Hepatocellular carcinoma: Combined treatment with TACE and RF ablation of the primary lesion and satellite nodule
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Patient: 80 years, male

Clinical History:
An 80-year-old male presented with HCV-related cirrhosis, hepatomegaly, mild anorexia and weight loss. The laboratory tests revealed a mild elevation of transaminases, GGT, and LDH, a normal bilirubin, and elevated alphafetoprotein levels (370 ng/ml).

Imaging Findings:
A patient with a 15-year history of HCV-related cirrhosis presented to our hospital with hepatomegaly, mild anorexia and weight loss. The laboratory tests revealed a mild elevation of transaminases, GGT, and LDH, a normal bilirubin, and elevated alphafetoprotein levels (370 ng/ml). An ultrasonography of the liver showed a large (30 x 34 mm) hyperechoic nodule within segment VIII of the liver. A multislice helical CT procedures confirmed the presence of a hypervascular nodule in segment VIII and revealed a smaller (8 mm in diameter) satellite nodule adjacent to the main lesion. The CT findings were consistent with hepatocellular carcinoma (HCC). The lesion was poorly margined and there was no evidence of a pseudocapsule in the portal venous phase, therefore the lesion was considered to be an initial form of an infiltrating HCC. Considering the characteristics and localization of the tumors, the patient was scheduled for a radiofrequency ablation (RFA) combined with transcatheter arterial chemoembolization (TACE), in order to treat both nodules. In addition, to obtain a larger area of tumor necrosis in the main nodule, we decided to use the balloon-occluded RFA technique (occlusion of the hepatic artery inflow during RFA).

Discussion:
Before the treatment, a common hepatic arteriography was performed. An 8 mm occlusion balloon catheter was inserted in the proper hepatic artery and left uninflated. The main hepatic nodule was punctured under US guidance and a multiple-hook RF electrode (RITA) was placed within the lesion. Heparin (5000 IU) was administered within the hepatic artery to prevent thrombosis and the arterial flow was stopped by inflating the occlusion balloon catheter. During interruption of the hepatic flow, the RF generator was activated for 20 min and a temperature of 90–100 °C was reached at the different temperature monitored hooks. After the RFA treatment, arteriography was performed
again to evaluate the effect of the procedure and demonstrated some residual peripheral vascularization. Superselective catheterization of the artery feeding the main lesion was then performed with a 3-F microcatheter and the subsegment carrying both nodules was embolized with a mixture of 7 ml of iodized oil (Lipiodol Ultra-Fluid) and 35 mg of epirubicin hydrochloride (Farmorubicin) followed by an injection of gelatin sponge particles. A control hepatic arteriography showed the absence of any residual vascularization in both the lesions. The patient was discharged after four days, after an uneventful clinical course. A multislice CT scan performed after five days demonstrated adequate embolization of the nodule and satellite lesions. Follow-up CT studies performed at 12 months confirmed the presence of an area of coagulation necrosis surrounded by areas embolized by Lipiodol; there was no evidence of recurrent tumor tissue neither in the main lesion nor in the satellite nodules. RFA ablation of HCC allows to achieve complete tumor necrosis in tumors smaller than 3 cm in approximately 90% of cases. In tumors larger than 3 cm, the rate of complete necrosis decreases to approximately 71% of cases; in addition, complete necrosis is obtained more often in capsulated tumors than in infiltrating type lesions. Some authors advocate the use of balloon occlusion during RFA or TACE after the RFA procedure, in order to increase the size of the coagulation necrosis and to achieve complete treatment in larger lesions. This approach is supported also by studies performed on animal models. For this reason, we decided to use balloon occluded RF+TACE in the main nodule of our patient. In addition, satellite nodules are left untreated in case of a simple RF, and for this reason we decided to use TACE after RF in order to treat all visible and non-visible satellites in this particular patient. In conclusion, RFA combined with TACE and arterial occlusion seems useful in the management of a large HCC presenting with satellite nodules.

**Differential Diagnosis List:** HCC nodules.

**Final Diagnosis:** HCC nodules.

**References:**

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Figure 1

Description: An ultrasonogram of the liver showing a large (30 x 34 mm), sharply delineated, hyperechoic nodule within segment VIII of the liver. Origin:
Figure 2

Description: A late arterial-phase enhanced CT image showing two nodular HCCs in segment VIII.
Origin:
Description: An image obtained with arteriography of the common hepatic artery confirming a hypervascular lesion near the dome of the liver. Origin:
Description: An abdominal film showing the RF electrode inserted within the nodule and an occlusion balloon catheter occluding the proper hepatic artery (indicated by an arrow). Origin:
Description: An image obtained with DSA of the right hepatic artery showing the presence of a residual peripheral HCC vascularization. Origin:
Description: An image showing the selective catheterization of the artery feeding the subsegment bearing the tumors. Origin:
Description: An image depicting the injection of the embolizing mixture. Origin:
Figure 6

Description: A multislice helical CT scan performed five days after the procedure demonstrating the central RF necrosis of the larger nodule and the good result achieved with the peripheral chemoembolization. There is good lipiodol accumulation seen within the smaller lesion (indicated by an arrow).
Description: A multislice helical CT scan performed five days after the procedure demonstrating the central RF necrosis of the larger nodule and the good result achieved with the peripheral chemoembolization. There is good lipiodol accumulation seen within the smaller lesion (indicated by an arrow). Origin:
Description: A follow-up multislice helical CT performed after 12 months demonstrating good persistence of lipiodol at the periphery of the main lesion and within the satellite. There is no evidence of residual/recurrent hypervascular tissue. Origin:
Description: A follow-up multislice helical CT performed after 12 months demonstrating good persistence of lipiodol at the periphery of the main lesion and within the satellite. There is no evidence of residual/recurrent hypervascular tissue. Origin: