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Ileal perforation with diaphragmatic injury after radiofrequency ablation for hepatocellular carcinoma

To the Editor,

We read with interest by Zaky et al. (1) on radiofrequency ablation (RFA) of hepatocellular carcinoma which had good results in tumor ablation and patient survival.

An 84-year-old man was diagnosed with hepatocellular carcinoma to have a subcapsular 2.5 cm lesion at segment 5 of his liver on magnetic resonance imaging (MRI) (Figure 1). The patient had alcoholic liver cirrhosis and no history of surgery or trauma during the past 12 months. Because of a superficial location of the tumor, artificial ascites was induced through infusion of 1000 ml of 5% dextrose solution into the peritoneal space. Then, sonographically guided RFA was undertaken by two 15-gauge internally cooled electrodes with a 2.5 cm exposed tip (RF medical Co; Seoul, Korea). He complained of abdominal pain and dyspnea after the procedure. On an immediate computed tomography (CT), the distal ileum was collapsed with multiple mesenteric air pockets, and the ablation zone extended to the diaphragm, which caused a large amount of pleural effusion (Figure 2). Laparotomy in 2 days showed a perforation at the distal ileum and thermal burn of the diaphragm which was adherent to the liver. Ileum resection with an end-to-end anastomosis was performed. A 3 cm ileal perforation was confirmed at pathology (Figure 3). The right pleural effusion was gradually resolved after surgery and the patient was hospitalized over 3 months for spinal stenosis despite recovery.

Although RFA is a minimally invasive technique compared to the surgery, it may injury adjacent organs, such as the stomach, intestine, diaphragm, gallbladder and vessels. The gastrointestinal perforation was more specific to thermal ablation and a frequency of 0.3% in a large series (2). The movable small intestine is known to have very low risk for perforation than the relatively fixed colon (3). Several protective techniques using fluid, gas, or balloon interpositions have been developed to thermally insulate and protect the organs at risk (4). We chose the artificial ascites technique for the better sonographic view and separation of the organs from the tumor which abutted on the liver surface. On an initial CT and MRI scan, the intestine seemed not to be adjacent to the lesion, but the distal ileum after RFA came to be close to the lesion resulting in a perforation. Hence, it is conceivable that the space induced by artificial ascites may allow the ileum to move into the liver capsule.

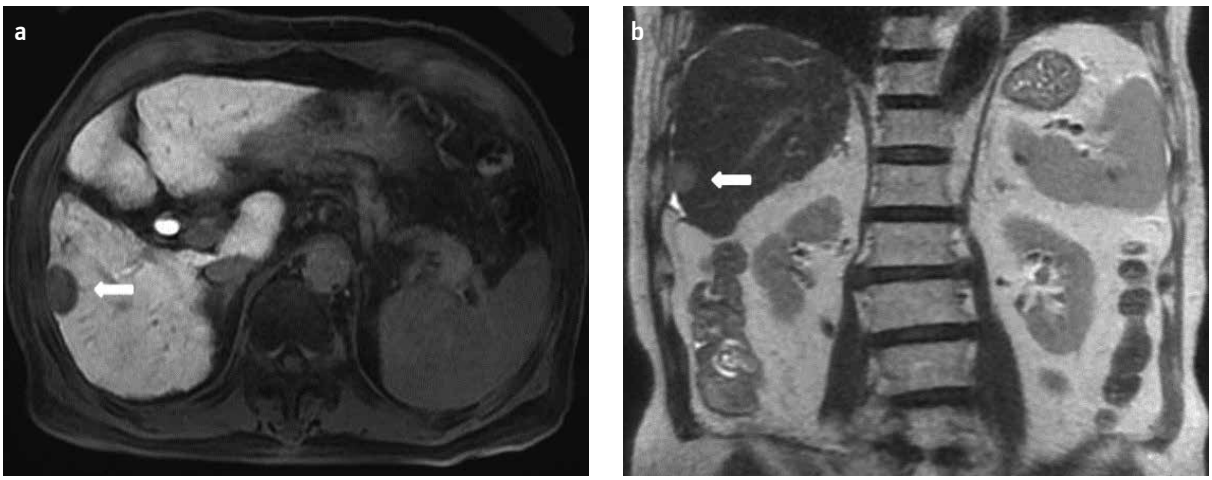

Figure 1. a, b. Axial (a) and coronal (b) MRI images show a subcapsular 2.5 cm tumor at segment 5 of the liver (arrow). The intestine is not shown around the liver capsule close to the tumor.

Figure 2. a, b. Coronal contrast enhanced CT images (a, b) following RFA reveal mesenteric air pockets with collapse of the distal ileum adjacent to the ablated zone (arrow) and a large amount of pleural effusion with right diaphragmatic injury (arrowheads).

Diaphragmatic injury following RFA may be hard to diagnose due to poor accuracy of radiographic images or vague signs. It may be asymptomatic and remained unidentified due to adherence to the liver (5). Since the pressure in the abdomen is higher than that in the chest, diaphragmatic injury following RFA with artificial ascites causes a pleural effusion as shown in our case.

Figure 3. Gross pathological examination reveals a 3 cm defect of the distal ileum on axial section. Scale in centimeters.

In conclusion, although RFA with artificial ascites is a safe and effective therapeutic tool in patients with tumors adjacent to the liver surface and diaphragm, clinicians should be cautious in the possibility of serious thermal complications which may lead to a major surgery.

Jei So Bang, Sung Hoon Kim, Soo Hyun Yang

Division of Gastroenterology, Department of Internal Medicine, Veterans Health Service (VHS) Medical Center, Seoul, Korea

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Address for Correspondence: Jei So Bang
E-mail: livebang@gmail.com
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Authors' reply

Good selection of Hepatocellular Carcinoma cases for Radiofrequency Ablation yield better outcome

Percutaneous ablation is the best treatment option for patients with early stage HCC who are not suitable for resection or transplantation. Currently, radiofrequency ablation should be the first choice for local ablation (1). Percutaneous RFA is a minimally invasive, repeatable procedure with few complications.

Randomized controlled trials showed that RFA is superior to ethanol injection in the treatment of small HCCs (2). However central tumors close to the hepatic hilum were reported to be unsuitable for percutaneous radiofrequency ablation (RFA) because of the risk of injuring adjacent bile ducts (3). Moreover, peripheral tumors adjacent to extrahepatic organs (subcapsular location) were also suggested to be unsuitable because of the risk of heat injuries, such as intestinal perforation and pleural effusion and should not be treated with RFA (4,5).

In our study we performed RFA for early stage HCC with the following criteria a. performance status 0, 1; b- Child–Pugh grade A, B; c- ≤3 HCC and each HCC not exceeding 4 cm in diameter; and d- The HCC is not near the major vessels, biliary radicles, gall bladder, and surface.

We had good results in tumor ablation and patient survival with no complications.

Good selection of HCC cases for RFA will result in better outcome with no or minimal complications.

Saad Zaky[1], Nahed A. Makhlouf[1], Mohamed O. Abdel-Malek[1], Ahmed A. Bakheet[1], Hany M. A. Seif[2], Hesham M. Hamza[3], Abeer M. M. Sabry[4]

[1]Department of Tropical Medicine and Gastroenterology, Assiut University School of Medicine, Assiut, Egypt
[2]Department of Radiology, Assiut University School of Medicine, Assiut, Egypt
[3]Department of Oncology Surgery, Assiut University South Egypt Cancer Institute, Assiut, Egypt
[4]Department of Internal Medicine, Assiut University School of Medicine, Assiut, Egypt

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