Virtual Needle Tracking Helps Accuracy and Efficiency of Liver RFA

Feasibility of the virtual needle tracking system for percutaneous radiofrequency ablation of hepatocellular carcinoma

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Summary and Methods

The authors evaluated the feasibility of ultrasound-guided virtual needle tracking used to perform percutaneous radiofrequency ablations (RFA) in eight patients with hepatocellular carcinoma.

The GE Healthcare LOGIQ E9 with Volume Navigation combined with the CIVCO VirtuTRAX was used to perform the study. The Cool-Tip RFA system from Covidien was used for ablation in all cases, and a multi-angle biopsy bracket was attached to the probe to assist with stability and alignment of the electrode.

Discussion and Results

In seven of eight patients, RFA was performed with a single puncture.

Due to large tumor size, one case required two pre-planned punctures. In the case of the large tumor, the virtual needle tracking system and pre-acquired ultrasound volume data set helped distinguish the needle tip from the highly echoic lesion and liver parenchyma.

No adverse events were reported.

Conclusions

The authors reported limitations of the system related to needle bend and operator learning curve, which was noted to be overcome with practice.

The study’s findings suggest the virtual tracking system helps when:
• anatomical structures in the liver obscure the needle tip
• multiple punctures are required due to ablation artifacts.

The study reported the use of virtual needle tip tracking has potential to improve accuracy in RFA and reduce procedure variability and duration.

Author Commentary

“The virtual needle tracking device has great potential in providing more accurate and efficient sessions of RFA in several situations.”

“The first is in cases where the needle tip is obscured due to the condition of the surrounding liver tissue or significant subcutaneous fat tissue... With the needle tracking system, however, the needle tip is guided virtually so the location of the tip is recognized no matter the echogenicity of the surrounding liver.”

“The second situation for the great potential of the virtual needle tracking device is in cases where multiple punctures are necessary to ablate a large lesion.”