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Original Research Article

Frequency of Coronary Artery Disease in Angiographically Confirmed Patients of Renal Artery Stenosis with Hypertension

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ABSTRACT

Background: In hypertensive patients who undergo renal angiography to investigate renal artery stenosis (RAS) there are no recommendations regarding when to investigate coronary artery disease (CAD). Moreover, the predictors of CAD in patients with RAS are not clear.

Objectives: To evaluate the frequency and the determinants of CAD in hypertensive patients with RAS referred to renal angiography.

Methods: 42 consecutive patients with high clinical risk suggesting the presence of RAS systematically underwent renal angiography and coronary angiography during the same procedure. Significant arterial stenosis was defined by an obstruction ≥ 50% to both renal and coronary territories.

Results: Of 42 consecutive patients with angiographically confirmed RAS; 28 (66.7%) had significant CAD in one or more coronary arteries. 6 patients (14.2%) had single coronary vessel disease, 11 (26.1%) had two-vessel disease and 11 (26.1%) had multivessel disease. On the other hand 26/42 (61.9%) had unilateral RAS and 16/42 (38.1%) had bilateral RAS. The clinical characteristics such as age, gender and smoking were not different between both groups while diabetes and hyperlipidemia had a strong association. The severity of CAD and RAS were also correlated. None developed complications as a result of the two consecutive procedures.

Conclusion: The data suggest that in patients with RAS the frequency of CAD is high and cannot be predicted on clinical grounds alone, therefore coronary angiography should be routinely recommended in the same setting.

Keywords: Angiography, Hypertension, Renal Artery Stenosis.

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INTRODUCTION

Coronary artery disease (CAD) is one of the most important causes of death in patients with atherosclerotic renal artery stenosis (RAS).[1,2] When RAS occurs bilaterally, the frequency of Coronary artery disease is more with a higher prevalence of multivessel lesions and with higher severity.[3] In addition, a higher frequency of RAS was found in patients suffering from CAD.[4] In a study included 609 subjects who underwent coronary angiography, abdominal aortography was performed to detect RAS. RAS was detected in 152 subject, 94% of them showed concomitant CAD. Therefore, it was suggested that coronary arteriography be performed in patients undergoing renal arteriography.[5] Atherosclerotic renal artery stenosis can predispose to secondary arterial hypertension and it was shown that it is independently associated with cardiovascular events.[6] In addition, The risk of cardiovascular events is equal in the presence of both RAS and coronary artery disease.[7]

The standard method for the detection of RAS is contrast angiography.[7] Factors predisposing to increase risk of RAS are reported as old age, CAD, a higher number of prescribed drugs, HTN, female gender and a previous coronary artery bypass graft.[1,2,7] The prevalence of CAD in patients with RAS has not been studied in Iraq. Therefore we aimed at evaluating the frequency of CAD in RAS associated hypertensive patients.

METHODS

From February 2013 to November 2013 more than 900 patients were seen in the medical and cardiology clinics in Azadi Teaching Hospital in Duhok city. Evaluation of 65 consecutive patients with established hypertension and suspicion of RAS had done based on clinical and imaging data. These entire 65 patients were referred for conventional renal angiography for final confirmation of RAS.

After undergoing a complete clinical examination, including a detailed medical history, all patients were selected according to the risk of RAS based on clinical data (severe or malignant hypertension, hypertensive flash pulmonary edema, refractory HTN and additional diagnostic noninvasive imaging suggesting the presence of RAS such as Doppler ultrasound of renal arteries,

CT angiography and/or magnetic resonance angiography of renal arteries, those with positive results for RAS were referred to renal angiography. Patients with known CAD or prior coronary artery revascularization were excluded from the study.

Patients were also assessed for the presence of current active smoking, the presence of diabetes mellitus, dyslipidemia and renal function test (blood urea and serum creatinine).

Blood pressure is assessed by mercury sphygmomanometer in both arms and average blood pressure is taken. Refractory HTN is defined as sustained high blood pressure (>140/90 mmHg) despite of 3 or more antihypertensive drugs and severe HTN as average blood pressure of more than 180/110 mmHg. Flash pulmonary edema is acute heart decompensation secondary to severe HTN in a structurally normal heart. Patients were considered to have diabetes mellitus if dietary or pharmacological interventions were required to maintain normal blood glucose levels (<126 mg/dl) or under use of antidiabetic medications. The diagnosis of hyperlipidemia was considered if the patients had been prescribed lipid-lowering agents or they had fasting total cholesterol >200 mg/dl, low density lipoprotein(LDL) more than 130 mg/dl, high density lipoprotein (HDL) less than 40 mg/dl or Triglyceride more than 150 mg/dl**.**

All 65 consecutive patients were referred for renal arteriography after they had signed a written informed consent as part of routine angiographic evaluation in Azadi cardiac center. Renal procedure was performed by selective injection into the renal arteries. Renal artery stenosis was defined as presence of a stenotic lesion of more than 50% of the arterial lumen according to the examiner's visual analysis at the time of the procedure. After RAS diagnosis had established, coronary angiography then performed immediately and quantification of arterial obstruction was done, coronary artery disease was defined as lesions with ≥50% arterial obstruction in at least one epicardial coronary artery, according to the visual analysis**.** Of these, 42 patients had a settled diagnosis of significant RAS and underwent coronary angiography in the same session. The study we approved by the scientific and ethical committee in the college of medicine, University of Duhok. A consent was taken from all subjects participated in this project.

