Evaluation of the upper abdomen on dynamic enhanced coronal Liver Acceleration with Volume Acquisition imaging: comparison with MDCT.

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Purpose

MR imaging has played the important part on evaluation of hepato-biliary disease. However, in many cases, MDCT was studied as the initial screening for abdominal disease because of more coverage. MR imaging has been mainly studied to evaluate local disease precisely. Liver Acceleration with Volume Acquisition (LAVA) belongs to 3D SPGR acquisition, which was modified in order to evaluate hepatic tumors on transverse plane. LAVA has some advantages, such as high spatial resolution and high signal-to-noise ratio. To cover the entire upper abdomen, coronal plane might be useful. In addition, gadolinium enhanced dynamic contrast study might enhance the advantages of LAVA imaging. The purpose of our study is to compare coronal LAVA imaging with 16 detector-row CT imaging for evaluation of hepato-biliary disease.

Methods and materials

This study consisted of 40 patients with hepato-biliary disease who underwent dynamic MRI and multi-detector row CT (21 men and 19 women, mean age: 68.2 year-old, age range: 46-89 year-old). The final diagnoses were pancreatic cancer (n = 8), gall bladder cancer (n = 6), bile duct cancer (n = 3), chole-cystitis (n = 12), gall bladder polyp (n = 1), intraductal papillary mucinous tumor (IPMT; n = 10), Islet cell tumor (n = 1). 19 of these patients had one or more hepatic lesions (simple cyst: n =13, hemangioma: n = 5, metastasis: n = 1, abscess: n = 1, HCC: n = 1). MR imaging was performed with a superconducting magnet operating at 1.5T (Signa TwinSpeed Excite HD; General Electric Medical Systems, Milwaukee, WI). All MR images obtained in the coronal plane with field of view of 35x35 cm by using 8ch body phased array coil. LAVA imaging was performed with the following parameters: TR / TE: 3.4/ 1.6 msec, FA: 12 degree, Matrix: 256*192, thickness: 2 mm, sections: 148 slices, Imaging time: 28 sec. Chemical-selective fat saturation, ZIP 512, Zip2, and ASSET were applied. Three phases (arterial, portal, and equilibrium) were obtained with 0.1mmol/kg of Gd-DTPA, 3mL/sec, by using MR SmartPrep (delay time from trigger to acquisition = 7 seconds). CT imaging was performed on 16-detector-row CT unit (LightSpeed Ultra; General Electric Medical Systems) with the following parameters: The detector configuration was 0.625 x 16 mm, in which 16 interspaced helical data sets were collected from 16 0.625-mm detector rows. FOV was 33 cm in diameter. Dynamic-contrast enhanced CT with a smart prep technique was performed with a power injector using 95mL of nonionic contrast medium, injected at a rate of 4mL / second, and three phases (arterial, portal, and equilibrium) were obtained. With all data transferred to a workstation, MPVR images were freely reconstructed by the operator. Assessment of MR and CT images was made independently with a blind fashion. The qualitative analysis was, using a 5-point scale, conducted by evaluation about delineation of lesions, arteries, and portal veins.

Results

The delineation of the cholangio-pancreatico lesions, hepatic lesions and the portal veins showed higher on LAVA imaging than on MDCT imaging (cholangio-pancreatico lesions; LAVA: 4.8, MDCT: 4.2, $p = 0.0006$, hepatic lesions; LAVA: 5.0, CT: 4.4, $p = 0.0023$, portal veins; LAVA: 4.8, CT: 4.2, $p < 0.0001$). On the other hand, the delineation of the arteries showed higher on MDCT imaging than on LAVA imaging (LAVA: 3.8, CT: 4.6, $p = 0.0002$).

Conclusion and discussion

Our study demonstrated that LAVA imaging provided more information about the local lesions and portal veins than MDCT imaging while MDCT imaging provided better arterial information than LAVA imaging. Although the reason of lower delineation of arteries on LAVA imaging night be due to the short injected duration of the contrast media (about 5-7 seconds) and the delay time from trigger to acquisition (7 seconds), we focused LAVA imaging on delineation of the local lesions.