

Original Research Article

Clinical profile of patients undergoing coronary angiography with special reference to complications of coronary angiography

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ABSTRACT

Background: Cardiovascular Diseases (CVD's) remain the biggest cause of death worldwide. Recent trends suggest that disease incidence has escalated and has started affecting younger age group also. Incidence of CVD's has been on increasing trend not only in urban areas but in rural areas also. Aim of this research is to study clinical profile and complications in patients undergoing coronary angiography.

Methods: 100 patients admitted in hospital who were planned for coronary angiography were selected. All routine investigations, HbA1c if patient is known diabetic, Serology, ECG, CXR were done at the time of admission. General physical and local examinations were performed at the end of procedure, after 12, 48 and 72 hours of coronary angiography.

Results: Acute Myocardial Infarction (AMI) is the commonest indication for CAG in this study group. Out of 100 patients who underwent CAG, complications occurred in 29 individuals. Only 3 types of complications- Haematoma, Anaphylactoid reactions and Contrast Induced Nephropathy (CIN) are observed in this study.

Conclusions: Hypertension, obesity, family history of IHD in first degree relatives and DM are important risk factors for IHD. Most common complication of CAG is haematoma. Females patients are more predisposed for all complications DM, HTN, advanced age and CHF are independent risk factors for developing CIN.

Keywords: Angiography, Cardiovascular diseases, Haematoma, IHD

INTRODUCTION

Cardiovascular Diseases (CVD's) remain the biggest cause of death worldwide. More than 8 million deaths occurred due to CVD's in 2008 more than 3 million of these deaths occurred before the age of 60 and could have largely been prevented.¹

In India, also CVDs have been leading cause of morbidity and mortality. Recent trends suggest that disease incidence has escalated and has started affecting younger age group also. Incidence of CVD's has been on increasing trend not only in urban areas but in rural areas

also. Its prevalence was estimated to be 3-4% in rural population and 8-10% in urban population, based on cross sectional surveys.¹ If future trends are considered prevalence of CVDs may get doubled in coming 20 years in both rural and urban populations of India. Amongst the many diseases that comprise cardiovascular diseases (CVD's) coronary artery disease (CAD) is the leading cause of mortality and morbidity, others being hypertensive heart disease, cerebrovascular diseases, peripheral vascular diseases, valvular heart diseases and congenital heart disease. Despite the advance in other diagnostic methods, coronary Angiography (CAG) remains to be the "gold standard" in diagnosis of

coronary artery diseases. Since its introduction several years ago coronary angiography and intervention has become widely used and ever increasingly popular diagnostic modality.

Aim of this research was to study clinical profile and complications in patients undergoing coronary Angiography.

METHODS

A cross sectional observational study was performed. 100 patients admitted in Bharati Hospital who were planned for coronary angiography were selected. Detail informed consent in patient’s language was obtained. Inclusion criteria included patients undergoing coronary angiography irrespective of indication for coronary angiography. Exclusion criteria included patients who underwent coronary angiography and subsequently underwent angioplasty at the same time or within 72 hours of coronary angiography.

Detail clinical history and medication history was taken. General and systemic examination according to standard proforma was done and recorded. All routine investigations- complete hemogram, RFT, LFT, SE, PT-APTT-INR, BSL, Hba1c if patient is known diabetic, serology, ECG, CXR were done at the time of admission. General physical and local examinations were performed at the end of procedure, after 12, 48 and 72 hours of coronary angiography.

Immediately after procedure patients were screened for periprocedural complications, vascular puncture related complications, immediate anaphylactoid reactions and conduction disturbances. After 12 hours of the procedure patients were looked for haematoma and other haemostasis related complications. Patients were re-examined after the period 48 hours after procedure to look for delayed anaphylactoid reactions and local infection. Lab investigations RFT were repeated to look for radio-contrast induced nephropathy. After 72 hours of the procedure patients were screened for rare complications like Pseudo aneurysm, delayed anaphylactoid reactions and arterio-venous fistula etc. Statistical analysis was assessed using Mean±standard deviation, Pearson’s correlation coefficient, Chi square test and ANOVA tests using SPSS software.

RESULTS

Out of 100 patients included in study group, 42 were females while 58 were males.

There were 3 patients below the age of 30 years, and 8 patients above 60 years. Most common age group in study group was of 41-50 yrs consisting of 47 patients. Average age of the patients included in study was 54.48±12.91 years.

Out of 100 patients included in study group, according to WHO guidelines only 28 patients had normal BMI. 28 patients were pre-obese; 35 patients had class 1 obesity and remaining 9 patients had class 2 obesity. After 72 hours of the procedure patients were screened for rare complications like pseudo aneurysm, delayed anaphylactoid reactions and arterio-venous fistula etc. Statistical analysis was assessed using Mean ± standard deviation, Pearson’s correlation coefficient, Chi square test and ANOVA tests using SPSS software.

