Angiographic Studies of Coronary Artery Disease in Rangpur Medical College Hospital

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Abstract :

Background : Coronary artery disease (CAD), one of the leading causes of death is increasing globally. The number of CAD is also increasing in Bangladesh. Rangpur Medical College & Hospital is also providing cardiovascular services to populations from urban, semiurban and rural population of northern region of the country. It started coronary angiography services from June 2011. This paper aims to analyze pattern of coronary artery occlusion in patients undergoing coronary angiography during January to October 2019. Methods: This was a retrospective observational study conducted in the cardiology department. There were a total of 308 cases of diagnostic angiography and coronary interventions done in Rangpur Medical College & Hospital from January to October 2019. Among them 308 cases of coronary angiography done for Acute Coronary Syndrome and Stable Angina, were analyzed using SPSS (Statistical Package for Social Science), version 17. Results: Males were higher in number than females and majority of the patients were at or above 50 years of age. Out of 308 cases 225 had Acute Coronary Syndrome (ACS) and 83 had Stable Angina. 54 out of 308 were found to have normal coronaries. 25 patient with ACS had normal coronary. Out of all the patients with coronary stenosis, 19 had left main disease, 59 had SVD, 62 has DVD, 71 patient had TVD. 9 patients had CTO. 159 patients had severe coronary stenosis. 117 out of 225 ACS patient had more than one coronary artery involved, which is significantly higher than the stable angina group (p<0.01). Severe stenosis was found to be more common in ACS group (p<0.003) when compared to the stable angina group. Conclusion: There has been a change with regard to clinical presentation and onset of risk factors for CAD at young age, but the load of atherosclerotic burden and pattern of involvement of coronary arteries have not changed in Elder group. Coronary angiography is a useful diagnostic and therapeutic tool for CAD. Coronary status is significantly different in ACS and stable angina. ACS has more chance of having multivessel stenosis whereas stable angina has single vessel, less severe or normal coronaries. Severity of stenosis is also high in ACS than in stable angina.

Indexing words : Acute coronary syndrome (ACS), Non-ST-Segment elevated myocardial infarction (NSTEMI), ST-segment elevated myocardial infarction (STEMI), Unstable angina (UA).

University Heart Journal 2021; 17(1): 55-59

Introduction:

The prevalence of CAD varies considerably by populations, may be up to 10 folds[1] and it is one of the leading cause of death is increasing globally.[2]

Each year approximately 3.8million men and 3.4 million women die from CAD[3]. It is becoming more significant and growing problem in most of the low income countries as well.[4]

South Asians are unduly prone to develop CAD[5]. Most notable features of CAD in this population are the extreme prematurity and severety; 2-4 fold higher prevalence, incidence, hospitalization & morality; 5-10 years earlier onset of first myocardial infarction (MI) and 5-10 fold higher rates of MI and death before the age of 40 years.[5,6] The prevalence of CAD in Bangladesh has been reported to be 0.33% to 19.6% in different studies.[6,7,8,9,10] Despite marked disparity in values, there seems to be a rising in prevalence of CAD in Bangladesh. A nation-wide survey is needed to find out the current epidemiological aspect of CAD in the country.

As the number of CVD is increasing in major hospitals in Bangladesh. This can be accounted to the fact that the risk factors of CAD, ie, smoking, hypertension, Diabetes mellitus, dyslipidaemia & obesity, have been increasing

rapidly. In Bangladesh approximately 20% of adult and 40-65% of elderly people suffer from hypertension, high incidence of metabolic syndrome and life style related factors like obesity high salt intake and less physical activity.[11]

According to the Non Communicable Disease (NCD) Risk factor survey 2010[12] prevalence of self reported documented DM is 3.9% (Men 4.3% and Women 3.6%). The prevalence of DM in rural population was 7.2 % in a recent study.[13] Tobacco consumption is quite common in Bangladesh: prevalence is 51.0 % in any from, 26.2% for smoking and 31.7% for smokeless tobacco.[12] Prevalence of dyslipidaemia was 16.6% in general, 22.2% in male & 15.9% in female.[14]

The excess burden of CAD among south Asian appears to be primarily due to dyslipidaemia that is characterized by high levels of apoB, triglyceride (TG) & LP (a); borderline high levels of low-density lipo protein cholesterol (LDL-C); and low level of high density lipo protein cholesterol (HDL-C) and $apoA_1$.

