

PREVALENCE OF RENAL ARTERY STENOSIS IN HYPERTENSIVE PATIENTS UNDERGOING CORONARY ANGIOGRAPHY

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Abstract

INTRODUCTION: Atherosclerotic renal artery stenosis (RAS) is an important cause of secondary hypertension as well as ischemic nephropathy. Little information is available about the incidence of RAS in hypertensive patients in the Iranian society. This study was performed to determine the prevalence of RAS and its related risk factors in hypertensive patients.

METHODS: A cross-sectional study was conducted on 122 hypertensive patients (80 males and 42 females) aged 33-74 years (mean age: 54±8.5 years), all of whom underwent coronary angiography and selective renal angiography.

RESULTS: According to angiographic data, 95 patients (77.9%) had coronary artery disease (CAD) and 27 (22.1%) had normal coronary arteries. RAS was seen in 22 patients (23.1%) with CAD and hypertension, and in 4 patients (14.8%) with hypertension and normal coronary arteries. Overall, 26 patients (21.3%) had RAS, which was classified as significant (14.7%) and non-significant (6.6%). RAS significantly correlated to the female gender ($P=0.019$), age ($P=0.002$), diabetes mellitus ($P=0.025$) and severity of hypertension ($P=0.006$).

CONCLUSIONS: The prevalence of significant RAS among hypertensive patients undergoing coronary angiography was 14.7%. Factors like old age, severe hypertension, diabetes mellitus and female gender were clinical predictors of RAS.

Key Words: Hypertension, renal artery stenosis, coronary artery disease, coronary artery angiography.

ARYA Journal 2006; 2(1): 23-26

Introduction

Renal artery stenosis (RAS) is an important cause of secondary hypertension as well as ischemic nephropathy. Atherosclerotic stenosis is the most frequent obstructive lesion of the renal arteries.

Secondary hypertension caused by RAS occurs rarely in the general population with a reported prevalence of <5%.¹ However, its occurrence is substantially higher in patients with established peripheral and/or coronary artery disease (CAD),^{2,3} hypertensive patients, and the uremic elderly population.⁴

A study of hypertensive patients undergoing coronary angiography for presumptive RAS in the United States found the prevalence of significant RAS (stenosis >50%) to be 19.2%.⁵ An increased mortality rate, particularly from cardiovascular diseases, is seen

in hypertensive and CAD patients with concomitant RAS.^{6,7} Hence, it is important to detect these cases because relief of stenosis either by angioplasty or surgical revascularization often cures the hypertension and improves or decreases the progression of renal failure, if present.^{8,9}

Little information is available about the incidence of RAS and its related risk factors in hypertensive patients in the Iranian society.

On the other hand, underlying risk factors have been the subject of several investigations with controversial results.¹⁰⁻¹²

We conducted this study in our Cardiology Department to determine the prevalence of RAS in hypertensive patients undergoing renal and coronary angiography.

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Date of submission: June 20, 2006

Date of acceptance: July 30, 2006

Materials and methods

Data for this cross-sectional study were collected prospectively between October 2003 and December 2004 at the Department of Cardiology of Shafa Hospital, Kerman University of Medical Sciences.

122 patients with hypertension and CAD, or suspected CAD underwent renal artery angiography after coronary angiography via the femoral approach using the Optimus M-200 Philips angiography system. CAD was defined as more than 50% reduction in diameter of at least one major epicardial artery.

RAS with more than 50% stenosis in diameter was considered as significant.

Hypertension was classified as mild (140-159 mmHg for systolic pressure and/or 90-99 mmHg for diastolic pressure), moderate (160-179 mmHg for systolic pressure and/or 100-109 mmHg for diastolic pressure), and severe ($\geq 180/110$ mmHg).

The relationship between RAS and age, gender, smoking, CAD, diabetes mellitus, hyperlipidemia and severity of hypertension was also studied. Written informed consent was obtained from each patient prior to the study.

The data were analyzed using SPSS 11.5. Having described the variables, their associations were explored with chi square test and pooled t-test.

P values below 0.05 were considered as statistically significant.

Results

A total of 122 consecutive patients (80 males and 42 females) aged 53.8 ± 8.5 years with confirmed hypertension underwent coronary and renal angiography. Mean \pm SD of systolic and diastolic blood pressure was 157.8 ± 20.7 and 90.1 ± 14.8 mmHg, respectively. The prevalence of mild, moderate and severe hypertension was 35.3%, 36% and 28.7%, respectively. There was a significant correlation between RAS and severity of hypertension ($P=0.006$) (Figure 1). The overall incidence of RAS was 21.3% (95% CI*, 14.4-29.6). Significant stenosis was seen in 14.7%, and non-significant stenosis in 6.6% of subjects. RAS was bilateral in 3 cases. Clinical variables are shown in Table 1.

CAD was present in 95 patients (77.9%). 27 patients (22.1%) had normal coronary arteries. The incidence of RAS was 23.1% in patients with CAD and 14.8% in those without, with no significant difference ($P=0.35$). RAS was more frequent in women than men (33.3% vs. 15%, $P=0.019$).

The risk factors were hyperlipidemia (43.4%), diabetes mellitus (16.4%) and smoking (35.2%).

Diabetes mellitus was more frequent in patients with RAS than in those without (40% vs. 17.6%, $P=0.025$). Patients with RAS were older than those without RAS ($P=0.002$). RAS did not significantly correlate to hyperlipidemia or smoking ($P>0.05$).

