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Original Article

Prevalence and Predictors of Renal Artery Stenosis in Patients with Type 2 Diabetes and Coronary Artery Disease Undergoing Coronary Angiography

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Abstract

Background: Atherosclerotic renal artery stenosis (RAS) is a major comorbid and independent risk factor for cardiovascular diseases. The presence of diabetes mellitus (DM) an independent predictive factor for RAS has been controversial. Many studies evaluated the risk of RAS in patients with DM as a subgroup analysis rather than a study population. We evaluated the prevalence of RAS specifically in patients with Type 2 DM and coronary artery disease (CAD).

Methods: The diabetic patients with CAD undergoing coronary angiography (CAG) and renal angiography were planned after completion of the CAG. The renal arteries were selectively cannulated with judkins right catheter, and renal angiogram was completed. In difficult cases, nonselective renal angiogram was done using pigtail catheter. Significant RAS was defined as decrease of at least 50% in luminal diameter.

Results: A total of 50 patients with angiographically proven CAD were studied. There were 30 men (60%) and 20 women (40%) with a mean age of 54.4 years (range 36-75). Patients had segment elevation myocardial infarction (STEMI) (n = 15), unstable angina/non-STEMI (n = 15), CSA (n = 20) 0.12 (24%) patients were smokers, 24 (48%) patients had hypertension, 20 (40%) patients had hyperlipidemia and 7 (14%) patients were receiving insulin treatment. Among 50 patients, 8 (16%) had a significant RAS, of which one had bilateral involvement. The prevalence of RAS was 2%, 4%, and 10% for single vessel disease, 2 vessel disease, left main coronary artery, and triple vessel disease, respectively. RAS was more prevalent in age >60, females, patients with coexistent hypertension (HT).

Conclusion: We, therefore, find that screening of RAS should be a part in diabetic patients with multivessel disease and coexistent HT. It is necessary to detect atherosclerotic RAS to save renal function, prevent complication by timely intervention limitation.

Key words: Coronary artery disease, Diabetes mellitus, Renal artery stenosis

INTRODUCTION

Atherosclerotic renovascular disease is a frequently overlooked and potentially correctable disease. Unsuspected renal artery stenosis (RAS) of varying severity coexists with coronary artery disease (CAD) patients. It is increasingly recognized that atherosclerotic RAS is an important cause of renal insufficiency, refractory hypertension (HT), and cardiac destabilization syndromes (unstable angina and flash pulmonary edema). The prevalence of RAS ranges from 3–30% in patients undergoing coronary angiography (CAG) for suspected CAD. RAS coexists with CAD of varying severity. There is a linear correlation between RAS and severity of CAD. It independently predicts mortality in CAD patients undergoing CAG. The increased mortality is mainly attributed by cardiovascular diseases. The coexistence of diabetes mellitus (DM), HT, CAD, and RAS forms a deadly combination.

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MATERIALS AND METHODS

This is a observational, analytical study. This study was done with the aim of screening RAS in patients with DM with CAD who are admitted for CAG and predicting risk factors association with atherosclerotic RAS.

Study Population

This study was conducted among 50 diabetic patients with CAD admitted for coronary angiogram. Informed and written consent were obtained from each patient before being included in the study.

Inclusion criteria

The inclusion criteria were patients admitted with a history of diabetes with CAD, planned for CAG.

Exclusion criteria

1. Does not opt for inclusion in the study
2. Pregnancy
3. Age <30 years
4. Chronic renal insufficiency GFR <60 ml/min/m^2
5. Patients with EF <30%
6. History of contrast allergy.

Data Collection and Methods

Clinical analysis includes the presence of signs of HT, CAD, and RAS. Laboratory profile includes blood counts, urea, creatinine, lipid profile, echocardiogram, for all patients, treatment details to be collected including drugs for HT, DM, CAD.

Outcome includes identify patients with high-risk clinical predictors and the prevalence of significant RAS thereby recommend screening in that subgroup and planned revascularization

Procedure

The diabetic patients with CAD undergoing CAG and renal angiography were planned after completion of the CAG. The renal arteries were selectively cannulated with judkins right catheter, and renal angiogram was completed. In difficult cases, non-selective renal angiogram was done using pig tail catheter. A significant RAS was defined as decrease of at least 50% in luminal diameter.

Statistical Analysis

The information collected regarding all the selected cases were recorded in a master chart. Data analysis was done using SPSS software Sigma stat 3.5 version (2012). Using this software, range, frequencies, percentage, mean, standard deviation, and *P* value were calculated through one-way ANOVA, Chi-square, Pearson, and Spearman correlation test and $P < 0.05$ was taken statistically significant.

RESULTS

A total of 50 patients with angiographically proven CAD were studied. There were 30 men (60%) and 20 women (40%) with a mean age of 54.4 years (range 36-75). Patients had segment elevation myocardial infarction (STEMI) ($n = 15$), unstable angina/non-STEMI (UA/NSTEMI) ($n = 15$), CSA ($n = 20$). 12 (24%) patients were smokers, 24 (48%) patients had HT, 20 (40%) patients had hyperlipidemia and 7 (14%) patients were receiving insulin treatment.

Among 50 patients, 8 (16%) had a significant RAS of which one had bilateral involvement. The prevalence of RAS was 2%, 4%, 10% for single vessel disease (SVD), 2 vessel disease (2VD), left main coronary artery (LMCA), and triple vessel disease (TVD), respectively. RAS was more prevalent in age >60, females, patients with coexistent HT.

DISCUSSION

RAS is a major comorbid and independent risk factor for cardiovascular disease. The western data show a prevalence of 13.5-18% in patients undergoing CAG for suspected CAD.[1] Less data are available from the Indian subcontinent.

