



Gastric Perforation After Microwave Ablation to Adjacent Hepatocellular Lesion

Kassem Sharif, MD^{1,2,3}, Adi Lahat, MD^{1,3}, Idan Levy, MD^{1,3}, and Shomron Ben Horin, MD^{1,3}

¹Department of Gastroenterology, Sheba Medical Center, Ramat Gan, Israel

²Internal Medicine B, Sheba Medical Centre, Ramat Gan, Israel

³Sackler Faculty of Medicine, Tel-Aviv University, Tel-Aviv, Israel

ABSTRACT

Locoregional treatment modalities for hepatocellular carcinoma are generally effective and safe and benefit the subset of patients who are not eligible for surgery or have marginal hepatic function. This case report discusses a 77-year-old patient with cirrhosis who underwent microwave lesion ablation for 3 hepatocellular carcinoma nodules. On the 12th day after ablation, the patient was diagnosed with a perforation of the anterior wall of the stomach near one of the target ablation sites on the left side of the liver. The patient underwent surgical therapy with clinical improvement. This report highlights the potential risks associated with microwave ablation for hepatocellular carcinoma.

KEYWORDS: hepatocellular carcinoma; microwave ablation; complication; perforation

INTRODUCTION

Hepatocellular carcinoma (HCC) is the predominant primary malignant neoplasm of the liver accounting for over 90% of the cases. HCC usually develops on a background of cirrhosis in 85% of the cases.¹ HCC is more prevalent among male patients and is a leading cause of cancer-related death worldwide.^{2,3}

The prognosis of HCC varies depending on the stage of the disease at the time of diagnosis. The Barcelona Clinic Liver Cancer takes into account tumor extent and severity of the underlying disease and defines 5 prognostic subgroups with respective treatments.⁴ Generally, early-stage tumors are treated with curative intent and options include hepatic resection, liver transplantation, and ablation, whereas patients with intermediate or advanced disease are treated with chemoembolization or systemic therapies, respectively.⁴

Locoregional treatment modalities benefit the subset of patients who are not eligible for surgery or have marginal hepatic function.⁵ The choice of procedure is individualized, with local thermal ablation being preferred in patients with relatively few small tumors, whereas arterially directed therapies (transarterial chemoembolization and radioembolization) and external beam radiation therapy are used for tumors confined to the liver but not amenable to local ablation.⁶ Microwave ablation involves applying a high-frequency electromagnetic energy to the target lesion resulting in cytotoxic damage to the tissue. Such a technique is considered safe and well-tolerated with a low rate of complications.⁷ Theoretically, the application of high thermal injury could result in complications in neighboring tissues. We describe a case of gastric perforation after microwave ablation of an HCC nodule.

CASE REPORT

A 77-year-old patient with cirrhosis secondary to nonalcoholic fatty liver disease was referred to the hepatology service because of abdominal discomfort. A computed tomography (CT) scan showed a solitary lesion measuring 4 cm between segments 5 and 6 of the liver, which was consistent with HCC based on radiographic findings. The patient underwent an open surgery aimed at curative resection of the lesion. The patient did not have any other previous surgeries, and at the time of the

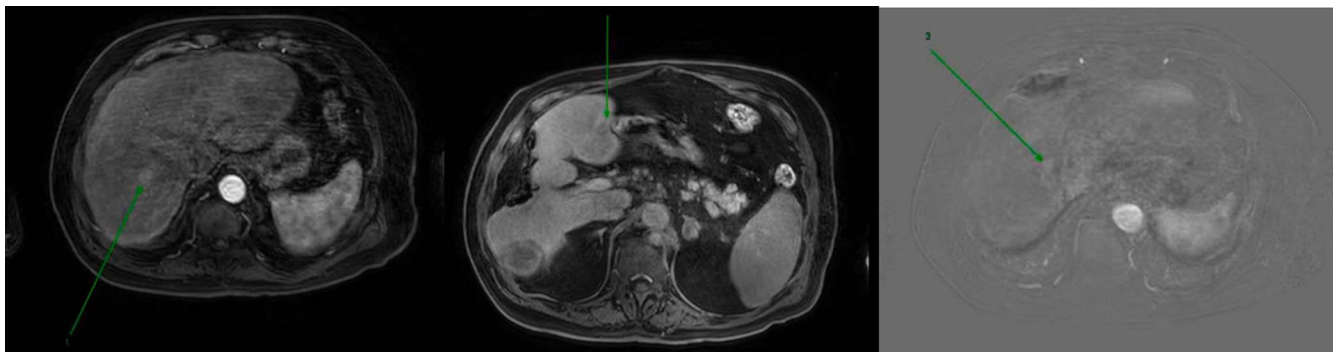


Figure 1. MRI 1 month before ablation. Arrows point to 3 different lesions in the liver, with the middle lesions being adjacent to the stomach. MRI, magnetic resonance imaging.

first surgery, no adhesions were noted. After the intervention, the patient was closely monitored using magnetic resonance imaging (MRI) and alpha-fetoprotein as part of a rigorous surveillance protocol. Two years after surgery, a liver MRI scan revealed recurrence of the HCC measuring 17 mm at the resection site, which was treated using microwave lesion ablation, and no residual disease was detected on subsequent MRI.

