

Prevalence of Renovascular Abnormality in Patients Undergoing Cardiac Catheterization

R Ravichandran, T Rengarajan, KN Reddy, SM Rao

Abstract

Objective : To determine the prevalence of renal artery disease and to correlate the underlying risk factors like age, sex, diabetes, hypertension, urea and creatinine in patients who have undergone angiogram for cardiovascular diseases.

Methods : Retrospective analysis of the reports of angiogram of patients who have undergone cardiac catheterization in Vijaya Heart Foundation for cardiovascular diseases.

Results : The prevalence of renovascular stenosis is 12.4%. Prevalence of hypertension and diabetes in the group of patients with renovascular stenosis compared with group having coronary artery disease is not statistically significant ($p > 0.8$). Univariate and multivariate logistic identified age, diabetes, hypertension and urea as independent predictors of renal artery stenosis; while variables like sex and serum creatinine were not associated.

Conclusion : High prevalence of unsuspected renovascular abnormalities is found in patients who undergo angiography for cardiovascular disease. Factors like age, diabetes, hypertension and urea could be clinical predictors of renal artery stenosis. Hence renal arteries should be visualized routinely in patients undergoing coronary angiogram for cardiovascular disease.

INTRODUCTION

Atherosclerotic renal artery stenosis is a frequently overlooked clinical entity that can cause progressive renal failure and uncontrolled hypertension. Revascularization of a stenosed renal artery is associated with improved clinical outcomes including the prevention of renal failure. Thus it is important to recognize all potential candidates for renal artery revascularization.^{1,2}

In general population referred for diagnostic cardiac catheterization, renal artery stenosis of any severity was found to be high and is poorly defined.²⁻⁴

The purpose of this study is to evaluate the prevalence of angiographically determined renal artery narrowing in a patient population undergoing routine cardiac catheterization, and to identify the underlying risk factors.

MATERIAL AND METHODS

This study was a retrospective analysis of 614 patient's angiograms done at Vijaya Heart Foundation for various cardiovascular diseases. This group included 96 females, 519 males with mean age 55.35 ± 9.5 years (minimum age

of 15 and maximum age of 86) (Table 1).

Table 1 : Age and sex distribution

Age	Female	Male
10-20	0	1
21-30	1	6
31-40	6	20
41-50	27	117
51-60	38	230
61-70	21	118
71-80	2	24
80	1	2
Total	96	518

The indications for angiogram were as follows; 582 for coronary artery disease, 3 for combined coronary and peripheral artery disease, 18 for valvular lesions, 10 for peripheral vascular study and one for complex congenital heart diseases.

Twenty ml of contrast medium was used in addition to visualize renal arteries for all the patients.

RESULTS

Of 614 patients, 215 (35.01%) had diabetes and 228 (37.13%) had hypertension.

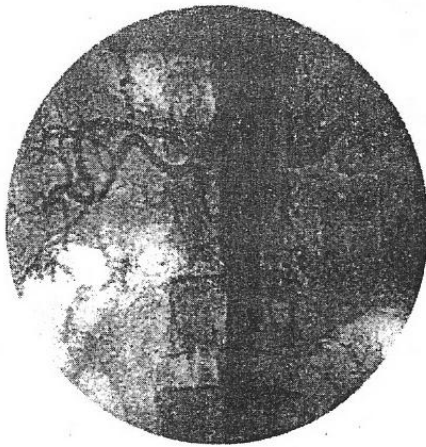


Fig. 1 : Bilateral renal artery stenosis.

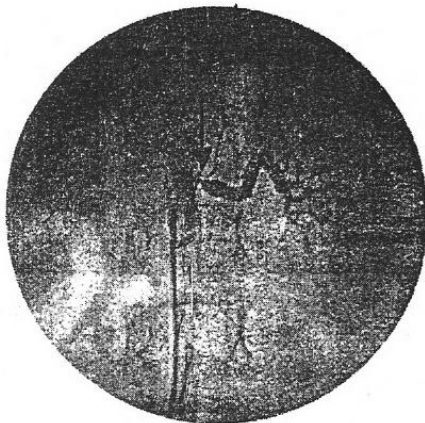


Fig. 2 : Left renal artery stenosis-ostium.

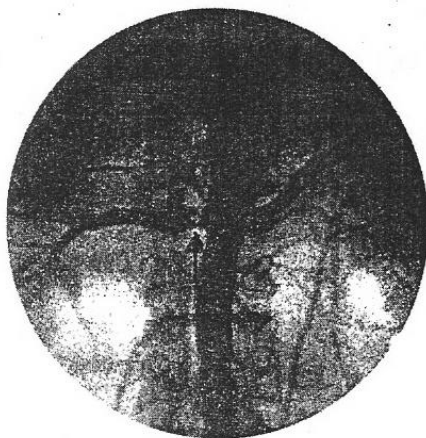


Fig. 3 : Right renal artery stenosis-ostium.

Angiogram revealed that 560 (91.2%) had abnormal coronary angiogram. One hundred and ninety six had single vessel disease, 99 had two vessel disease and 239 had triple vessel disease. Ten had peripheral vessel disease and 13 had combined peripheral vessel disease and coronary artery disease. Twelve had valvular lesions (both acquired as well as congenital). Four had combined valvular lesions and coronary artery disease. Three had cardiomyopathy. One

had complex congenital heart disease. Only 54 (8.7%) had normal coronary angiogram and none of them had renovascular stenosis.

