Non-surgical treatment of hepatocellular carcinoma in Japan: Current status and Prospect (Recent advances and perspectives of RFA therapy and therapy assist imaging for HCC in Japan)

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Hepatocellular carcinomas (HCCs) are main lesions of the liver in which radiofrequency ablation therapy (RFA) is used as the first choice of treatment. Good application of RFA for HCCs is small sized (less than 2 cm) and small number HCCs (less than three). Small sized HCCs are well differentiated hepatocellular carcinoma and therefore the results of RFA is satisfactory. Local complete cure rate is 95 % or more.

It is important to take an enough safety margin, more than 5 mm in each side, to avoid recurrence when the tumor size is between 2 and 3 cm in diameter.

Recently a new deployment type needle for RFA is introduced to Japan. RITA model 90 needle can ablates the liver tissue of 5 cm in diameter in a single RFA session. The maximum deployed diameter is 5 cm and five thermometers are installed at the tip of the deployed needles out of 9 needles.

Combination of RFA and IVR techniques, trans-catheter embolization of the hepatic artery reduces the cooling effect by blood flow. When tumor size is 3-5 cm, combination of RFA and TAE should be considered.

Segmental or sub-segmental ablation is obtained when both of the segmental hepatic artery and portal vein are occluded using intervention radiology techniques. Temporal occlusion of both blood vessels are obtained by injection of an embolic material made of starch, Spherex. Combination of RFA and this procedure enables segmental or sub-segmental ablation. Therefore, the application of RFA for HCCs is now widened from small size to larger size than 5 cm.

Precise puncture is important to obtain good results of RFA. The 2D B-mode ultrasound has been used for puncture guidance. We have used a multi-detector CT combined with an angiography installation for guidance of RFA therapy for HCCs.
Combined installation of a 16 rows MD-CT and angiographic equipment is used. Procedures of RFA with this installation are: 1) angio-CT, CT-arteriography and CT-portography, are obtained to detect all lesions in the liver, 2) a deployment type RFA needle is inserted toward the targeted tumor under ultrasound guidance, 3) the needle position is checked using MD-CT, 4) ablation procedure is performed and 5) ablation area and safety margin are evaluated using amigo-CT.

IVR-CT guided RFA therapy has made it possible to shorten the medical care of HCCs. It took half of a day to perform a precise diagnosis and localization of HCCs, RFA procedures and post RFA evaluations.

Levovist contrast ultrasound is useful to decide the application of RFA for HCCs. The delayed parenchymal phase which is obtained later than 5 minutes after Levovist injection indicates diagnosis of histological differentiation of HCCs.

Vascular imaging of contrast ultrasound tells us precise localization of malignant tissue. This is most useful when the lesion is a local recurrence. It is difficult to distinguish between scar lesion and recurred HCC tissue using non contrast B mode imaging.

Recently Micro Flow Imaging (MFI) has been developed for next generation ultrasound contrast agents. This imaging technique enables us to visualize micro vessels using a “maximum intensity holding” method. It is possible using MFI to obtain the correct diagnosis and perform precise therapy for HCCs.
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