

Time-SLIP versus DSA in Patients with Renal Artery Stenosis

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Purpose: To compare the findings in non-contrast enhanced MRA using the Time Spatial Labeling Inversion Pulse (Time-SLIP) technique [1,2] to those of Digital Subtraction Angiography (DSA) in patient with significant renal artery stenosis (>60%).

Material and Methods:

Thirty seven (37) Patients (16 man, mean age $68 \pm 10,91$ y) with renal insufficiency and suspected renal artery stenosis were explored to obtain pre-treatment evaluation for endovascular therapy if necessary. Non contrast Enhanced MRA images were obtained on a 1.5T MRI system (Vantage, TOSHIBA, Tokyo). The Time-SLIP technique was used with an SSFP sequence, respiratory-gating and the following parameters: TR=5.2

ms, TI=1200 to 1800 ms, TE=2.6 ms FA 120, FOV 35x35 cm, Matrix 256X256, Speeder Factor 2, 35 slices, Fat Sat on, and time =4 to 6 min. The image quality of the native slices and the MIPs in several plans were visually assessed by an experienced radiologist and scored as: poor, moderate, or good. The maximum intensity maps (MIPs) and the native images were examined by an experienced radiologist and the degree of stenosis was estimated using measurement tools on a post-processing workstation (GP Workstation, Toshiba, Japan). A degree of stenosis of 60% or higher was considered as significant. In 17 patients with a significant stenosis, a DSA was performed.

Results: The Time SLIP images were scored as good in 81 %, moderate in 17 % patients and poor in 2% (1 patient). We detected in total 42 significant stenosis in 27 patients: 13 with RAS on 1 main artery, 13 with RAS on 2 main arteries, and 1 with RAS on 2 main arteries and an accessory artery (see figure 1). Up to now 17 patients (with 29 significant RAS) had a DSA. The Spearman correlation coefficient between Time-SLIP and DSA was 0,93. The degree of stenosis was slightly overestimated in Time-SLIP but the difference was not significant (Wilcoxon test, $P > 0.05$). The area under the curve of the ROC analysis was 0,98 and for a cut-off degree of stenosis value of 55% , we obtained 100% sensitivity and 91,5% specificity.

Conclusion: Time-SLIP is a reliable alternative to contrast enhanced MRA for the evaluation of renal arteries. It is safe, cheaper and faster in terms of total examination time (no need for patient preparation for contrast injection). It is tolerated by all patients.

References: 1. Miyazaki M, Lee V.S, Radiology 2008 Jul;248(1):20-43. 2. D. Utsunomiya et al. *Circ J* 2008; **72**: 1627–1630.

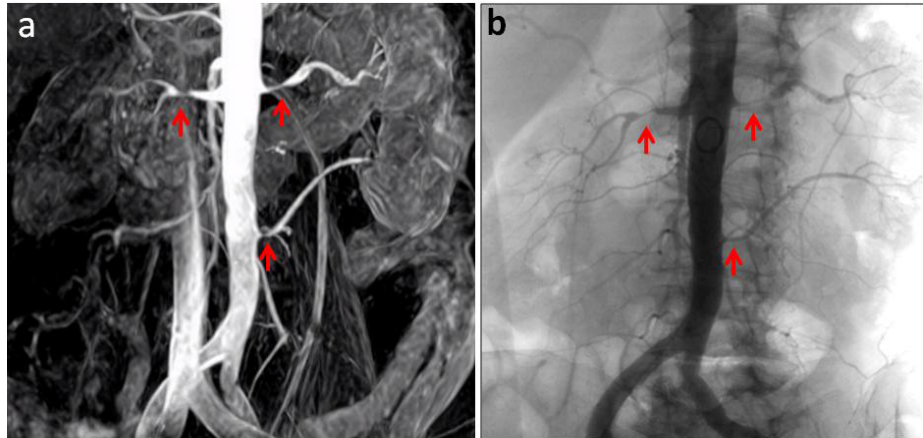


Figure 1: 73 year old woman with moderate renal dysfunction and a severe hypertension. (a) Time-SLIP showing a left and right main renal arteries both with a severe elongated stenoses and a significant stenosis on a left accessory artery (see arrow). (b) DSA confirming in agreement with Time-SLIP.