NON-CONTRAST-ENHANCED MR ANGIOGRAPHY FOR SELECTIVE EVALUATION OF THE RENAL ARTERY

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Background:

Although MR contrast agents have been recognized to be much safer than CT contrast media, it was recently reported that a serious adverse reaction called nephrogenic system fibrosis may occur after exposure to gadolinium-based contrast agents in patients with renal insufficiency or after renal transplantation. Accurate visualization of the renal artery anatomy without the use of an exogenous contrast agent is beneficial for patients who will undergo surgical procedures such as renal transplantation. The aim of this practice is to compare and evaluate the diagnostic performance of non-contrast-enhanced MR angiography (NCE-MRA) with contrast-enhanced MR angiography (CE-MRA) in the preoperative assessment of renal artery.

Methods:

Eighteen patients with hypertension and twelve potential living renal donors underwent NCE-MRA and CE-MRA with the same 1.5T MR scanner. Anatomic angiographic images were reconstructed and their datasets available for analysis independently performed by two blinded radiological technologists.
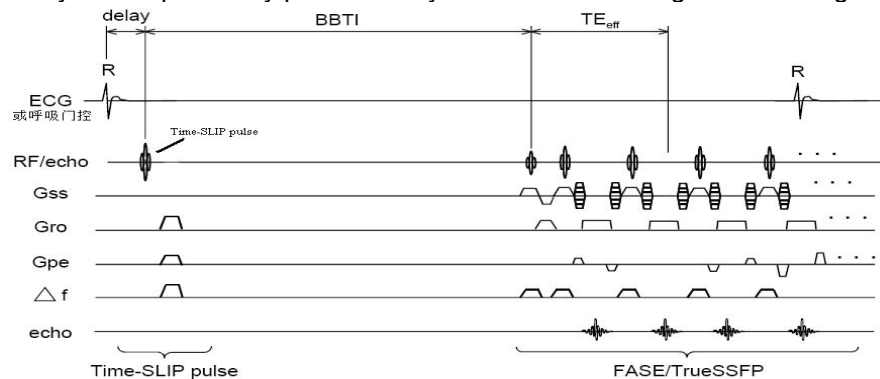

Figure 1. The principle of NCE-MRA

1.5T Toshiba MR scanner with the following parameter: true SSFP TR/TE/FA = 5.0msec/2.5/msec/120 (breath hold + FS); BBTI = 1200ms-1500ms; FOV 320mm×320mm; Matrix256×256; Speeder PE2.0; slice thickness = 2.5mm; Time of acquisition 192s; Actual spatial resolution 1.3×1.2×2.5; Reconstructed spatial resolution 0.7×0.7×1.5

Results:

Assessment of data quality of renal arterial vessels was rated with a four point scale. After consensus reading, a total 28 images (93.3%) scored more than 3 point were observed in NCE-MRA and 29 (96.7%) in CE-MRA, respectively. Segmental branch vessels were visualized on MR angiography in the majority of cases. Both NCE-MRA and CE-MRA correctly characterized 57 of 60 single kidneys and without false positive cases. 3 false negatives were observed in NCE-MRA group. There were no statistically significant differences between NCE-MRA and CE-MRA for characterization of renal vasculature（$P < 0.05$）.Kappa value was more than 0.75 for both reviewers.
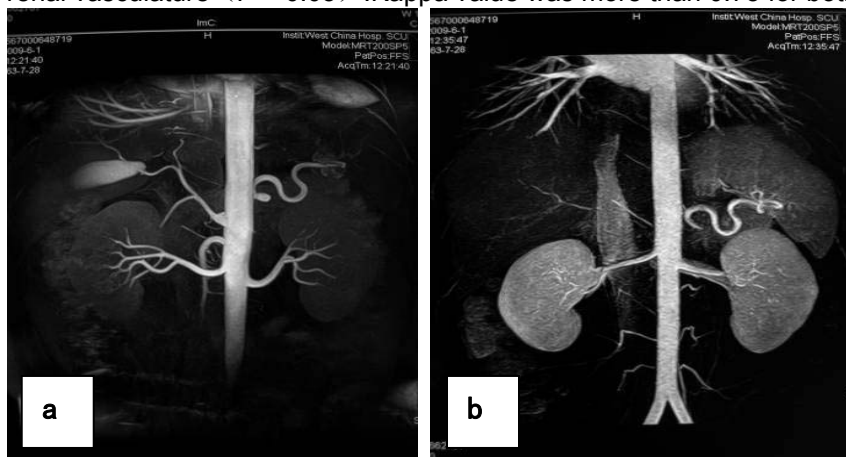

Figure 2. Differences in the renal artery visualization between two methods, (a) NCE-MRA and (b) CE-MRA

Conclusion:

NCE-MRA is a non-invasive and effective method that provides a comprehensive assessment of the renal artery.