No addiction was seen in the female patients of the study group. Amongst the 58 male patients of the study group; 21 patients had addiction only of alcohol, 10 patients had addiction of smoking along with alcohol. 27 male patients did not have any addiction. Hypertension was the commonest risk factor of IHD observed in the study group. 66 number of patient had hypertension. 37 patients were diabetic. 23 patients had both diabetes and hypertension. 43 patients had positive family history of IHD. 44 patients out of 100 had either class 1 or class 2 obesity, accounting for second most prevalent risk factor of IHD in study population.

The commonest indication for CAG was acute myocardial infarction. 52 patients were subjected to CAG post AMI. Second most common indication was NSTEMI. 2 patients underwent CAG for evaluation of arrhythmia in absence of any obvious cause. Some other indications of CAG in patients of our study group were Positive stress test and Congestive Heart Failure (CHF), in 11 and 10 patients respectively.

Right femoral arterial approach was favored over radial arterial. In 94 out of 100 patients of our study group right Femoral artery was selected for CAG while right Radial artery was used in remaining 6 patients. Out of 100 patients who underwent CAG; 29 patients had at least one or more than complication. Table 1 shows the distribution of complications in study group.

Table 1: Gender versus occurrence of complication.

	Total patients	Complication occurred in	Percentage
Male	58	16	27.59%
Female	42	13	30.95%

Table 2: Gender wise distribution of type of complication.

Complication	Gender		Total
	Male	Female	
Haematoma	7/58 12.07%	8/42 19.05%	15/100
Contrast induced nephropathy	6/58 10.34%	7/42 16.67%	13/100
Immediate anaphylactoid reactions	4/58 6.90%	2/42 4.76%	6/100

Above Table 2 shows that, only 3 types of complications were seen in the study group. The commonest of them all was haematoma, which was observed in 15 patients. Second common complication was Contrast Induced Nephropathy (CIN) which was observed in 13 patients. While least common complication was of anaphylactic reactions, seen in only 6 patients.

There were no complications seen in patients below 30 years of age. Next age group of 31-40 years had total 14 patients out of those only 2 (14.19%) had complications.

Next age group of 41-50 years had total 47 out of those 11(23.40%) patients had complications. Next age group 51-60 years had total 28 patients out of those 12 (42.86%) patients had complications. The present study group had 8 patients older than 60 years and out of those 4 (50%) patients had at least one or more complications. From Table 3, we can conclude that occurrence of complications increased with the increase in the age of the patients.

Table 3: Age wise distribution of complications.

Complication	Age group										Total
	≤ 30	31 - 40	41 - 50	51 - 60	> 60						
Haematoma	0	3	1/14	7.1%	5/47	10.6%	8/28	28.5%	1/8	12.5%	15
Contrast induced nephropathy	0	3	0/14	0	5/47	10.6%	6/28	21.4%	2/8	25%	13
Immediate anaphylactic reactions	0	3	1/14	7.1%	2/47	4.3%	2/28	7.1%	1/8	12.5%	6

Table 4: Vascular access site versus complication comparison.

Complication	Vascular puncture		Total
	Radial	Femoral	
Haematoma	0	15	15
Contrast induced nephropathy	1	12	13
Immediate anaphylactoid reactions	0	6	6

13 out of 15 patients who had haematoma had either DM or HTN or both. While 12 out of 13 patients who suffered from CIN had either DM or HTN or both. 6 patients out of 100 had anaphylactoid reactions in our study group, these reactions include mild symptoms like nausea, vomiting, skin rash and itching. Out of the 13 patients who developed contrast induced nephropathy (CIN); 4 were below the age of 60 while 9 were above the age of 60. It shows that risk of developing CIN increases with increasing age. Out of 13 patients who developed CIN; 6 were male and 7 females. Out of the 13 patients who developed CIN only 1 did not have any co-morbidity; while remaining 12 had either DM or HTN or both. It shows strong positive association of comorbidities (DM/HTN) with that of CIN. Our data shows that out of 13 patients who developed CIN 5 patient had Congestive Heart Failure (CHF). Our study group had total 10 patients who had CHF. It suggests 50% of patients having CHF developed CIN in our study group; showing strong association between CHF and CIN. In the present study group 16 patients received N-Acetylcysteine (NAC) prior to the procedure prophylactically for the prevention of CIN. Due to such small number, a comparative study

between the patient who received NAC and the patients who did not receive it could not be carried out.

Out 16 patients who received NAC, 12 patient’s serum creatinine value increased after CAG. Among those 12 patients 4 patients developed CIN.

DISCUSSION

The maximum patients of the study group belong to the age group of 41-50 years followed by next group of 51-60 years. Each group had 47 and 28 patients respectively. 75% patients of the study group were between ages of 41-60 years supports the fact of IHD is common in middle age group. Out of 100 randomly selected patients 58% were male while 42% were female patients. We can conclude that prevalence of IHD is more common in males than females. This can be due to the difference in the risk factors like smoking and alcohol consumption between males and females in Indian population.

Addiction pattern was observed in patients of study group. 69% of the patients did not have any addiction. All the 42 female patients belong to this group along with 27 male patients who did not have any addiction. Out of remaining 31 patients; 10 patients had only smoking addiction and remaining 10 had addiction of both smoking and alcohol.