In UK, Bangladeshi men have 112% higher CAD mortality and 220% higher stroke mortality than europids[15]. Also among the south Asians in UK, Bangladeshis have the highest prevalence of most of the CAD risk factors.[16,17,18]

Rangpur Medical College Hospital provides services to rural, semiurban & urban population of northern region of Bangladesh. This Hospital has been providing speciality service in cardiovascular disease since 1981. Majority of patients in cardiology department in initial period were Rheumatic heart disease, Corpulmonale, Congenital heart disease, Hypertension & CAD. But in the last decade's trend has changed into CAD, Hypertension, Heart failure, Corpulmonale & rheumatic heart disease.

With the increased burden of CAD in Rangpur Medical College Hospital (RpMCH) many cases need to be referred to capital city, Dhaka for coronary angiogram and other interventions. Duration of transportation from Rangpur to Dhaka and affordability are always challenges for making decision to refer such cases.

Rangpur Medical College Hospital started cardiovascular laboratory services since June 2011. Indicated cases of acute coronary syndrome and stable coronary artery disease were investigated with coronary angiography and interventions were done according to necessity.

This papers aims to analyze pattern of coronary artery occlusion in patients undergoing coronary angiography during January to October months of 2019.

Methods:

This was a retrospective observational study conducted in the cardiology department. There were a total 308 cases of diagnostic angiography and few coronary interventions done in Rangpur Medical College Hospital from January to October 2019. Data were collected from patient's demographic profile & patient's registrar. Coronary angiography was performed in ACS according to their presentation. Stable angina patients having continued chest pain were evaluated with angiography.

Coronary angiography and Intervention were done using Philips Allura Xper FD 10 X-ray system. All coronary angiographic studies were performed from femoral & Radial approach using standard catheters and techniques. Each coronary artery was selectively viewed in at least two projections.

Grading of stenosis : Was done as per the following criteria: SCCT grading scale for stenosis severety[19]

0.	Normal	Absence of plaque and no luminal stenosis.
1.	Non significant (minimal)	Less than 30% stenosis of luminal diameter of any epicardial artery.
2.	Intermediate (Mild to moderate)	30 to <50% stenosis of luminal diameter of LMCA, or 30 to <70% stenosis of luminal diameter of one of the major epicardial arteries.
3.	Obstructive (Severe)	At least 50% stenosis of luminal diameter of LMCA or at least 70% stenosis of luminal diameter of at least one of the major epicardial coronary arteries.
4.	CTO (Chronic total occlusion)	A complete obstruction of a coronary arteries, exhibiting TIMI 0 or TIMI 1 flow, with an occlusion duration >3 months.

Two separate observers analyzed the report, imaging materials and documents independently. Data analysis was done using SPSS 17.

Based on diseases severety, obstructive coronary artery disease (CAD) was classified as Single Vessel Disease (SVD), Double Vessel Disease (DVD) or Tripple Vessel Disease (TVD).

Results :

The age and sex distribution of the patients is listed in Table I. Males were higher in number than females and majority of the patients were at or above 50 years.

Table -I

Age & sex distribution

Variabe		N=308		Percentage
Sex	Male 229			74.35
	Female 91			29.54
Age		Male	Female	
	30-44	64	14	25.32
	45-54	71	37	35.06
	55-64	66	29	30.84
	>65	28	11	12.66

Regarding the clinical diagnosis prior to coronary angiography, 225 (73.05%) had acute coronary syndrome (ACS) and 83(26.94%) had stable angina.

Table-II

Risk factors of CAD among patients who underwent coronary angiography. Majority of patients with CAD had multiple risk factors. Dyslipideamia was found to be a major risk factors contribute to CAD.

	M	F	N	%
HTN, DM & dyslipi daemia	39	10	36	15.9
HTN & DM	19	9	28	9.09
HTN & dyslipi daemia	38	11	49	15.90
DM & dyslipi daemia	23	11	36	11.68
DM	29	14	43	13.96
HTN	31	19	28	9.09
Dyslipi daemia	29	13	49	15.90

The angiographix findings showed that majority of the cases had coronary stenosis (Table 3)

Fifty four out of 308 were found to have normal coronaries. 25 patients with ACS had normal coronary. Out of all the patients with coronary stenosis, 19 had left main disease, 133 had more than single vessels involvement. 159 had severe coronary stenosis

Table-III

Angiographic findings

Angiographic findings	M	F	Number	%
Coronary stenosis	188	66	254	82.46
Normal coronary arteries	31	23	54	17.53

