Panel (Debate)

Radiofrequency Ablation of Hepatocellular Carcinoma

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Surgical resection or transplantation is accepted as the best curative option for the patients with hepatocellular carcinoma (HCC). However, the benefits of curative treatment can be provided in less than 1/3 of patients because of poor hepatic reserve, unfavorable tumor location, or limited liver donors. Hence, local-regional treatment plays a key role of the management of HCC.

Image-guided tumor ablation is recommended in patients with early-stage HCC when surgical options are precluded and can replace resection in selected patients. Radiofrequency ablation (RFA) has shown superior therapeutic effects and greater survival benefit compared to ethanol injection in meta-analysis of randomized controlled trials and is currently established as the standard method for local tumor treatment. Five RCTs have compared RFA and PEI for treatment of early stage of HCC. The results of these investigations consistently showed that RFA is more effective than PEI, leading to better local control of the disease.

The benefits of RFA for management of HCC have been universally validated by the many guidelines (BCLC/AASLD, APASL, Japanese, and Korean Guidelines) by international academic societies. Basically, all the guidelines have a consensus that RFA can be performed for the patients with HCC nodules smaller than 3 cm in diameter and less than 4 in number. However, there are still controversy between the western and eastern guideline) regarding whether RFA can be tried for the patient with very early or early stage HCC nodule.

Recently, Cho et al concluded that RFA and hepatic resection are to be considered equally effective for the treatment of the very early stage HCC. Therefore, in patients with very early HCC, RFA can be offered as a first-line treatment, with a surgical approach reserved for when individual variables, including tumor location, would make RFA not feasible or unsafe.

Recent reports on long-term outcomes of RFA treated patients have shown that in patients with Child-Pugh class A disease and early stage HCC, 5 year survival rated are as high as 51～64% and may reach 76% in patients who meet the BCLC criteria for surgical resection. Therefore, an open question is whether RFA can compete with surgical resection as first line treatment, not only for patients with very early HCC but also for those with a small solitary HCC larger than 3 cm. There are several RCTs comparing resection and RFA. However, there are many limitations; 1) the limited number of each group; 2) lack of minimal sample size calculation; 3) Heterogeneous study population; 4) only focused on survival and not considering morbidity and mortality; 5) no assessment of the following treatments for the recurrent tumors. A properly designed RCT to compare RFA with resection would require a very large sample size to demonstrate even a slight survival benefit for on treatment versus the other. Therefore, it will be very difficult to prove whether RFA can be replaced with surgical resection in the selected group by a well-designed prospective RCT.

The main advantages of RFA include 1) it is minimally invasive with acceptable morbidity, 2) it enables excellent local tumor control, 3) it has promising long-term survival, and 4) it is a multi-modal approach. The main limitations of current RFA technology in hepatic ablation include 1) limitation of ablation volume, 2) technically infeasible in some tumors due to conspicuity and dangerous location, and 3) the heat-sink effect. Many technical and innovative approaches have been introduced to overcome those limitations

by using artificial fluid, novel guiding modality, new US contrast material (Sonazoid), more powerful energy source (microwave), and combined treatment strategies (Combined with TACE or novel thermo-sensitive drug). However, we need to keep in mind high recurrence rate of HCC even after curative treatment. Therefore, multi-modality strategy is the smart answer to manage the patients suffering from HCC depending on the various characteristics of each recurrent tumor.

In summary, RFA will continue to play a role as a representative local ablative modality in the management of unresectable HCC, even in the era of targeted agents. Novel thermal and non-thermal techniques for tumor ablation, including microwave ablation and irreversible electroporation, seem to have potential to overcome the limitations of RFA and warrant further clinical investigation.