Original Article

Prevalence of Renal Artery Stenosis in Patients Undergoing Routine Coronary Angiography

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Abstract

This retrospective observational study aimed to see the angiographic association of at Renal-Artery Stenosis (RAS) with Coronary Artery Disease(CAD) in Bangladeshi population.It was conducted in the department of cardiology,Khwaja Yunus Ali Medical College and Hospital (KYAMCH),Enayetpur, Sirajgonj, Bangladesh,from January 2007 to January 2009.A total 281 patients with Ischaemic heart disease,on non emergent coronary angiogram who underwent either selective or non selective renal angiography were enrolled in this study. Among 281 patients, male patients was 241(85.76%), female was 40(14.23%) and age group was 30-75 years. Among those patients 228(81%) patients had Coronary artery disease, 53(18.86%) patients had normal coronary artery. Among CAD, 51(18.14%) patients had single vessel disease (SVD),39(13.87%) patients had double vessel disease (DVD),124(44.12%) patients had triple vessel disease(TVD) and 14(4.9%) patients had minimal coronary artery disease.RAS was detected 23(8.18%) patients and RAS with HTN was 18(78%) patients and ARAS without HTN was 5(21.73%) patients.RAS tends to increase with age. In age group 30-45 years, RAS was 17.39% and age group 50-75 it was 82.60%.The incidence of was high in50.09±8.76 years. Incidence of RAS was more common in male patients (73.91% vs. 26.08%).

Key words: *RAS- Renal Artery Stenosis; CAD-Coronary Artery Disease.*

Introduction

Atherosclerotic renal artery stenosis (RAS) is an important and frequently unrecognized contributor to refractory hypertension (HTN), ischemic nephropathy, and cardiac destabilization syndromes (unstable angina, flash pulmonary edema, and decompensated heart failure).[1-5] Atherosclerotic RAS is a progressive disease leading to renal atrophy over time and chronic kidney disease despite control of HTN.[6-13] Presence and severity of incidental RAS is an independent predictor of mortality in atherosclerotic patients regardless of the mode of treatment of underlying coronary artery disease[13-15]. The prevalence of RAS has been reported to be in the range of 20-30 percent in high risk populations including patients with known atherosclerotic vascular disease elsewhere.[16-18]. The prevalence of RAS increase with age, in patients known or suspected coronary artery disease ,hypertension, peripheral vascular disease[17]. In these patients invasive screening for RAS is highly cost-effective especially when done at the time of another invasive diagnostic procedure like cardiac catheterization, and may affect treatment strategies.19 Atherosclerosis is a diffuse process but affects certain regions of the vascular bed preferentially. The association between extent and severity of CAD and RAS has been well established

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in most previous studies,[12-14] but a few has been addressed the relationship between the distribution of lesions in coronary tree and RAS.[2,8,14] The main purpose of our study was to find out if any association exists. In conclusion, we postulated that these findings might help decide in which group of patients screening renal angiography could be justified following coronary angiography.

Objectives:

To determine the prevalence of renal artery stenosis (RAS) and associated risk factors in patients undergoing cardiac catheterization for suspected coronary artery disease.

Methods:

This retrospective observational study aimed to see the angiographic association of renal-artery stenosis(RAS) with coronary artery disease in Bangladeshi people. It was conducted in department of cardiology, Khwaja Yunus Ali Medical college & hospital (KYAMCH), Enayetpur, Sirajgonj, Bangladesh, from January 2007 to January 2009.A total 281 patients with Ischaemic heart disease, on non emergent coronary angiogram who underwent either selective or non selective renal angiography were enrolled in this study.

Selective angiography was performed by a Right Judkins catheter with hand injection of non ionic contrast agent in each main and accessory renal artery and with supplementary semi selective injection if needed .Non selective angiography ,when utilized was performed by powered injector with non ionic contrast agent through a Pigtail catheter positioned at the level of the L1 vertebral body in the postero-anterior projection. All images were recorded digitally at 30 frames/sec.Digital subtraction was reserved for cases with poor visualization of the renal artery due to overlying gas and structures.

Inclusion criteria: Patients of Ischemic heart disease(Chronic stable angina, Unstable angina, NSTEMI, STEMI).

Exclusion criteria: Vulvular heart disease, Cardiomyopathy, Congenital heart disease.

Results:

Of the 281 patients, 228 had Coronary Artery Disease and significant RAS were present in 23 patients. Patients mean age was 49.89 (± 9.04), patients age was from 30-75 years. Baseline demographic Characteristics are mentioned in the following table.