The prevalence of RAS in our study conducted in 50 patients is 16%.[2,3-5] Mean age is 54.4 years (Table 1). Most of the patients are females. STEMI is the most common clinical presentation (Table 2). The conventional risk factors such as smoking and dyslipidemia did not find a significant association. The coexistent of HT increases the probability of RAS in the study group. In the subgroup analysis of our study, the prevalence of RAS was 2%, 4%, and 10% for SVD, 2VD, LMCA, and TVD, respectively (Table 3).[6] We, therefore, find that screening for RAS should be a part in TVD population. This study

Table 1: Age distribution

Age in years	Total number of cases *n*=50 (%)	RAS *n*=8 (%)
<40 years	10 (20)	1 (2)
41-55	16 (32)	2 (4)
56-70	22 (44)	5 (10)
>70	2 (4)	-

RAS: Renal artery stenosis

Table 2: CAD versus RAS

CAD	Total no of cases *n*=50 (%)	RAS *n*=8 (%)
CSA	20 (40)	4 (8)
UA/NSTEMI	15 (30)	3 (6)
STEMI	15 (30)	1 (2)

RAS: Renal artery stenosis, CAD: Coronary artery disease, UA/NSTEMI: Unstable angina non-segment elevation myocardial infarction

Table 3: CAD/angiogram versus RAS

CAD/angio	Total no of cases *n*=50 (%)	RAS *n*=8 (%)
SVD	10 (20)	1 (2)
2VD	11 (22)	2 (4)
3VD	14 (28)	2 (4)
LMCA	15 (30)	3 (6)

CAD: Coronary artery disease, LMCA: Left main coronary artery, RAS: Renal artery stenosis, 2VD: 2 vessel disease

made us to screen RAS in a subset of patients such that unnecessary renal angiogram could be avoided in vast majority patients. Although RAS can be present in non-diabetes and normal coronary patients, the number is too low. Hence, we excluded this population from our study. We have also excluded PAD in our study as to reduce access site complications. Our study found age >60 years, female sex, coexistent HT, and multivessel disease as predictors of RAS.[7-10]

The luminal diameter of significant RAS was ≥50% in our study. The relatively high prevalence in our population may be less stringent criteria.

The presence of diabetes as an independent predictor of RAS has been controversial, but many of these studies evaluated the risk of RAS in patients with DM as a subgroup analysis rather than a study population.

Our study evaluates the prevalence of RAS specifically in adults with type 2 diabetes.

Limitations of the Study

The study population was small and it is a single-center cross-sectional observational study.

Functional assessment of RAS was not done. IVUS and FFR are not in our investigation strategy.

There is a strong correlation of RAS and peripheral artery disease but peripheral angiogram was not part of our study.

Overestimation of lesion severity was done because it is only a luminogram and orthogonal assessment is not done.

CONCLUSION

We, therefore, find that screening of RAS should be a part in diabetic patients with multivessel disease and coexistent HT. It is necessary to detect atherosclerotic RAS to save renal function and prevent complication by timely intervention.

REFERENCES

1. Jean WJ, al-Bitar I, Zwicke DL, Port SC, Schmidt DH, Bajwa TK. High incidence of renal artery stenosis in patients with coronary artery disease. Cathet Cardiovasc Diagn 1994;32:8-10.
2. Ollivier R, Boulmier D, Veillard D, Leurent G, Mock S, Bedossa M, *et al.* Frequency and predictors of renal artery stenosis in patients with coronary artery disease. Cardiovasc Revasc Med 2009;10:23-9.
3. Harding MB, Smith LR, Himmelstein SI, Harrison K, Phillips HR, Schwab SJ, *et al*. Renal artery stenosis: Prevalence and associated risk factors in patients undergoing routine cardiac catheterization. J Am Soc Nephrol 1992;2:1608-16.
4. Alhaddad IA, Blum S, Heller EN, Beato MA, Bhalodkar NC, Keriaky GE, *et al*. Renal artery stenosis in minority patients undergoing diagnostic cardiac catheterization: Prevalence and risk factors. J Cardiovasc Pharmacol Ther 2001;6:147-53.
5. Olin JW. The prevalence of atherosclerotic renal artery stenosis and clinical clues to the diagnosis. J Invasive Cardiol 1998;10:191-3.
6. Leandri M, Lipiecki J, Lipiecka E, Hamzaoui A, Amonchot A, Mansour M, *et al.* Prevalence of renal artery stenosis in patients undergoing cardiac catheterization: When should abdominal aortography be performed? Results in 467 patients. J Radiol 2004;85:627-33.
7. Dzielinska Z, Januszewicz A, Kadziela J, Makowiecka-Ciesla M, Demkow M, Janas J, *et al*. Predictive risk factors of renal artery stenosis in hypertensive patients with coronary artery diseases undergoing coronary angiography. J Hypertens 2004;22 Suppl 2:S234.
8. Aytemir K, Fatihoğlu G, Karakulak UN, Kaya EB. Frequency and prediction of renal artery stenosis in hypertensive patients undergoing coronary angiography. Eur Heart J 2012;33 Suppl 1:455-6.
9. Rigatelli G, Rigatelli G. Predictors of renal artery stenosis in patients with normal renal function undergoing coronary angiography. Minerva Cardioangiol 2006;54:145-9.
10. Cohen MG, Pascua JA, Garcia-Ben M, Rojas-Matas CA, Gabay JM, Berrocal DH, *et al.* A simple prediction rule for significant renal artery stenosis in patients undergoing cardiac catheterization. Am Heart J 2005;150:1204-11.

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