

Biliary anatomy evaluation of potential living liver donors: comparison of high-resolution magnetic resonance cholangiography and multislice-CT cholangiography

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Introduction:

Reflecting the shortage of cadaveric liver transplants, living donor liver transplantation (LDLT) has evolved into a frequently considered therapeutic option in recent years. This innovative procedure allows healthy adults to donate a portion of their liver to compatible recipients suffering from end-stage liver disease. A major role in the process plays the preoperative evaluation of the biliary anatomy to determine variations and abnormalities. Therefore, aim of this study was to compare the diagnostic performance of optimized high-resolution MRI techniques and contrast-enhanced multi-detector row computer tomographic cholangiography (ceMDCT-CA).

Materials and Methods:

Both ceMDCT-CA and MR imaging was performed in 18 consecutive potential living donors of the right hepatic lobe (12 men, 6 women, mean age 36 years). MRI was performed on a 1.5 T scanner (Magnetom Avanto®, Siemens, Germany), using specially adapted heavily T2 Half-Fourier acquisition single-shot turbo spin-echo (HASTE; TR: 4500ms; TE: 754ms; slice thickness (st): 4cm; flip angle: 180°) and thin slice T2 2D turbo spin-echo (TSE) sequences (TR: 3450ms; TE: 638ms; st: 2mm; flip angle: 180°) In 7/18 patients, additional Single-Slab, 3-Dimensional, T2-weighted Turbo-Spin-Echo Sequence With High Sampling Efficiency (SPACE) sequences (TR: 3900ms; TE: 650ms; st: 1mm; flip angle: 140°) were performed. CT Imaging was performed on a 16-row Multidetector CT scanner (Sensation16®, Siemens, Germany) in all patients. For delineation of the biliary system the first CT-image set was acquired 20 min after infusion of 100 ml of a biliary contrast agent (Biliscopin®, Schering, Germany). All acquisitions (native, contrast enhanced arterial, portalvenous and venous phase) after additional automated intravenous injection of 140 ml of an iodinated contrast agent (Ultravist300®, Schering, Germany) used the same imaging parameters (kVp 120, mAs 150-180, slice width/collimation 5/0.75 mm, reconstructed st 1 mm/ 0.6mm increment. Analysis both from MRC and ceMDCT-CA image data was based on source images and post processed images on a commercially available workstation (SynGo®, Siemens, Germany). Two experienced blinded radiologists focused on grading the depictability of the intrahepatic biliary branches (grade 1=visualization of common hepatic duct/upper biliary confluent; 2=right/left hepatic duct; 3 and 4=2nd/3rd order intrahepatic branches). Comparison of CT and MRI performance was based on the Wilcoxon rank test. A $p < 0.05$ indicated a statistically significant difference.

Results:

CeMDCT-CA showed significantly better delineation of the biliary tree than MRC with T2 HASTE and T2 TSE sequences ($p=0.003$). While ceMDCT-CA frequently displayed the intrahepatic bile ducts up to the 3rd order branches (mean grading 2.8), duct visualization in MRC was most often (15/18 cases) limited to the 2nd branch (mean 2.1). Largely ceMDCT-CA displayed one branch order more than MRC. As a variant, three donors presented a trifurcation at the upper confluent, which could, however, be detected both by ceMDCT-CA and MRC.

Conclusion:

In comparison to the optimized MRC-procedure, contrast enhanced MDCT-CA shows a more detailed representation of the biliary anatomy of potential liver donors. In contrast to earlier superiority of CT over MRI, today MRC techniques provide all relevant information for surgery planning. To our opinion, a preoperative evaluation with MRC is to be preferred over CT due to the lack of ionizing radiation and better tolerance of the used contrast agents.

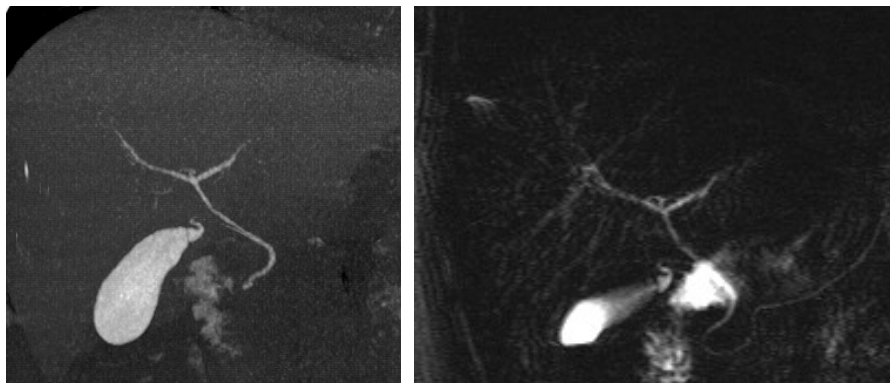


Fig. 1: Corresponding biliary imaging (CT left, MR right) shows a trifurcation at the upper biliary confluent. In this case MRC and ceMDCT-CA performed equally well.

References:

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