Table 1: Baseline Demographic Characteristics

	Parameters	Features
Age	Mean age Range	49.89 (± 9.04) 30-75 years
Sex	Male Female	241(85.76%) 40(14.23%))

In 281 IHD patients were significantly associated with major risk factors of coronary artery disease. Table 2 shows commonest risk factors of those patients who were undergoing routine coronary angiography.

Table 2: Risk factors Profile study population:

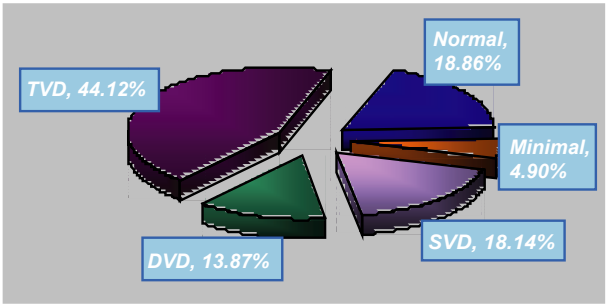
Risk factors	Number	Percent
Hypertension	65	23%
DM	35	12.45%
Smoking	84	29.89%
Hyperlipidaemia (Dyslipidaemia)	91	32.38%

Among 281 Ischaemic heart disease patients diagnosed by clinically and routine investigations such as -ECG,Troponin I, ETT,Echocardiography than we performed coronary angiography and CAD was present in 228 (81%) patients and absent of Coronary Artery Disease was 53 (18.86%) patients. In this study, among the CAD patients, TVD was found 124 patients (44.12%), DVD 39 patients (13.87%) and SVD was 51 patients (18.14%).

Table 3: Coronary Artery involvements On Coronary angiogram.

Coronary angiogram	Frequency	Percent
Normal	53	18.86%
Minimal CAD	14	4.9%
SVD	51	18.14%
DVD	39	13.87%
TVD	124	44.12%

Fig: Pie chart shows Involvement of Coronary artery.



Pie chart shows 53 (18.14%) patients had normal Coronary Artery Disease, 51(18.14%) patients had SVD,39 (13.87%) patients had DVD,124 (44.12%)) patients had TVD and 14 (4.9%) patients had minimal CAD.

Atherosclerotic Renal artery stenosis was mostly common in patients of increasing age group such as 46-75 years and lower frequency in lower age group 30-45.So ARAS was relatively high incidence in advanced age group and also in hypertensive patients.

Table 4: Frequency of RAS in different age group.

Age Group (years)	RAS on renal angiogram	Percent
30-45	2	8.69%
46-75	19	82.60%

RAS was more common in male 73.91%(17 patients) than female 26.08% (6 patients) among the total RAS(23 patients) and mean age of the male patient was 49(±9.23) and female patient was 52(±8.45).But frequency of RAS is relatively high(15% vs. 7.05%) in female patient in relation to male patients among the total female patient(40 patients).

Table 5: Frequency of RAS in different sex group.

Sex	RAS	Renal angiogram Normal	Total number
Male	17(7.05%)	224(92.94%)	241
Female	6 (15%)	34 (85%)	40

Among the 281 total ischaemic heart disease patients undergoing routine coronary angiography we found RAS were older 50(±8.76).Association of risk factor ARAS is stastically significant with HTN, DM, smoking. There was no significant association with Dyslipidaemia.But RAS more common in male patients and incidence of RAS increasing with age.

Table 6: Clinical Characteristics of RAS

Character	Without RAS	With RAS	P value
Total number	258(91.81%)	23(8.1%)	
Age	49.89(±9.04)	50.09(±8.76)	
Gender			
Male	224(79.71%)	17(6.04%)	
Female	34(12.09%)	6(2.13%)	
HTN	47(16.72%)	18(6.40%)	0.001
DM	21(7.47%)	14(4.98%)	0.0001
Smoking	73(25.97%)	11(3.91%)	0.0499
Dyslipidaemia	84(29.89%)	7(2.49%)	n/s

*n/s-not significant

ARAS is significantly associated with coronary artery disease. Table 7 shows ARAS in relation to CAD. Atherosclerotic renal artery stenosis was present in 23 (8.1%) out of 281 IHD patients ongoing routine coronary angiography.

Table 7: Association of RAS with CAD

	With RAS	Without RAS	P value
CAD;n=228	23(8.1%)	205(89.91%)	d"0.0158

RAS is associated with different coronary artery involvement ARAS tends to increase with the severity of CAD. Coronary artery disease was present 228 population among 281 patients. 228 coronary artery diseased patients RAS was present 23 patients. Here table shows association of RAS with different vessels involvements of CAD.

Table 8: Association of RAS with Different CAD.

