

Renal Artery Evaluation with ECG-gated Breath-hold 3D-FIESTA MRA

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Introduction: With progress of MR hard and software techniques, most parts of systemic arteries can be well illustrated by 3D contrast-enhanced MRA and comparable with that of DSA when considering the renal artery. Many patients, however, still want have their renal artery be evaluated without any contrast agent.

Purpose: To evaluate the value of ECG-gated 3D FIESTA sequence as a non-enhanced MRA technique in diagnosing renal artery stenosis and comparing with 3D CE-MRA.

Methods: Consecutively 59 patients tended comparative ECG-gated breath-hold MRA and 3D CE-MRA. ECG-gated MRA was performed with oblique coronal and axial view perpendicularly each other along the course of renal artery for each side of kidney and may repeat if necessary. 3D CE-MRA was then taken using Fast SPGR sequence after 40ml Gd-DTPA injected intravenously with power injector under the rate of 3 ml/s. Two blinded experienced doctors separately evaluated the MIP reformatted images and described the renal arteries manifestations including normal, extension degree, early branching, accessory artery delineation, significant stenosis(>50%) and sclerosing appearance(mild stenosis).

Results: There are 2 cases of 3D CE-MRA images blurring severely due to failed cooperation breath-hold when starting contrast scanning. One case failed during ECG-gated breath-hold MRA because of health problem. These 3 patients were discarded from the comparative study. One case had one kidney resection previously, so totally 56 patients with 111 sides (branches) renal arteries were bring into the study. Table 1 shows the results of separated evaluation of two methods.

Table 1.

| | Normal | Segment | Subsegment | Early branching | Accessory artery | Stenosis >50% | Stenosis <50% |
|---------------|--------|---------|------------|-----------------|------------------|---------------|---------------|
| 3D CE-MRA | 73 | 61 | 9 | 15 | 10 | 23 | 15 |
| ECG-gated MRA | 70 | 56 | 2 | 13 | 5 | 21 | 20 |

For diagnosing significant stenosis, the accuracy, sensitivity and specificity of ECG-gated MRA was 94.6%, 82.6% and 97.7% respectively when taken 3D CE-MRA as gold standard. $X^2=0.1667$, $P>0.05$.

Conclusion: ECG-gated breath-hold MRA has no potential contrast agent harms to patients and convenient for repeat. Although it is fewer efficacies for distal and small vessels demonstration at present, ECG-gated breath-hold MRA has a relative high consistence with 3D CE-MRA in diagnosing clinical significant stenosis and can be taken as one of screening methods.

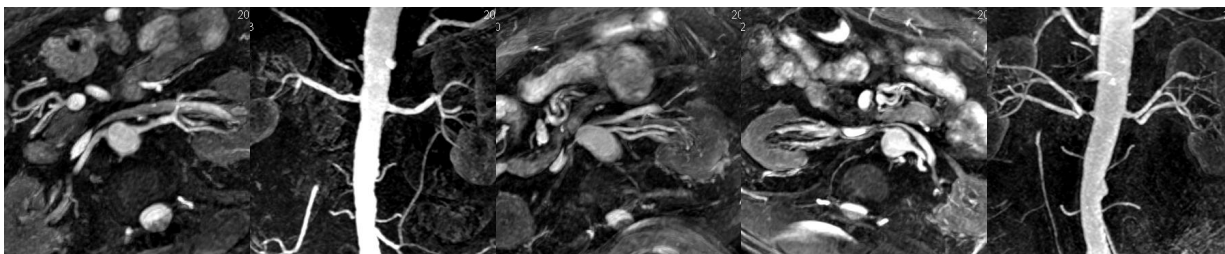


Fig1,2. 86 years old, renal arteriosclerosis. Fig3~5. 73 years old, right renal artery stenosis with bilateral early branching

Reference:

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