

MR Cholangiopancreatography at 3.0 T: Intraindividual Comparative Study with MR Cholangiopancreatography at 1.5 T

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Purpose

An ultrahigh-field in MR systems contributes to the improvement in signal-to-noise ratio [1]. However, some drawbacks of the ultrahigh-field are known such as dielectric effect and susceptibility artifacts [1, 2]. The purpose of the study was to prospectively evaluate quantitative and qualitative image quality of MR cholangiopancreatography at a field strength of 3.0 T compared with the field strength of 1.5 T.

Materials and Methods

This study was approved by the institutional review board, and informed consent was obtained from all patients. Twenty-six patients (15 men and 11 women; mean age, 63.0 years; range, 42-75 years) suspected of having the pancreaticobiliary disease (pancreatic cancer, n = 7; Pancreatic cystic lesion, n = 9; bile duct cancer, n = 5; gall bladder cancer, n = 2; cholelithias, n = 1; benign biliary stenosis, n = 1; anomalous pancreaticobiliary junction, n = 1) underwent MR examination with both a 1.5 T scanner (Signa Excite HD; GE Healthcare, Milwaukee, WI) and a 3.0 T scanner (Signa Excite HD 3.0T; GE Healthcare, Milwaukee, WI). Respiratory triggered 3D MR cholangiopancreatography with Fast Recovery Fast Spin Echo sequence (TR/TE = 3000-6000/388-484, Matrix size 512 x 160, FOV 36 x 36 cm, slice thickness 2 mm, slice number 44-54) was compared between 1.5 and 3.0 T in this study. Contrast of common bile duct versus periductal tissue was evaluated quantitatively. Maximum intensity projection images of 3D MR cholangiopancreatography were also evaluated visually using a 4-point scale in regard to the delineation of the biliary tracts (score 3, delineating including intrahepatic bile ducts; score 2, delineating including both right and left hepatic ducts; score 1, delineating only common bile duct; score 0, delineating none) and the susceptibility artifacts (score 3, none; score 2, mild; score 1, moderate; score 0, severe). Statistical analysis consisted of the paired *t* test and the signed rank test.

Results

Contrast of the common bile duct versus the periductal tissue at 3.0 T was significantly superior to that at 1.5 T (Fig 1). The results of the visual evaluation are shown in Table 1 and 2. The partial signal loss of the common bile duct was observed in one case at 3.0 T because of the susceptibility effect of the adjacent bowel gas.

Discussion

The contrast is affected by the changes of T1 and T2 relaxation times according to the magnetic-field strength [3]. Our result showed that contrast of the bile duct at 3.0 T was superior to that at 1.5 T. Contrast-to-noise ratio was not evaluated in our study because the parallel imaging technique was used in the MR cholangiopancreatography. Magnetic susceptibility effect increases with the field strength. However, there was no significant difference between at 3.0 T and 1.5 T in our results. Some authors reported that no significant differences in regard to susceptibility artifacts could be detected between the field strength, too [2, 4]. The delineation of the biliary tracts at 3.0 T was equal or superior to that at 1.5 T.

In conclusion, MR cholangiopancreatography at 3.0 T revealed equivalent or superior image quality compared with that at 1.5 T.

References

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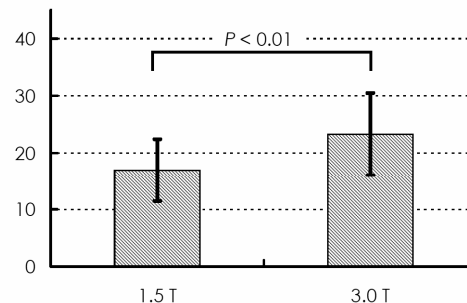


Figure 1. Contrast of the common bile duct versus the periductal tissue

Table 1. The Results of the visual evaluation for the delineation of the biliary tracts

	0	1	2	3
1.5 T	0	1	11	14
3.0 T	0	0	9	17

N.S. *P* = 0.10

Table 2. The Results of the visual evaluation for the susceptibility artifacts

	0	1	2	3
1.5 T	0	0	0	26
3.0 T	0	0	1	25

N.S. *P* = 0.80