Coronary Angiogram	Renal Angiogram		P value
+VE n= 228	With RAS n=23	Without RAS;n= 205 (normal)	
SVD	1(0.43%)	50(21.92%)	n/s
DVD	3(1.31%)	36(15.78%)	n/s
TVD	19(8.33%)	105(46.05%)	0.0042
Minimal CAD	- A-	14(6.14%)	

*n/s-not significant

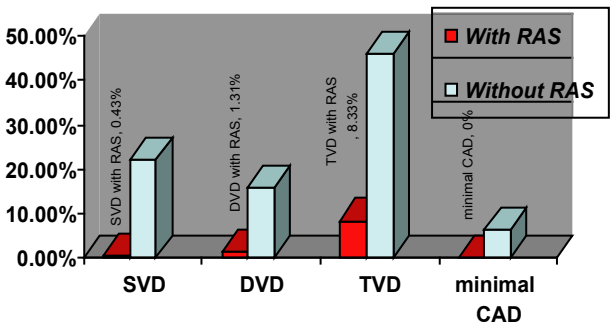


Fig: Bar chart shows Relation between multiple CAD & RAS

Statistical analysis:

Data were analyzed using the Statistical Package for Social Sciences. Continuous variables are presented as mean + SD. Continuous variables between the groups were compared by using categorical variables were compared by Chi-square test with help of SPSS 17 version of computer software.

Discussion:

Atherosclerotic renal artery stenosis accounts for 90 percent cases of renal artery stenosis and associated with common clinical syndromes, HTN, ischaemic heart nephropathy, and with premature cardiovascular events (myocardial infarction, stroke and, death)[8,25]. In this study, the prevalence of angiographically RAS was 8.1% which lower than previously reported values in the range of 11-23%.[21-24].

In our study; total 281 ischaemic heart disease patients undergoing routine coronary angiography we found mean age of the RAS were 50(±8.76) years and association of risk factor of RAS is stastically significant with HTN, DM, smoking. There was no significant association with dyslipidaemia.But RAS was more common in male patient and incidence of RAS increasing with age. Renal artery stenosis was mostly common in patients of increasing age group such as 46-75 years and lower frequency in lower age group 30-45. So RAS was relatively high incidence in high age group.

In weber -mzel et al 8 2002 study patients with RAS were older (67±8 years=0.004) whereas in Buller et al showed 73.2 years (p=0.001); but we found RAS were older 50(±8.76); RAS was more common in male(17 patients) than female(6 patients) 73.91% vs 26.08% among the total RAS(23 patients) and mean age of the male patient was 49(±9.23) and female patient was 52(±8.45). But frequency of RAS is relatively high(15% vs. 7.05%) in female patients in relation to male patients among the total female patient(40 patients). But in Buller et al[17] RAS is more common in female gender 13% vs. 6%.

We found highly significant relationships between atherosclerotic involvement of triple vessel disease and RAS. As for number of coronaries involved, patients with three vessels CAD showed strong relationship with RAS and those with normal coronaries or insignificant CAD had a potent negative association with RAS. The predilections of certain sites in vascular system to develop atheroma are clear.[1] RAS predominantly affects the aorto-ostial segment,[1] but relationship between distribution of coronary artery lesions and segments involved has not been addressed extensively. There was no relationship between anatomical distribution of coronary artery lesions and RAS; in a study by Danesh et al,[2] but two and 3-vessel coronary disease reported as an independent predictor of significant RAS. In our study RAS is significantly involve with TVD (RAS with TVD 8.33% ; p=0.0042 which is stastically significant)) with although the therapeutic implications of incidentally detected RAS has been remained controversial until now 26 it may be valuable to be aware of this condition given the progressive nature of the disease, the precautions in prescribing angiotensin antagonists and possibly the need to revascularization in appropriately selected cases. Given the considerable drawbacks of noninvasive imaging techniques[1,2,13] and safety of renal angiography[13,16,17] recognizing potential candidates for screening of RAS based on readily available variables at the time of cardiac catheterization is important from a practical point of view. Patients with incidental RAS may deserve aggressive medical treatment and more close follow-up.

Conclusion:

In conclusion, RAS is present in a significant proportion of patients undergoing cardiac catheterization for suspected coronary artery disease. The probability of having significant RAS is increased in elderly patients with hypertension, diabetes mellitus, smoking, diffuse coronary artery disease.

Acknowledgements:

We greatly appreciate all interventional cardiology fellowships and medical officers and catheterization laboratory staff of the Khawja Yunus Ali Medical

College and Hospital for their cooperation in data collection & valuable scientific help to complete this study.

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