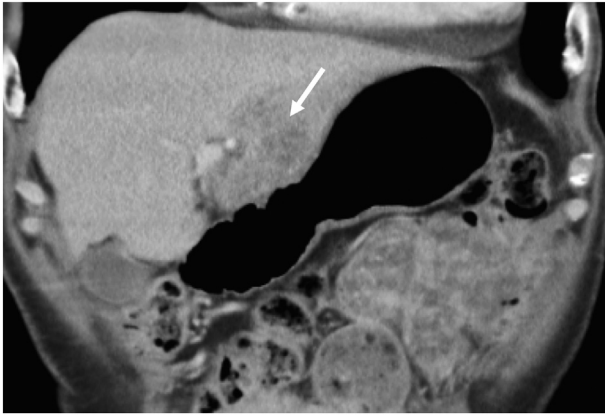


Fig. 1. Coronal image of contrast-enhanced CT demonstrates a 4.5 cm heterogeneous enhancing metastatic mass at segment III of liver (solid arrow), which was close to liver capsule.

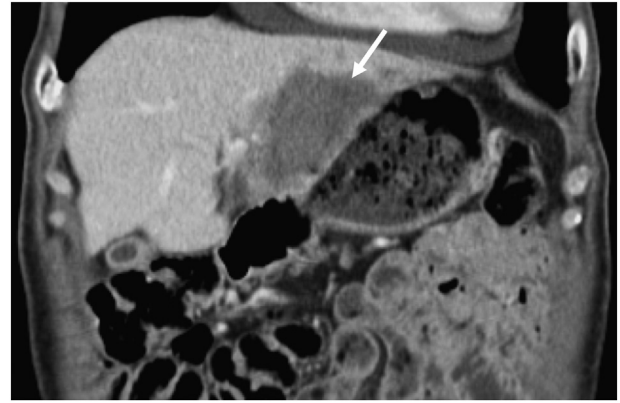


Fig. 3. Coronal image of one month follow-up contrast-enhanced CT revealed a non-enhancing and well-margined ablation zone (solid arrow) with proper coverage of target tumor.

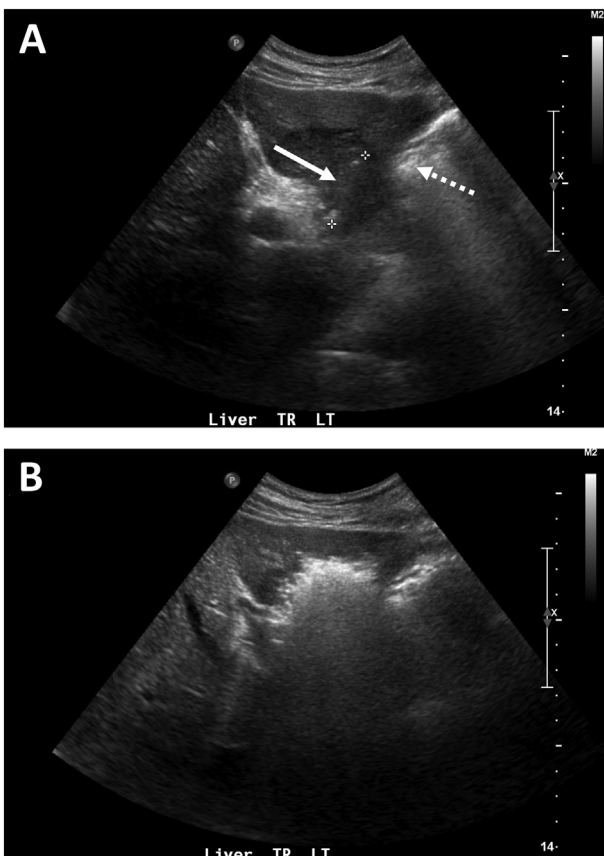


Fig. 2. Images of ultrasound-guided percutaneous RFA showed (a) left path of RF electrode (solid arrow) with 3 cm active tip was placed at least 1 cm away from liver capsule and stomach wall (dotted arrow). After ablation, (b) hyperechoic gas bubbles appeared to cover the tumor.

retracted slowly at a rate of 1 cm/s until the liver capsule. No significant abdominal discomfort was complained about thereafter, and the patient was discharged and followed at an outpatient clinic. One-month follow-up CT revealed an ablation zone with full tumor coverage without abnormal wall thickening of the gastric wall (Fig. 3).

Sixty-four days after ablation, sudden onset of severe hematemesis occurred. The patient was sent to the emergency room where his blood pressure was measured at 75/40 mmHg and laboratory data revealed a normal white blood cell (WBC) count of 7400 WBC/ μ L and Hgb of 10.1 g/dL. Blood transfusion of 3000 mL with fluid resuscitation was

performed. Emergent upper gastrointestinal endoscopy could not identify the source of the bleeding because excessive fresh blood and blood clots were located in the stomach. Subsequently, he underwent emergent transarterial angiography, which revealed a ruptured pseudoaneurysm from the branch of the left hepatic artery with contrast extravasation through a tract into the stomach (Fig. 4a, b). Transarterial embolization (TAE) with N-butyl cyanoacrylate (NBCA) glue was performed and was technically successful (Fig. 4c). A subsequent endoscopy was performed 5 days later, revealing a deep gastric ulcer 1.5 cm in diameter over the anastomosis site (Fig. 5a). Follow-up CT and upper gastrointestinal series in the same admission confirmed the diagnosis of a hepatogastric fistula (Fig. 5b, c). The deep gastric ulcer was considered as the opening of the fistula. After TAE, his vital signs and hemoglobin stabilized, and we commenced high-dose proton pump inhibitor and somatostatin treatment to control the gastric ulcer. He was discharged from the hospital in a stable condition.

3. Discussion

Complications resulting from RFA can be classified into 2 categories: (1) those related to imaging-guided electrode placement and (2) those related to thermal therapy [5]. Vascular injuries, such as bleeding or thrombosis, are usually related to an unintentional electrode path traversing the vessel or a sustained thermal effect. Gastrointestinal wall damage has been described and is mostly caused by nontarget thermal injury. To our knowledge, this is the first reported case of postablative complications—including hepatic artery injury and a hepatogastric fistula with presentation of hematemesis—successfully treated through TAE.

On the basis of postprocedure time of occurrence, complications can be divided into 3 categories: (1) immediate (within 24 h of the procedure), (2) periprocedural (within 30 days of the procedure), and (3) delayed complications [6]. In most cases, vascular complications, such as arterial bleeding, pseudoaneurysm, or an arteriovenous fistula, occur soon after the procedure. Kim et al. reported that 1.2% (62 of 5196) of patients experienced RFA-related bleeding, confirmed immediately or 1 day after follow-up CT. Among them, 25% (15 of 61) had contrast extravasation, representing a direct sign of bleeding in CT, whereas others had indirect signs, including hemoperitoneum, subcapsular hematoma, hemothorax, hematoma adjacent to the electrode, and hemobilia [7]. Thermal damage-related hollow organ perforations are often periprocedural or delayed complications and can potentially be fatal [4]. Because of the greater thickness of the stomach wall, the stomach is considered to be at less risk of damage than the small intestine and colon. Risk factors for gastrointestinal perforation that have been mentioned include prior upper abdominal surgery and a target

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