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CASE REPORT

Transarterial Embolization and Thermal Ablation for Hepatocellular Carcinoma

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A 61-year-old man with an otherwise unremarkable medical history presented to orthopedic surgery for chronic left shoulder pain, sequelae of a remote left shoulder trauma from a fall. He was planned for left shoulder arthroplasty. Routine preoperative clearance workup revealed incidental thrombocytopenia (platelet count was 47,000/µL). Due to this finding, the planned left shoulder surgery was deferred pending a comprehensive workup for the etiology of the isolated thrombocytopenia.

Further workup revealed an aspartate aminotransferase level of 53 U/L (normal range, 0–39 U/L), a normal alanine aminotransferase of 40 U/L, alkaline phosphatase level of 90 U/L, total bilirubin level of 1.3 mg/dL, negative hepatitis serology, normal renal function, alpha-fetoprotein level of 8.9 µg/L, carcinoembryonic antigen of 7.4 µg/L, and a mildly elevated iron panel. CT imaging of the abdomen demonstrated splenomegaly with perisplenic and gastroesophageal varices. Multiple liver lesions were also found on CT.

A follow-up MRI of the abdomen confirmed a 4.9-cm segment 6 mass classified as LR-M, a 2.3-cm segment 6 LI-RADS 5 lesion, and a 2-cm segment 8 LI-RADS 3 lesion. The MRI also confirmed the previous CT findings of splenomegaly with perisplenic and gastroesophageal varices. The patient had no family history of liver disease. Social history was significant for alcohol use.

Due to the LR-M classification of the dominant segment 6 mass, he underwent a percutaneous CT-guided liver biopsy that histologically confirmed a well-differentiated hepatocellular carcinoma (HCC) (Figure 1).

The patient's working diagnosis was multifocal HCC in the setting of Child-Pugh class A cirrhosis with a MELD score of 9. Preliminary assessment was intermediate ([BCLC] Barcelona Clinic Liver Cancer stage B) HCC. He was active, working, and fully functional ([ECOG] Eastern Cooperative Oncology Group 0).

The multidisciplinary liver tumor board consensus was a recommendation for locoregional therapy, with the goal of tumor destruction to prevent disease progression with the potential for downstaging and consideration of liver transplant in the future. The options of bland embolization, chemoembolization, and radioembolization combined with thermal ablation were discussed with the patient, and he agreed with the recommendation for transarterial bland embolization (TAE) followed by microwave ablation of the segment 6 and segment 8 lesions.

PROCEDURE

The patient's procedure was essentially uncomplicated with standard left radial access technique after a Barbeau test per protocol. A 5-F, 125-cm radial artery catheter was used to select the celiac trunk (Figure 2). After the celiac axis was selected, a 3-F Renegade® HI-FLO™ Microcatheter (Boston Scientific Corporation) was advanced into the right hepatic artery and on to the target lesions in segment 6 (Figure 3). The arteries were embolized to occlusion with a mix of ethiodol (to facilitate ablation targeting) and 100-µm Embozene™ Microspheres (Boston Scientific Corporation) (Figure 4).

The patient returned 1 month later for the planned thermal ablation of the aforementioned tumors. This procedure was performed under general anesthesia using CT fluoroscopy and 3D-reconstructed images for an oblique approach for the LeVeen CoAccess™ Electrode System (Boston Scientific Corporation) (Figure 5).

Follow-up MRI 6 months after ablation categorized the treated lesions as LR-TR nonviable

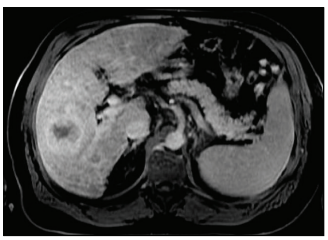

Figure 1. CT-guided liver biopsy confirmed the diagnosis of HCC.

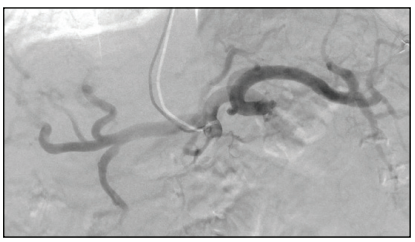

Figure 2. A 5-F, 125-cm radial artery catheter was used to select the celiac trunk.

