Short Communication

Incidental renal artery stenosis in patients of peripheral arterial disease in a rural Indian setting

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INTRODUCTION

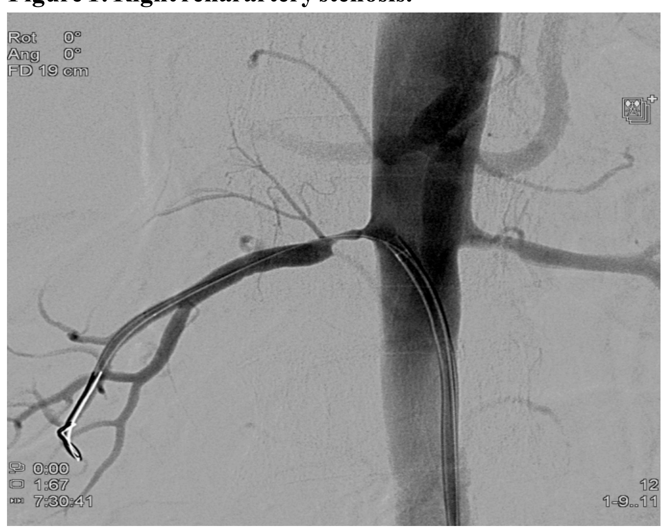
Renal artery stenosis (RAS) is becoming increasingly common because of atherosclerosis in an ageing population. Patients usually present with hypertension and varying degrees of renal impairment, although silent renal artery stenosis may be present in many patients with vascular disease.[1] RAS commonly present with chronic renal failure (with or without hypertension). The prevalence of RAS is increasing in patients with other manifestations of atherosclerosis. The diagnosis is being made more frequently due to better screening tests such as duplex ultrasound and magnetic resonance angiography. It is discovered incidentally during imaging studies performed for other reasons.[2]The prevalence of renovascular hypertension in the general population is between 4% and 33 %.[3]

Angiographies performed in elderly normotensive patients with atherosclerosis showed RAS in 32-49%.[4,5] Previous studies which have investigated the association of RAS with peripheral arterial disease (PAD) were done in patients undergoing cardiac angiographies. These included patients in whom peripheral arteries were not screened for disease. Few studies have considered the assessment of clinical variables with multivariate analysis.[6,7] RAS with narrowing of >50-60% of the lumen is considered hemodynamically significant and may be suitable for treatment with angioplasty or angioplasty plus stent placement (in case of osteal renal artery stenosis). The therapeutic approach of the hypertensive patient with a hemodynamically significant renal artery stenosis is currently a matter of great debate.[8] The aim of this study was to determine the prevalence of incidental RAS and its significant clinical predictors in patients with symptomatic PAD who had aortofemoropopliteal angiography.

METHODOLOGY

The institutional ethics committee approved the research project. A total of 210 patients who were diagnosed with PAD with aortofemoropopliteal angiography from January 2009 to June 2011 were consecutively studied for this project. These patients were referred for angiography for intermittent claudication and critical limb ischemia. Ten patients had suboptimal aortography for renal vessel evaluation and were excluded. Thirteen patients with a contraindication to DSA (renal failure, severe hypersensitivity) were also excluded.

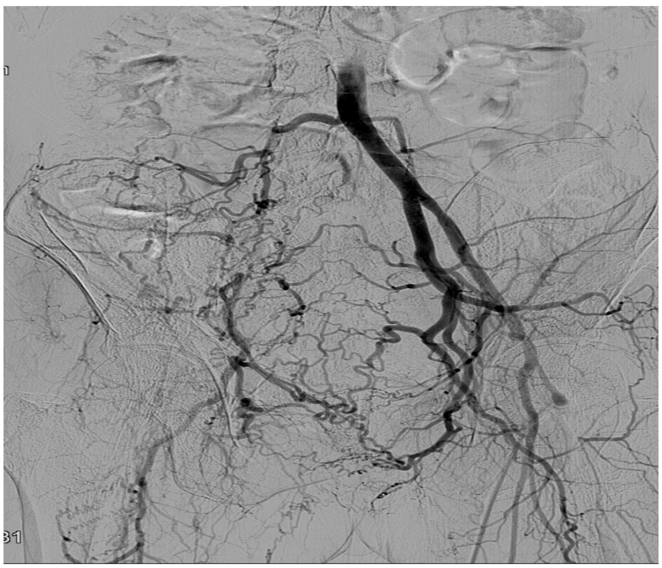
Figure 1: Right renal artery stenosis.



Detailed demographics and histories were recorded. They included age, gender, smoking history, diabetes, hypertension and reason for angiography. Blood samples obtained in fasting state were screened for creatinine, cholesterol, high and low density lipoprotein, triglycerides and glucose. Diabetes was defined as fasting blood glucose level above 126gm/dl or use of antidiabetic drugs. Hypertension was diagnosed as mean systolic blood pressure of 140mmHg and above, mean diastolic blood pressure of 90mmHg or above and the use of medication.

Angiography: Aortofemoropopliteal angiographies were performed using the Seldinger technique via the femoral or brachial approach. In cases where aortography was insufficient to image the renal arteries, selective injection was done. Radiologists reviewed the images from the angiography monitor.

Figure 2: Occlusion of right common iliac artery with collateral vessels.



The ratio of width of contrast at the site of greatest luminal narrowing to adjacent normal renal artery was calculated by callipers. Two groups of patients were formed according to the severity of RAS. In the control group, patients with normal or mildly (<60%) stenosed renal arteries were placed. The RAS group had patients with significant renal artery stenosis (Table/Figure 1). Post aortography, lower limb angiographies were done to visualise arteries from common iliac to pedal arch vessels. Lower limb arterial disease was defined as a stenosis of greater than 50% of limb vessel (Table/Figure 2). It was categorised into aortoiliac segment including the abdominal aorta and iliac arteries (from renal arteries to inguinal ligament), femoropopliteal segment including common femoral, superficial and deep femoral, and popliteal arteries (from inguinal ligament to first crural artery division), peroneal, tibial arteries, and tibio-peroneal trunk. Further divisions into unisegment and multisegment disease were also done.

