# Comparison of aspirin renogram and captopril renogram in the diagnosis of renovascular hypertension

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## Abstract

Renal artery stenosis (RAS) is the most common cause of secondary hypertension. Preliminary data indicate that aspirin renography with hippurate may be more sensitive for detection RAS. In this study 20 patients with known or suspected RAS underwent aspirin renography (20 mg/kg orally 1 hour before injection of radiotracer) and captopril renography (50 mg orally) with $^{99m}$Tc-DTPA. Renal angiography was performed in all patients. Of the 20 patients enrolled, 11 had unilateral RAS on angiography. Captopril renography was positive in 10 patients (91% sensitivity and 90% specificity). Aspirin renogram showed 9 patients with RAS correctly (81.8 % sensitivity and 100% specificity). Our data suggest that aspirin renography with $^{99m}$Tc-DTPA has comparable sensitivity with captopril in detection of unilateral RAS.

**Key words:** Renovascular hypertension, Aspirin rengoram, RAS, $^{99m}$Tc-DTPA

## Introduction

Renovascular hypertension is the most common cause of curable hypertension (1). Renal angiography is the gold standard for the diagnosis of RAS. However, this technique is invasive and costly (2). Therefore noninvasive tests have been developed, of which captopril renography is the most widely used. Preliminary data indicate that aspirin renography with hippurate may be more sensitive for detecting unilateral RAS (3). Perhaps, aspirin, which reduces both renal blood flow and glomerular filtration, more effectively impairs the excertion of radiotracer whose excertion depends on both filtration and tubular secretion. The second study with $^{99m}$Tc-$MAG_3$ showed that aspirin renography and captopril renography and were equally sensitive for identifying patients with RAS (4). In this study we compared captopril renography and aspirin renography with $^{99m}$Tc-DTPA.

## Material and methods

Twenty patients with known or suspected RAS underwent renal basal scan, captopril renography and aspirin renography. All patients were hydrated with 250 ml water before starting renal scan. Angiotensin converting enzyme inhibitor and nonsteroidal anti-inflammatory drugs were discontinued 3 days and 7 days, respectively, before the first renographic study. Either 50 mg captopril or 20 mg /kg aspirin were administered orally 1 hour before renal scan. Blood pressure was measured before the administration of drugs and 1 hour later.

Renography was performed using a Siemens gamma camera with a large field of view, a low-energy parallel – hole collimator,

and computerized data acquisition. After intravenous injection of 370 MBq $^{99m}$Tc-DTPA, sequential timed – image data in a 64×64 matrix were recorded on a computer: 2 second frames during the first minute, followed by 30 second frames 30 minutes. Regions of interest and perirenal background regions were assigned for each kidney. A time activity curve was obtained. The following variables were evaluated: the fractional contribution of each kidney to the total renal uptake measured in the third miunte, the time to peak activity and time to the half maximum activity for each kidney. GFR was calculated by Gates method. Renal angiography was performed in all patients.

**Results**

Decreased parenchymal uptake and GFR (9 ± 3 ml /min) with delayed secretion were observed in 11 patients after captopril test. Mean renal basal GFR of the affected kidney was 38±7 ml/min and after captopril test was 30±8 ml/min. Nine patients showed decreased parenchymal uptake and GFR and increased cortial retention in one kidney after aspirin renogram. Mean renal GFR of the affected kidney after aspirin test was 32±7 ml/min. Of the 20 patients enrolled, 11 had unilateral RAS on angiography. The rest of the patients (9 Pts) had normal renal angiogram. Blood pressure of the patients before and after captopril test was 175/95±37 mm Hg and 161/92±32mm Hg, respectively.

Blood pressure changed from 175/96±37 mmHg to 165/93±33 mmHg during aspirin renography. The decrease was slightly larger during captopril than aspirin renography. Hypotension did not occur. Of 11 cases of RAS, 10 were detected by captopril renography (90 % sensitivity) and 9 were detected by asprin renography (81.8% sensitivity).The difference was not significant.

**Discussion**

That Captopril enhances the sensitivity of renography for detecting RAS is well established (5). We wanted to know that whether aspirin would further increase the sensitivity of the test. Because aspirin and captopril yielded rather similar results, we can conclude that aspirin may enhance the sensitivity of renography as a detection method for RAS, but apparently not more than captopril does. The rational for the idea that aspirin may also improve the sensitivity of renography is the increased dependence of circulation of stenotic kidneys on prostaglandins. In the poststenotic kidney, angiotensin II levels are elevated, causing constriction predominantly in the postglmoercular arteriole (6). The preglomerular arteriole is kept open by increased local levels of vasodilating prostaglandins(7). Aspirin, Which inhibits prostaglandin synthesis, caused preglomerular vasoconstriction, with the double effect of decreasing renal blood flow and decreasing glomerular capillary pressure and filtration rate. These changes also occurred in the contralateral kidney, but the preglomerular resistance,

increased to a significantly higher level in the part of kidney behind the stenosis.

In this study, we used filtration agent ($^{99m}$Tc-DPTA) Which was not supposed to have the same accuracy as tubular agents. However, we should consider that both aspirin and catopril lower glomerular capillary pressure and filtration and in this way will

delay time to peak activity and increase cortical retention.

Preliminary study in Japan showed superior sensitivity for aspirin renography. However, our study did not confirm this idea. The specificity of aspirin test was 100%, which is better than the specificity of captopril renogram (90%). The sensitivity of the testswas slightly different (81.8% for aspirin renogram and 91% for captopril test).

**Conclusion**

Our data suggest that aspirin renography with 99mTc-DPTA has comparable sensitivity with captopril renogram in detection of unilateral RAS. We recommend further studies with filtration agents.

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