Characterization of Benign Periablational Enhancement Following Multipolar Radiofrequency Ablation Using Perfusion CT in an In-Vivo Porcine Liver Model

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Background: Thermal ablation is an important interventional option in the management of liver tumors. Immediate postablational imaging regularly shows periablational enhancement. This peripheral hyperperfusion may induce heat-sink effects which could contribute to incomplete tumor ablation. To reduce the effect of hyperperfusion the feeding vessels source must be known.

Objectives: To dynamically characterize the type of blood supply of the periablational enhancement zone immediately after hepatic radiofrequency ablation (RFA) using perfusion CT.

Methods: We used an in-vivo porcine liver model. Multipolar RFA was performed in healthy pig livers. Immediate post-ablational perfusion CT was acquired. The contrast enhancement over time of the peripheral ablation zone, the aorta and the portal vein were recorded. Time differences of the peak periablational enhancement to the peak arterial perfusion and to the peak portalvenous perfusion were calculated and analyzed.

Results: The perfusion peak of the periablational enhancement zone always occurred in mean 8.1 s after the arterial peak in the aorta and in mean 16.9 s before the peak in the portal vein.

Conclusions: Benign periablational enhancement is a result of primary arterial and not portalvenous hyperperfusion. In order to reduce heat sink effects, peri-ablational arterial balloon occlusion or transarterial chemoembolization may be beneficial during RFA.