Statistical analysis: SPSS 9.0 for Windows (SPSS Inc. Chicago, IL) was used for statistical analysis of risk factors for RAS. To study categoric variables, two-tailed Pearson's chi-squared test was used. Student's *t*-test or Mann-Whitney *U*-test was used to compare non categoric variables between control group (n=190) and renal artery stenosis group (n=20). Significant clinical variables were selected as risk factors in the multivariate analysis (logistic regression). $p<0.05$ was defined as significant.

RESULTS

Demographics and clinical characteristics of the patients are shown in Table 1. Of the total 210 patients, 195 (92.85%) were male and 15 (7.14%) were females. The ages ranged from 41-77 years. There were 52 (24.72%) patients of renal arterial narrowing with 20 patients showing significant RAS (9.5%). There was no patient of renal artery occlusion. It was seen with univariate analysis that age, hypertension and aortoiliac disease were risk factors for significant RAS.

Table 1: Demographics and risk factors in the rural population.

Risk factors	Mean±SD
Age (years)	61.2±8.3
Claudication, n (%)	175 (83.33%)
Male gender, n (%)	195 (92.85%)
Diabetes mellitus, n (%)	85 (40.47%)
Fasting glucose (mg/dl)	152±59
Hypertension, n (%)	92 (43.81%)
History of coronary artery disease, n (%)	90 (42.85%)
Smoking n (%)	181 (86.10%)
Pack of cigarettes per year	48±11
Total cholesterol (mg/dl)	200±55
HDL cholesterol (mg/dl)	62±14
LDL cholesterol (mg/dl)	121±31
Triglycerides (mg/dl)	189±111
Creatinine (mg/dl)	1.3±2
Aortoiliac disease, n (%)	110 (52.38%)
Femoropopliteal disease, n (%)	160 (76.19%)
Crural disease, n (%)	155 (73.81)
Multisegment disease, n (%)	145 (69%)

Patients with aortoiliac disease had more prevalence of RAS. The presence of multisegmental disease was not a significant clinical predictor of RAS. Patient's gender, reason for doing angiography, smoking, diabetes and lipid profile were not clinical predictors. Age and hypertension were independent significant clinical predictors of RAS in logistic regression (Table 2).

Table 2: Univariate and Multivariate analysis of various parameters.

Risk factors	Univariate analysis	Multivariate analysis
Age (years)	<0.001	<0.001
Claudication, n (%)	0.44	
Male gender, n (%)	0.15	
Diabetes mellitus, n (%)	0.48	
Fasting glucose (mg/dl)	0.10	
Hypertension, n (/%)	0.001	0.01
History of coronary artery disease, n (%)	0.22	
Pack of cigarettes per year	0.9	
Total cholesterol (mg/dl)	0.9	
HDL cholesterol (mg/dl)	0.9	
LDL cholesterol (mg/dl)	0.7	
Triglycerides (mg/dl)	0.41	
Creatinine (mg/dl)	0.57	
Aortoiliac disease, n (%)	0.05	
Femoropopliteal disease, n (%)	0.18	
Crural disease, n (%)	0.9	
Multisegment disease, n(%)	0.12	

Patients with significant RAS had mean age of 64.4±7.8 years while those without it had mean age of 59.7±9.2 years (p<0.001). The finding of hypertension was seen in 65% of patients showing RAS and in 34% of patients in the control group (p=0.01).

DISCUSSION

Patients with atherosclerosis elsewhere, especially abdominal aortic aneurysm, aorto-occlusive disease, or lower-extremity occlusive disease have a high prevalence of significant RAS even in the absence of the usual clues to suspect it.[9] Renal artery stenosis was seen as a frequent finding in patients of peripheral arterial disease. Also, 33% patients of significant RAS did not have hypertension. Cardiovascular morbidity and mortality is increased among these patients and this is likely due in part to the associated disease states; however, RAS itself may also contribute.[10]

It is imperative to take note of incidentally discovered RAS, as it may result in ischemic nephropathy. A study showed a 4-year mortality rate of 14% in patients without RAS on abdominal aortography.[11] An independent predictor of cardiovascular morbidity and mortality appears to be chronic renal ischemia caused by RAS.[3] Prevalence rates of 14% to 49% are seen in studies of unsuspected RAS in patients of PAD or coronary artery disease undergoing aortography. Ozkan et al showed 9.6% patients of significant RAS an incidental detection in patients of PAD.[12] A wide range of incidence of RAS is seen if reference threshold is 50% or 60% stenosis. The wide range maybe considered due to patient population selection and lack of standardisation.

Predictors of RAS were found to be age,[13-15] hypertension,[6,13,15] serum cholesterol,[6,15] impaired renal function,[15] history of coronary artery disease[14] and history of smoking.[6,13] Applying univariate and multivariate analysis we found that increasing age and hypertension were the two most significant variables for incidental detection of RAS in peripheral angiographies of patients of PAD.

CONCLUSIONS

Patients of peripheral vascular disease diagnosed with angiography have high prevalence of renal artery stenosis. We found 9.5% of patients showing significant (>60%) renal artery stenosis. The distribution of peripheral arterial disease is not associated with significant renal artery stenosis. Also, increasing age and hypertension were the two most significant variables for incidental detection of renal artery stenosis in such patients.

Conflict of interest: None declared
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