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

Yasunari Fujinaga, Ayumi Ohya, Akira Yamada, Musahiro Kurozumi, Kazuhiko Ueda, Yoshihiro Kitou, Hitoshi Ueda, Katsuya Maruyama, and Masumi Kadoya

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.

REFERENCES

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).