

HEMODYNAMIC EVALUATION OF HEPATOCELLULAR CARCINOMA USING DYNAMIC CONTRAST-ENHANCED MRI WITH HIGH TEMPORAL RESOLUTION: COMPARISON WITH DYNAMIC CT DURING HEPATIC ARTERIOGRAPHY

Yasunari Fujinaga¹, Ayumi Ohya¹, Akira Yamada¹, Masahiro Kurozumi¹, Kazuhiko Ueda¹, Yoshihiro Kitou², Hitoshi Ueda², Katsuya Maruyama³, and Masumi Kadoya¹

¹Department of Radiology, Shinshu University, School of Medicine, Matsumoto, Nagano, Japan, ²Radiology Division, Shinshu University Hospital, Matsumoto, Nagano, Japan, ³Imaging & Therapy Systems Division, Siemens Japan. K. K., Tokyo, Japan

BACKGROUND: The radial volumetric imaging breath-hold examination (r-VIBE), which is a modified version of Cartesian (traditional) VIBE (c-VIBE), is a new 3D-gradient-echo sequence. It features several advantages over the c-VIBE sequence, including less motion sensitivity, absence of both aliasing artifact and less degradation of the image quality due to undersampling [1, 2]. Furthermore, r-VIBE with k-space-weighted image contrast reconstruction (r-VIBE-KWIC) allows powerful view sharing and provides high temporal resolution sub-frame images as well as a full-frame image. Dynamic contrast-enhanced MRI (DCE-MRI) using r-VIBE-KWIC has the potential to provide high spatial and temporal resolution images like a dynamic CT during hepatic arteriography (dyn-CTHA) without an invasive procedure or radiation exposure. However, hemodynamics of hepatocellular carcinoma (HCC) on DCE-MRI using r-VIBE-KWIC has not been analyzed.

PURPOSE: To compare hemodynamics of HCC in DCE-MRI using r-VIBE-KWIC with that in dyn-CTHA.

MATERIALS AND METHODS: DCE-MRI and dyn-CTHA were examined in 15 patients with pathologically proven HCCs (11 to 47 mm: mean 21.8 mm in diameter). Arterial phase of DCE-MRI was performed using r-VIBE-KWIC reconstruction (eight sub-frames; temporal resolution, 2.6–3 seconds) 25 seconds after the beginning of venous injection of Gd-EOB-DTPA (at a rate of 2mL/sec), followed by portal venous phase (45 seconds after arterial phase) and late phase (90 seconds after arterial phase). Dyn-CTHA was performed using 16-row multi-slice CT after an angiographic catheter was positioned in the common hepatic artery. Scanning began just before the contrast medium injection (1mL/sec), and an up to 60-seconds continuous scan with a 3- or 3.6-mm collimation was obtained in a single breath-hold. Images of each four slice were reconstructed at 1-sec intervals. Findings of HCC were assessed in each method and compared them.

RESULTS: On DCE-MRI/dyn-CTHA, early stain, low signal or density band around the tumor, corona enhancement and washout of HCC were observed in 14/14 (100%), 10/12 (83%), 8/10 (80%), and 12/14 (86%) patients, respectively. The median of tumor enhancement time on r-VIBE-KWIC/dyn-CTHA was 24/21 seconds, respectively (Figure 1). There was no significant difference ($P=0.2981$) between two methods.

CONCLUSION: DCE-MRI with high temporal resolution using r-VIBE-KWIC has a diagnostic potential comparable to dyn-CTHA in the hemodynamic evaluation of HCC.

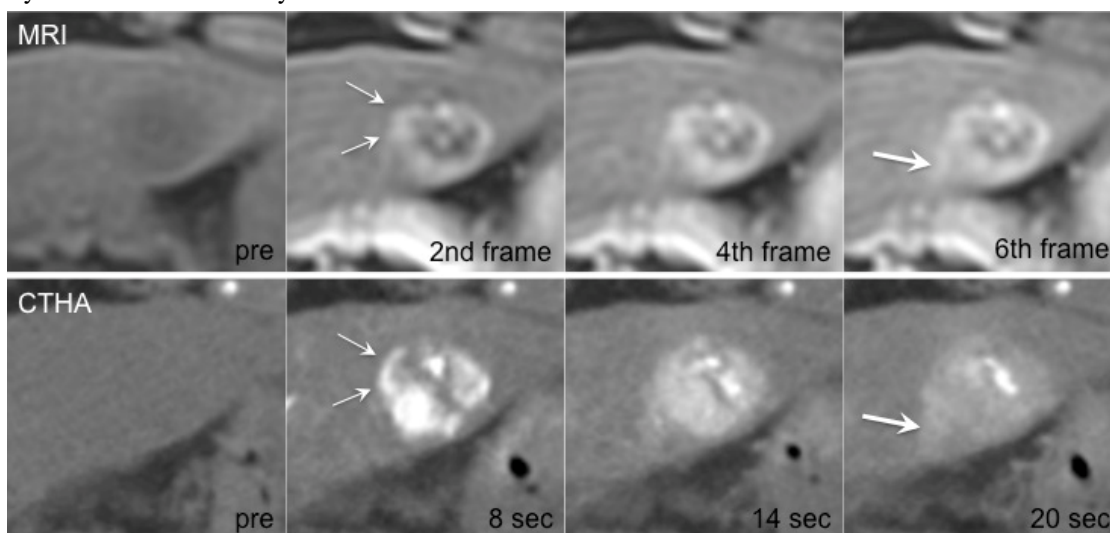


Figure 1. A 73-years-old woman with HCC. Early tumor stain, peritumoral low intensity/density (thin white arrows) and corona enhancement (white arrow) were seen on DCE-MRI (upper row) and dyn-CTHA (lower row).

REFERENCES

- [1] Vigen KK, Peters DC, Grist TM, et al. Undersampled projection-reconstruction imaging for time-resolved contrast-enhanced imaging. *Magn Reson Med* 2000;43:170-176.
- [2] Song HK, Dougherty L. Dynamic MRI with projection reconstruction and KWIC processing for simultaneous high spatial and temporal resolution. *Magn Reson Med* 2004, 52:815-824.