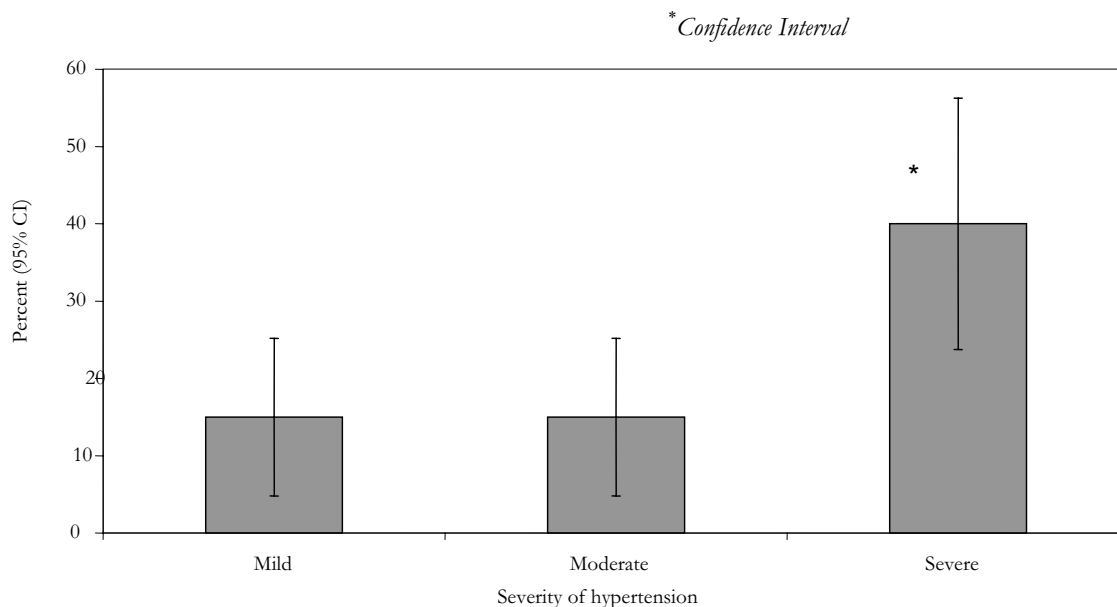


FIGURE 1. The association between RAS and severity of hypertension (* $P=0.0006$)

TABLE 1. Clinical characteristics of subjects

Groups	Cases	Gender male - female	Age (years)	CAD	Diabetes mellitus	Hyperlipidemia
RAS	26	12 - 14	58.7±7.6	22 (84.6)	8 (30)	12 (46.1)
NRAS	96	68 - 28	52.5±8.4	73 (76)	12 (12.5)	41 (42.7)
P value		P=0.019	P=0.002	P=0.35	P=0.025	P=0.75

RAS = Renal artery stenosis;

NRAS = non-renal artery stenosis;

CAD = Coronary artery disease

Results are presented as percentages or mean ± SD

Discussion

We evaluated the incidence of RAS and its related risk factors in hypertensive patients undergoing coronary angiography.

The overall incidence of RAS was 21.3%, 14.7% of which was significant. The prevalence of RAS varies substantially among selected patients and in different geographic areas. For example, in a study performed by Wachtell et al., the incidence of RAS was 34% in patients with hypertension and peripheral vascular disease.¹³ In another study conducted by Aqel et al., the incidence of single RAS in hypertensive veterans referred for coronary angiography was 28% and 10% had bilateral RAS.¹⁴

In a study conducted in the USA, 47.2% of hypertensive patients had RAS, 28% had less than 50% stenosis, and 19.2% had stenosis of 50% or more.⁵ The prevalence of RAS in the Iranian society is apparently lower than in western nations.

Our results were similar to those of a study conducted on Asian populations by Yamashita et al.; they found the prevalence of significant RAS to be 13% in Japanese hypertensive patients.¹⁵

The majority of previous clinical trials showed that old age, severity of CAD, peripheral vascular disease, poorly controlled hypertension and renal insufficiency were clinical predictor of RAS,¹⁶⁻¹⁹ but results on sex, diabetes mellitus, and smoking were not consistent.^{20,21}

In our study, abnormal renal angiograms were found significantly more often in elderly hypertensive patients, female patients, diabetics, and severely hypertensive subjects, but smoking, CAD, and hyperlipidemia had no relationship with RAS. Therefore, risk factors for the development of atheromatous change in renal arteries may be different from conventional CAD risk factors and detecting them is of great importance since RAS is a progressive disease and a frequent cause of end-stage renal failure.

We found RAS to be common in subjects with diabetes mellitus and coexistent hypertension; the incidence of RAS was significantly different between hypertensive diabetics and hypertensive non-diabetics. The association between old age and RAS in this study was similar to that described in other studies, but the age of our study population was lower than other studies.^{22,23}

Thus, one might predict a trend toward more RAS in the future. Our results are similar to those of earlier studies about the relationship between severe hypertension and RAS.^{24,25}

Limitations of our study should be noted; the first was that most hypertensive patients were taking medications; hence the severity of hypertension may have been underestimated. Furthermore, in contrast to major trials, the present study included only 122 subjects.

Our findings suggest that RAS is frequent in hypertensive patients undergoing coronary angiography and more attention should be directed towards RAS in hypertensive patients with old age, severe hypertension, history of diabetes mellitus and female gender.

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