During a recent follow-up liver MRI, 3 lesions were detected in segment VII, measuring 13 mm in diameter, a hepatic dome lesion in segment VIII measuring 12 mm, and another lesion in segment IV B measuring 10 mm in diameter (Figure 1). It was determined that ablation was the appropriate treatment approach. Using CT guidance, microwave ablation was performed on all 3 lesions using Emprint HD. Each lesion was ablated for 5 minutes at a power of 150 W, according to the standard protocol. The patient experienced an uneventful intraoperative and postoperative course, and a CT scan performed at the conclusion of the procedure confirmed satisfactory ablation of all 3 lesions.

On the fifth day after the ablation procedure, the patient experienced a fever of 38.5°C but did not report any abdominal

pain or other symptoms. The patient's abdomen was not tender during physical examination. Laboratory tests indicated a high white blood cell count of 13.96 k/mL, with 75.0% neutrophils, and an elevated C-reactive protein level of 183 mg/L (normal level is between 0 and 5). The patient's hemoglobin level remained similar to baseline at 13.23 g/dL. An abdominal CT scan showed a 6 cm hyperdense lesion near the liver dome, which was consistent with a hematoma, and fat stranding adjacent to the stomach, which was expected after the nearby lesion was ablated (Figure 2). The patient was treated with antibiotics for a possibly infected hematoma not amenable to drainage, which resulted in an improvement in fever and laboratory test results. However, on the 12th day, the patient was readmitted because of a recrudescence of fever and unsatisfactory decrease in inflammatory markers. During the patient's readmission, a report of having dark, tarry stools was made, and as a result, a gastroscopy was performed (Figure 3). The gastroscopy did not reveal any recent signs of bleeding but did show a large defect of at least 3 cm in the anterior wall of the stomach that seemed to be communicating with the peritoneal cavity. An adjacent ulcer with an 8 mm fibrotic base was also noted. A CT scan was then performed, which revealed a sealed perforation of the anterior wall of the stomach near one of the target ablation sites (segment IVB) on the left side of the liver

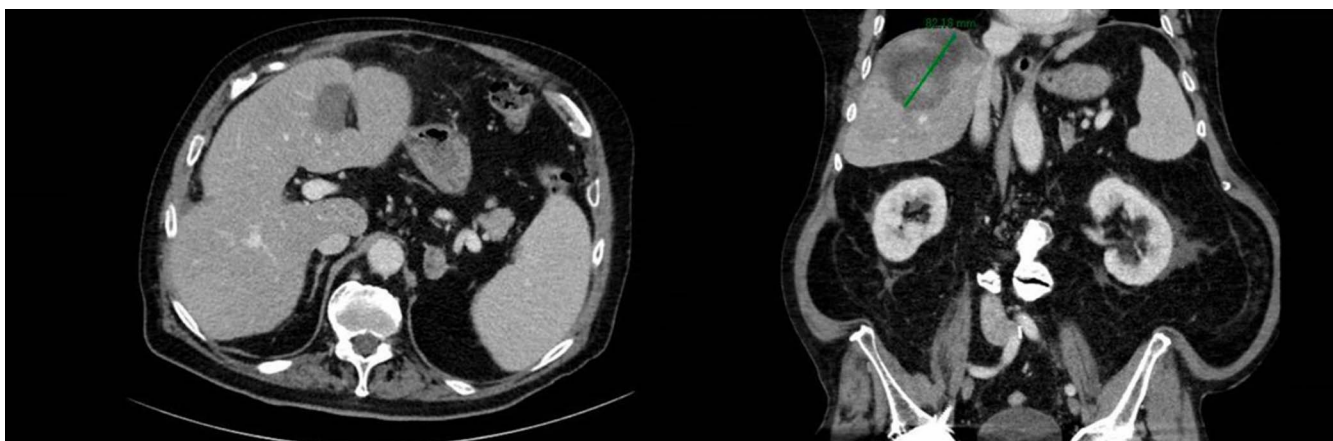


Figure 2. A computed tomography scan 5 days after the ablation showing a 6 cm hematoma.