Statistical Analysis

This is a prospective case series study. For evaluation the study population was divided into two groups according to the presence or absence of CAD and the groups were compared for clinical characteristics that could predict CAD. Data were analyzed with SPSS 17.0 statistical software. Descriptive analysis was used to define the study population. Results of parametric data were expressed as mean ± standard deviation and nonparametric data as median. The clinical characteristics of groups with and without CAD were compared by Chi square test while t- test was applied for mean age. Statistical significance was accepted at P value of less than 0.05.

RESULTS

All the 42 consecutive hypertensive patients who have been confirmed angiographically for RAS were also screened for coronary angiography in the same settings. Of these 28 (66.7%) patients have significant CAD in one or more coronary arteries. 6 patients (14.2%) have single coronary vessel disease, 11 (26.1%) have two-vessel disease, and 11 (26.1%) have multivessel disease. On the other hand 26 (61.9%) have unilateral RAS and 16 (38.1%) have bilateral RAS. The main characteristics of the total sample and according to the presence or absence of significant CAD are shown in (Table 1).

Table 1: Comparison between RAS and CAD for baseline variables

	Total RAS (N, %)	Total CAD (N, %)	P value
Age (yr)	59.952 +- 10.43	59.952 +- 10.43	0.99
Female	32 (76.1%)	22 (52.3%)	0.3042
DM	16 (38%)	15 (35.7%)	0.001746
HL	23 (54.7%)	19 (45.2%)	0.007947
Smoking	8 (19%)	4 (9.5%)	0.1337
HT	42 (100%)	28 (66.7%)	

Table 2: Assessment of severity of RAS based on the variables

Variables	Unilateral RAS (N, %)	Bilateral RAS (N, %)	Total RAS (N, %)	P value
Age (yr)	59.926 +- 10.56	60.121 +- 10.50	59.952 +- 10.43	0.95
Male	7 (16.7%)	3 (7.1%)	10 (23.8%)	0.2729
Female	19 (45.2%)	13 (30.9%)	32 (76.1%)	0.2729
DM	8 (19%)	8 (19%)	16 (38%)	0.1065
HL	15 (35.7%)	8 (19%)	23 (54.7%)	0.3133
Smoking	7 (16.6%)	1 (2.4%)	8 (19%)	0.04878
HT	26 (61.9%)	16 (38.1%)	42 (100%)	

Table 3: Relationship of the severity of RAS to CAD

	Single RAS (26=61.9%)	Bilateral RAS (16=38.1%)	Total RAS (42=100%)	P value
No CAD	13 (30.9%)	1 (2.4%)	14 (33.3%)	0.001746
Single CAD	4 (9.5%)	2 (4.7%)	6 (14.2%)	0.3976
2 vessels	6 (14.2%)	5 (11.9%)	11 (26.1%)	0.2793
3 vessels or more	3 (7.1%)	8 (19%)	11 (26.1%)	0.002952

We observed a high percentage of associated diabetes and hyperlipidemia. There were no significant differences between the two groups concerning risk factors, such as age, sex or smoking status. On the other hand there is no significant difference between patients with single and bilateral RAS concerning risk factors apart from smoking which has significant association with single RAS. (Table 2)

In comparison between patients without significant CAD and those with one or more CAD, patients with multivessel CAD have higher percentage of bilateral RAS. (Table 3)

DISCUSSION

Previous reports have shown a high frequency of RAS in subjects with CAD during routine cardiac catheterization. Moreover, a positive association between the number of affected coronary vessels and RAS prevalence has been reported. In the current study, we found that 66% of patients with significant RAS also had significant, previously undiagnosed CAD. These findings suggest that CAD should be sought in RAS patients regardless of the presence or absence of cardiac symptomatology especially as the severity of the two conditions seems to be highly correlated.[3] Also, a strong relationship between RAS and the number of coronary artery lesions was found.

De Carvalho et al showed that 74% of subjects with RAS have concurrent CAD in one or more coronary arteries, though they were asymptomatic.[2] In addition, Ollivier et al. found that among 650 subjects suffering from CAD, 94 were concurrent with RAS, corresponding to a prevalence of 14.5%, include 6% of patients with left coronary artery stenosis, 5.4% with right coronary artery stenosis, and 3.1% with bilateral stenosis.[8]

In addition, when medical records of subjects who underwent angiography were checked, it was found that multi vessel CAD was more prevalent in subjects with significant RAS. However, the correlation between the number of significant coronary lesions and the prevalence of RAS was not straight forward. However, it is commonly found that when the number of lesions within the coronary arteries increases, the probability of RAS would increase.[9]

In our study, abnormal renal and coronary angiographies were found to have no relationship with smoking, gender and Age. In contrast, HL and DM were the strongest risk factors. Therefore, it seems that risk factors for the development of athermanous changes in renal arteries may be different from conventional CAD risk factors and the detection of risk factors is important because RAS is a progressive disease and may lead to end-stage renal failure. In addition there was no significant association of the risk factors with the number of the renal arteries involved.

The present investigation has some limitations that should be addressed. First of all, our sample size was small (42 patients) mainly explained by our single center study design investigated only patients with high clinical risk suggesting the presence of RAS. Second, the criteria used to select patients depended on presenting features of renovascular hypertension and other procedures such as doppler ultrasound and magnetic resonance of renal arteries. It is known that finding in ultrasound depended on the experience of operator. Third, the selection of hypertensive subjects with a risk of atherosclerotic RAS could overestimate the number of subjects affected by atherosclerosis in others arteries.[5,10,11]

CONCLUSION

Although this is a small study, it suggests that such patients should probably have routinely recommended coronary angiography after angiographic confirmation of RAS in a single setting, which would make it practical and cost effective. The benefit of a documented diagnosis would be initiation of appropriate early treatment for prevention or reversal of an otherwise overlooked ischemic heart disease.

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