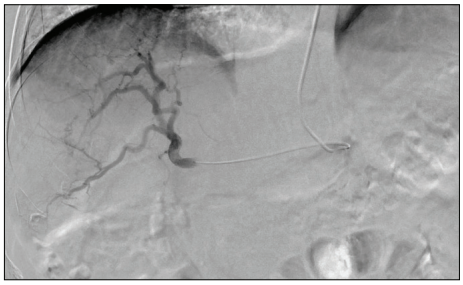

Figure 3. Right hepatic arteriogram through a 3-F Renegade® HI-FLO™ Microcatheter placed coaxially.

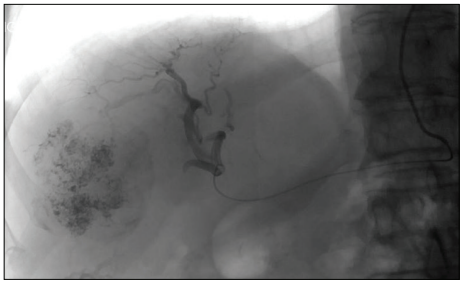

Figure 4. Right hepatic arteriogram performed after selective catheterization and embolization of the lower right lobe segmental arteries.

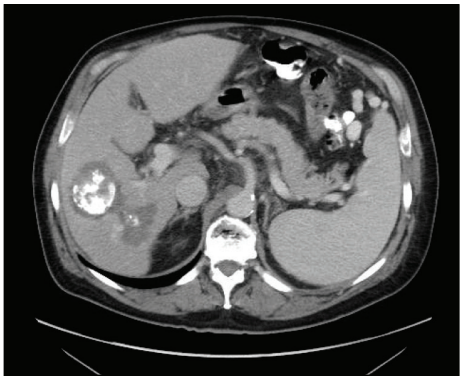

Figure 5. Contrast-enhanced CT after ablation of the right lobe lesions with the LeVeen CoAccess™ Electrode System. Residual ethiodol remained in the tumors.

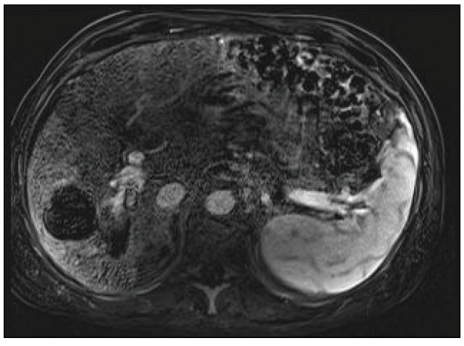

Figure 6. Follow-up MRI at 6 months showed no enhancement of the treated lesions.

(treated, probably or definitely not viable), consistent with successful treatment of multifocal HCC by combination of bland TAE and thermal ablation (Figure 6). At 1-year follow-up, with no new findings, the patient was considered downstaged and is currently listed for transplant.

DISCUSSION

The indications for TAE in this presented patient's case were unresectable HCC outside the Milan criteria for liver transplant with intermediate BCLC stage B disease and the possibility of downstaging to resection or transplant criteria. With a fully functional performance status and no evidence of hematologic dysfunction, encephalopathy, or other clinical findings suggesting poorly compensated advanced liver dysfunction, the patient was an excellent candidate for TAE.

HCC is a significant cause of morbidity and mortality in patients with liver cirrhosis. Transarterial chemoembolization (TACE) is currently recommended as the standard of care in patients with unresectable HCC by the National Comprehensive Cancer Network and the American Association for the Study of Liver Diseases.[1] Both TACE and bland TAE without the delivery of chemotherapeutic agents are based on hepatic physiology and anatomy. Although the hepatic parenchyma receives most of its blood supply from the portal vein, neoplastic hepatocytes receive their blood supply principally from the hepatic artery due to tumor-associated angiogenesis and neovascularity. Therefore, the embolization of the hepatic artery branches preferentially impacts tumor cells over normal hepatocytes. Randomized controlled trials have demonstrated the superiority of TACE over best supportive care and the equivalence of bland embolization with TACE.[2,3] The combination of ablation with embolization appears to extend the efficacy of ablation for larger (> 3 cm) tumors.[4] ■

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