Seventy five patients (12.21%) had renovascular stenosis. Mean age was 59.14 (\pm 8.02) years. Of this 38 (50%) had hypertension and 37 (49%) had diabetes.

Bilateral renal artery stenosis was found in 27 (36%) persons. Twenty two (29.3%) of them had stenosis < 50% bilaterally and five (6.6%) of them had stenosis > 50% bilaterally (Fig. 1). Unilateral renal artery stenosis was found in 48 (64%). Unilateral left renal artery stenosis was found in a total of 31 (41%) persons (Fig. 2). Unilateral right renal artery stenosis was present in 17 (22.6%) persons (Fig. 3). Stenosis (> 50%) either unilateral or bilateral was found in 52 (69.33%) persons (Table 2).

Table 2 : Renovascular stenosis types

<i>Bilateral renal artery stenosis</i>	
Total	27
< 50%	5
> 50%	8
Right renal artery stenosis > 50%, left renal artery stenosis < 50%	5
Right renal artery stenosis < 50%, left renal artery stenosis < 50%	8
Bilateral interlobar stenosis	1
<i>Unilateral left renal artery stenosis</i>	
Total	17
> 50%	14
< 50%	3
<i>Unilateral right renal artery stenosis</i>	
Total	31
> 50%	27
< 50%	4

Forty one (54.66%) had proximal stenosis, 33 (44%) had stenosis of ostium, seven had stenosis of ostium extending into proximal segment, one had mid-renal artery stenosis, one had distal renal artery stenosis, one had bilateral interlobar artery stenosis (Table 3).

Table 3 : Location of stenosis

Ostium	33
Proximal	41
Ostium extending into proximal	7
Mid	1
Distal	1
Interlobar	1
Total renovascular stenosis	75

Of the 26 who had congenital renovascular and/or renal anomalies only 15 had renovascular anomalies alone; eight had dual left renal arteries, six had dual right renal arteries and one had triple left renal arteries. Of these 15, nine had renal vascular stenosis. Remaining 11 had other anomalies. Five had hypoplastic kidneys, two had absence of right kidney, one had ectopic left kidney, one had absence of renal artery and two had irregular right renal artery. Only

three in this had renovascular stenosis.

Coronary reports on these 75 patients showed none of them to be normal. Forty eight (64%) had triple vessel disease, six (8%) had two-vessel disease, 14 (18%) had single vessel disease, and seven (9%) had peripheral vessel disease.

Prevalence of hypertension and diabetes in the group of patients with renovascular stenosis compared with group having coronary artery disease was not statistically significant ($p > 0.8$). Univariate and multivariate logistic regression identified age, diabetes, hypertension and urea as independent predictors of renal artery stenosis (Table 4). While variables like sex and serum creatinine were not associated. Blood urea was found not to be disproportionately high compared to serum creatinine levels in patients with renal artery stenosis. The mean and standard deviation of urea and creatinine in normal and in patient with renal artery stenosis is given in Table 5 which shows mean urea in abnormal patients (32.3 ± 17.3) was significantly higher than the mean urea in normal patients (25.6 ± 11.6) ($p = 0.002$). However, there was no significant difference between abnormal and normal patients as far as creatinine was concerned ($p = 0.007$).

Table 4 : Regression of age, sex, diabetes, hypertension, urea and creatinine on stenosis

Variable	Coefficient	Std error	F-test	P-value
Age	0.005	0.001	10.2036	0.001484
Sex	-0.108	0.038	7.9483	0.004991
Diabetes	0.076	0.030	6.4246	0.011538
Hypertension	0.056	0.029	3.8181	0.051222
Creatinine	-0.034	0.044	0.6062	0.436551
Urea	0.004	0.002	5.5481	0.018859

Table 5 : Urea and creatinine in normal and abnormal patients of stenosis

Variable	Normal	Abnormal	p-value*
	Mean \pm SD	Mean \pm SD	
Urea	25.6 \pm 11.6	32.3 \pm 17.3	0.002
Creatinine	0.95 \pm 0.47	1.11 \pm 0.69	0.07

*Students independent t-test was used to calculate the p-value.

DISCUSSION

Renal artery stenosis is frequently overlooked in the group of persons who undergo cardiac catheterization.^{4,2,5,6}

Its prevalence has been reported to be high in previous studies. Sony HY et al in their study had a prevalence of 10.5%,² Valentine RJ et al study revealed 28%⁵ and Harding MB et al found a prevalence of 30%.⁶ Prevalence of unsuspected renal artery stenosis in our study also was found to be high (12.4%). This procedure involves only an addition of 20 ml of dye.

Clinically it is difficult to predict which patient will have stenosis. Hypertension, age, diabetes have been reported in previous studies as predictable associated factors for the presence of renovascular stenosis.^{2,3,6,7} In our study we found out that factors like age, diabetes, hypertension and urea as independent predictors of renal artery stenosis (Table 4); while variables like sex and serum creatinine were not associated.

Mere detection of renal artery stenosis does not warrant any intervention. Further studies are required to see how many of these patients need any modifications of drug therapy or intervention due to detection of renal artery disease.

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