Association of smoking with cardiovascular disease is well known. Smoking alone causes 1/10th of cardiovascular disease worldwide.² Our study group had 31% of patients who had history of alcohol consumption at least for 10 years or more. This figure supports the established association of alcohol consumption and its cardio-metabolic effects.³ Second most common risk

factor for IHD in our study group is obesity. 28% of the patient had BMI higher than normal and 44% patient had either class I or Class II obesity.⁴

Prevalence of obesity in such high percentage supports the evidence of high BMI as a risk factor for IHD in Indian population.⁵ Studies conducted in other parts of the world also show similar evidences.⁶⁻⁹

Commonest complication of CAG in our study group is haematoma. 15% patients had haematoma out of 100 patients. Incidence of haematoma and access site bleeding varies among different institutions and centers. In a study done in Pakistan by Wajih-ur-Rehman et al, incidence of haematoma and bleeding has been reported upto 6.2%.¹⁰ The incidence of haematoma is significantly lower in western countries. In a study carried out in England by Duerman et al, reported decrease in incidence in 1.7% in 2005 to 0.78%.¹¹ Similarly, a study carried out by Whimmer et al, in Massachusetts U.S. reports incidence of femoral access site bleeding to be 1.2%.¹²

If we look at the gender wise incidence of haematoma, percentage of female patients who developed haematoma is more than that of males. Similar trends were seen in studies done by Ahmed et al and Chiu et al.^{13,14}

When radial artery was selected for vascular access, no incidence of haematoma was seen. All 15% haematoma complications occurred when femoral arterial access was selected. The lower incidence of vascular access site complications in radial artery can be explained as radial artery being more superficial and narrower in lumen as compared to femoral artery. Thus, it is easier to apply compression and achieve haemostasis in radial artery compared to femoral artery.

Results from our study match with most of the similar studies around the world where vascular access site complications were significantly lower in radial than in femoral artery.¹⁵⁻¹⁷ Despite that, in our institution femoral arterial access is favored more than radial artery as in most centers.¹⁵⁻¹⁷ This can be due to the extra skill required by the operator for radial artery access. Another reason is femoral artery diameter is more and it is easier to use large size catheters. The radiocontrast agent is iodinated molecule of benzene ring. The risk for adverse allergic reaction increases with higher osmolality and higher ionicity. The risk for adverse allergic reaction is 1-3% for non-ionic contrast agent.¹⁸

In our institute, radiocontrast used during CAG is Iohexol which is a low osmolar nonionic contrast agent. Total 6% patients from our study group had anaphylactoid reactions to Iohexol. These reactions included mild symptoms like nausea, vomiting and skin rash. Severe reactions like anaphylaxis and haemodynamic instability requiring intensive care can also occur but its incidence very low. Goss et al in 1995 reported incidence of contrast related severe anaphylactic reaction to be 0.23%

in Cathlab during cardiac catheterisation.¹⁹ Contrast induced nephropathy (CIN) is an iatrogenic renal injury that follows intravascular administration of radio-opaque contrast media. Expectedly more and more patients are at risk of developing CIN with advancement of radio-imaging diagnostic and therapeutic modalities and its ever-increasing use. In today's era CIN remains third most common cause of hospital acquired Acute Kidney Injury (AKI).²⁰

The incidence of CIN after any kind of diagnostic procedure including Percutaneous Coronary Intervention (PCI) is 9-16%.²¹ Following are some studies carried out in different parts of world showing incidence of CIN occurring after percutaneous coronary intervention (PCI).

In the present study, overall incidence of CIN is 13%, but incidence is higher among patients of DM and CHF. 6 out of 37 diabetics, 7 out of 66 hypertensive and 5 out of 10 patients having CHF developed CIN. Thus, incidence of CIN among diabetics of our group is 16.22%, among hypertensives is 10.6% and among patients having CHF it is 50%. Incidence of CIN in diabetics and CHF is higher than that of overall incidence. We can confirm the positive association of DM and CHF with CIN. Our study findings are consistent with other studies like Bartholomew et al, Mehran et al, Marenzi et al.²²⁻²⁴ All these studies have identified DM and CHF to be independent risk factor for CIN. Numerous studies on the role of NAC in prophylaxis of CIN have been published, but the results are conflicting. Several small prospective randomized trials showed that the administration of NAC had beneficial effects, whereas some of the studies have shown NAC to be ineffective in prevention of CIN. In our study 16 patients received NAC prior to procedure for the prophylaxis of CIN. 12 patients among those 16 showed rise in serum creatinine level after CAG, 4 of them developed CIN. So, NAC administration was not beneficial for prevention of CIN in our study group.

Conclusion of this study was hypertension, obesity, family history of IHD in first degree relatives and DM are important risk factors for IHD. Most common complication of CAG is haematoma. Females patients are more predisposed for all complications. DM, HTN advanced age and CHF are independent risk factors for developing CIN.

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