Radiofrequency Ablation Combined with Percutaneous Ethanol Injection in the Treatment of Hepatocellular Carcinoma and Portal Vein Neoplastic Thrombosis

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Abstract. In the last ten years new techniques, such as percutaneous ethanol injection (PEI) and radiofrequency ablation (RFA), have been developed for the treatment of hepatocellular carcinoma (HCC). Portal vein involvement is a complication of HCC and the role of surgical resection for HCC with tumor thrombi in the portal veins is controversial. Here we present the case of a 58-year-old man, with Child's class A cirrhosis and a focal lesion of HCC with thrombosis of the segmental portal branch extending into the right portal vein. We treated the nodule with RFA and the portal tumor thrombosis with ethanol injection. Twenty-two months after the combined treatment, an enhanced spiral CT scan showed complete necrosis of the nodule and color/power Doppler ultrasound demonstrated the complete patency of the right portal vein.

Until recently surgical therapy offered the only chance for long-term cure of patients with hepatocellular carcinoma (HCC). In the last ten years new techniques, such as percutaneous ethanol injection (PEI) and radio frequency ablation (RFA), have been developed for the treatment of HCC. These procedures are as effective as surgery for tumors up to 3 cm in diameter though both less invasive and less expensive. Portal vein involvement is a major complication of HCC and has an important impact on management and prognosis. The role of surgical resection for HCC with tumor thrombi in the major vasculature is controversial. Non-surgical treatments have been demonstrated to be an effective choice.

We present the case of a patient with a focal lesion of HCC and portal vein tumor thrombi who we treated with RFA combined with PEI of the malignant thrombosis.

Case Report

A 58-year-old man, with Child's class A alcoholic cirrhosis, presented at our hospital with a single 46-mm lesion of the right lobe of the liver and thrombosis of the segmental portal branch extending into the right portal vein (Figures 1 and 2). An enhanced spiral CT scan study of this lesion showed characteristic findings of HCC and histological confirmation was obtained by ultrasound-guided fine-needle aspiration biopsy of both the nodule and the portal vein thrombosis. We treated the nodule with RFA and the portal tumor thrombosis with ethanol injection. Both procedures were performed under real-time ultrasound guidance. The RFA was carried out during general anesthesia. An 18-gauge cooled needle electrode with a 3-cm-long exposed metallic tip was placed into the lesion. The electrode was connected to a 500 kHz radiofrequency generator (Radionics, Burlington, Mass, USA). Complete treatment of the lesion required three distinct insertions of the needle, one at the centre and one each at the two extremities of the nodule.

Percutaneous ethanol injection was performed in the outpatient department without the patient requiring sedatives or local anesthesia. During each session 3-4.5 ml of sterile 95% ethyl alcohol was injected into the lesion with a 20-cm-long, 21-gauge needle with a closed conical tip and three terminal side holes (PEIT needle). The total amount of ethanol delivered into the nodule was 19 ml.

A contrast enhanced spiral abdominal CT performed two months after RFA showed complete necrosis of the V...
segment lesion. Twenty-two months after the combined treatment an enhanced spiral CT scan confirmed the complete necrosis of the nodule (Figure 3) and color/power Doppler ultrasound demonstrated the complete patency of the right portal veins (Figure 4).

Discussion

Until recently surgical resection and liver transplantation have been considered the only curative treatments for HCC. However, surgical resection of HCC is feasible in only a minority of cirrhotic patients because of poor hepatic reserve or major vascular invasion. Candidates for partial hepatectomy should have a well compensated cirrhotic disease (Child’s stage A), normal portal pressure and normal serum bilirubin. For patients not meeting these criteria orthotopic liver transplantation (OLT) should be considered only when there is a solitary lesion smaller than 5 cm in diameter, or fewer than three lesions smaller than 3 cm (1), but the role of OLT is very limited by the small number of organs available. Inoperable patients may be candidates for ablative procedures, such as microwave coagulation, hepatic arterial chemoembolization, cryoablation, PEI and RFA. These procedures can achieve local control of the tumor minimizing the loss of functioning hepatic tissue.

PEI and RFA have become the two most widely used modalities for patients with non-resectable HCC. When PEI and RFA are used for treating small tumors (< 3 cm), the survival rates can be similar to those achieved by partial hepatectomy (2-5). RFA is as effective as PEI in the treatment of small HCC, but RFA achieves complete tumor necrosis with fewer treatment sessions than does PEI (6-9). When used for the treatment of medium (3.1-5.0 cm) and large (5.1-9.5 cm) neoplastic lesions, RFA obtains complete necrosis in
47.6% of patients (10). Portal vein involvement is a major complication of HCC and has an important impact on management and prognosis. The role of surgical resection for HCC with tumor thrombi in the major vasculature is controversial because of a high operative risk and poor prognosis. Hepatectomy with tumor thrombectomy is justified in selected patients who have a relatively small primary tumor, good hepatic functional reserves and no distal metastases. In this setting, the extended surgical treatments improve the quality of life and prolong the patient’s survival (11-13).

Other non-surgical treatments have been tried. Interesting results have been achieved with segmental chemoembolization (TACE) alone or combined with transportal ethanol injection; in selected patients, the combined treatment resulted in a survival rate of 51% at 6 years (14,15).

In one case reported in the literature, a patient with HCC and portal vein thrombi was treated with a Wallstent placed in the portal vein and with chemoembolization, rendering the main portal vein patent for 6 months after treatment (16). In another report, PEI and TACE were used to treat postoperative residual HCC with malignant portal vein thrombosis; there was no evidence of tumor recurrence after 18 months of follow-up (17). The use of PEI in the treatment of portal vein tumor involvement by hepatocellular carcinoma was first described by Livraghi in 1990 (18). The case we report showed that PEI into malignant portal vein thrombosis is effective and without side-effects. The distribution of the alcohol within the thrombus is clearly visible by real time ultrasonography, allowing areas not infiltrated to be identified and targeted for needle insertion in subsequent sessions. Considering the size of the neoplastic nodule, we felt that this was better treated with RFA since this technique is more effective than PEI and requires fewer administration sessions.

Given that both PEI and RFA are well tolerated and the treatments can be repeated, we believe that they should be considered in combination for patients who are not candidates for surgery.

References