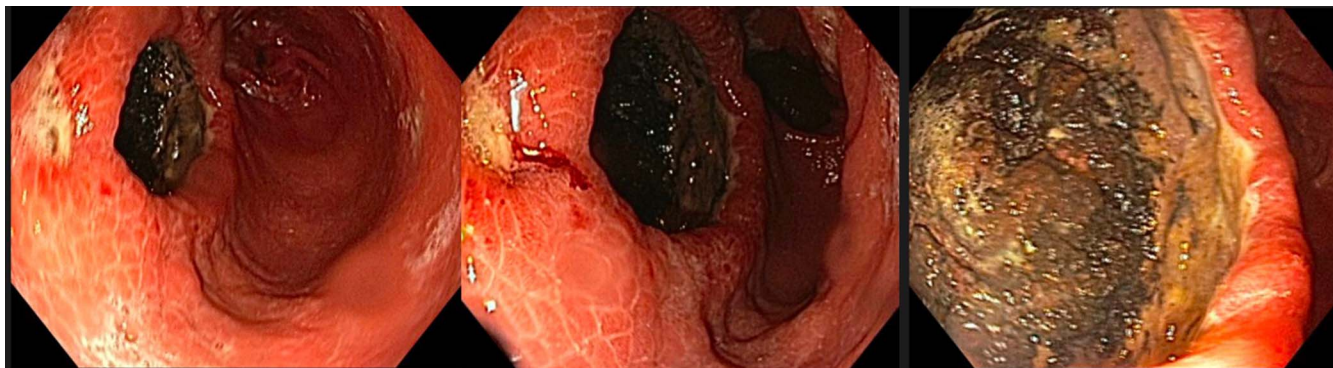


Figure 3. Gastroscopy performed 12 days after ablation showing perforation in the anterior wall of the stomach.

(Figure 4). The patient underwent distal gastrectomy and Roux-en-Y bypass with slow improvement till discharge.

DISCUSSION

For patients who are not eligible for surgery, locoregional treatments can offer potentially curative options.⁸ Microwave ablation uses electromagnetic energy to create a homogeneous heating of the tissue, leading to coagulation necrosis. However, the higher thermal efficacy of microwave ablation may also result in injury to adjacent critical tissues.⁹

Microwave ablation is generally considered a safe procedure. A retrospective study involving 1,136 patients who underwent microwave ablation for malignant liver tumors reported 2 deaths unrelated to the procedure. Major complications occurred in 30 patients, including 5 cases of liver abscess and empyema, 2 cases of bile duct injury, 2 cases of colon perforation, 5 cases of tumor seeding, 12 cases of pleural effusion, 1 case of hemorrhage requiring arterial embolization, and 3 cases of skin burn requiring resection.⁷ In the cases of colon perforation, both occurred in patients who had undergone a partial right hepatectomy before ablation. The lesions were located in the right lobe and had caused a slight budding of the capsule, with the target lesions being 6–8 mm away from the colon at preoperative

ultrasound. Surgical repair was performed, which showed fibrotic adhesions that affixed the colon to the liver.⁷

On reviewing the literature, only one case of gastric perforation was reported in a patient who underwent microwave ablation for HCC. In this case, a 1.2 cm defect was found in the gastric antrum near the necrotic ablation area in segment III. Owing to the absence of intraperitoneal gas or liquid and peritonitis, the patient was managed conservatively and had excellent clinical and radiographic outcomes.¹⁰

It is evident that microwave ablation has brought about a shift in the paradigm of HCC management. The decision to use ablation therapy is typically individualized based on efficacy factors such as tumor size, patient health status, remaining liver function, and portal hypertension. However, to ensure safety, it may be necessary to consider additional factors, especially when dealing with lesions in proximity and adjacent to vital organs. Additional investigation is necessary to determine whether safety outcomes vary when considering the location of the target lesion.

DISCLOSURES

Author contributions: K. Sharif and A. Lahat: initial manuscript writing, conceptualization. I. Levy and SB Horin: supervision and draft finalization. K. Sharif is the article guarantor.

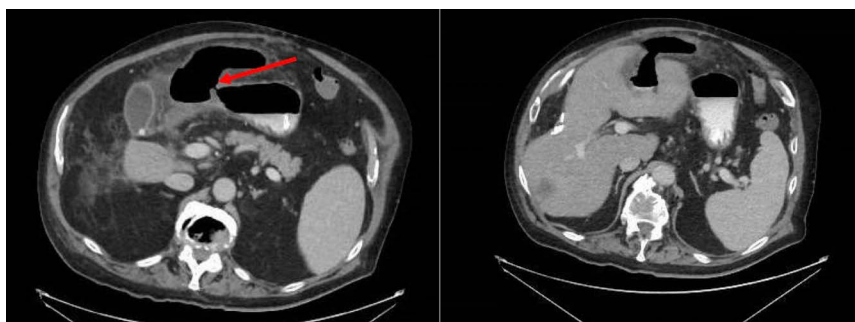


Figure 4. A CT scan 12 days after ablation showing free communication between the stomach and the peritoneum forming a sealed perforation; the arrow points toward the free perforation between the liver and the stomach. CT, computed tomography.

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