Table-IV

Angiographic profile among the patient who underwent CAG

Angiographic profile	M	F	N	%
Normal	31	23	54	18.18
Non significant	15	05	20	6.49
Intermediate	31	11	42	13.63
Obstructive CAD				
SVD	43	10	53	17.20
DVD	41	21	62	20.12
TVD	58	19	77	25.00

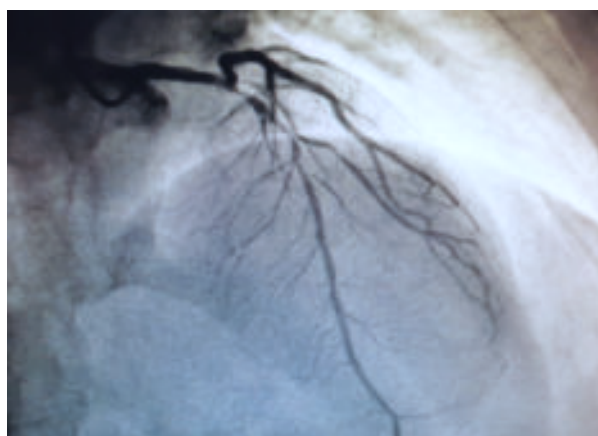**Fig.-1:** *Coronary angiogram in a patient with angiographically significant RCA lesion.*

Fig.-2: *Coronary angiogram in a patient with angiographically significant LAD lesion.*

Table 5 shows classification of coronary stenosis between ACS and stable angina groups in terms of number of vessels involved. 117 out of 225 ACS patients had more than one coronary artery involved, which is significantly higher than stable angina group (P<0.01).

Table-V
Coronary artery classification among the patient of ACS & stable angina

		Normal	Non significant	Intermediate	SVD	DVD	TVD	Level of significance
ACS	NSTEMI	7	4	11	12	29	37	
	STEMI	6	2	09	17	13	10	
	UA	12	3	12	13	11	17	
Stable	Angina	29	11	10	17	09	07	P<0.01
		54	20	42	59	62	71	

Table-VI shows the level of stenosis between two groups. Severe stenosis was found to be more common is ACS group (p <0.003) when compared to the stable angina group .

Table-VI

ACS	Less severe <70%	Severe >70%	Level of significance
	41	159	P < 0.003

Discussion:

Acute coronary syndrome and stable angina are the clinical presentation of coronary artery disease. Majority of CAD is due to atherosclerosis. The clinical presentation depends upon the pathology of atherosclerosis.[6] The process of atherosclerosis may vary between patients. The atherosclerosis causing stenosis and complete blockade can be assessed with coronary angiography, computed tomography. The coronary angiography helps to identify the coronary anatomy and luminal diameter correctly. With its multiple view, coronary lumen can be better evaluated and in intervented as per necessity.

Studies have found that majority of patients (74.35%) were male. Patients more than 65 years were 12.66%. Majority of patients were at or above 50 years of age and majority of CAD has multiple risk factors. The study also showed that 41% of studied population had hypertension, Diabetes Mellings & dyslipideamia and 9% had isolated hypertension, 15% had dyslipideamia. In this study there has been a changing trend in the number of young patient undergoing CAG and the reason for this is the onset of risk factor for CAD at younger age.

Not all ACS or stable angina cases in this study had coronary stenosis which support the report by Germing A et. al.[19] Our study showed that 17.53% of study population who had either ACS or stable angina had normal coronaries. In comparison to stable angina, normal coronaries were less frequent in ACS group.

The progression of coronary artery disease is commonly observed with history of stable angina. Progression in acute presentations of ACS usually evolves from a previously insignificant rather than a previously significant stenosis.[21]

Our study showed that 35% of stable angina had normal coronary, 25% had less severe stenosis and 40% had severe form of stenosis. In ACS group 71% had severe stenosis, 18% had less severe stenosis and 11% had normal coronaries.

The study found that 52% of ACS patients had more than one vessel involved where as 19% of stable angina patients had more than single vessels involved. The pattern of involvement of coronary arteries was same between the ACS & stable angina patients; LAD is the most coronary affected vessel[22,23,24] followed by involvement of LCX, RCA and LMCA is the least involved vessel. The prevalence of CTO was lesser in our study similar to other studies. CTO mostly commons involved RCA.[23]

Looking at the severity of stenosis and number of vessels involved, ACS had more complex in nature. Ambrose JA et al, reported that unstable angina has more irregular and multiple narrowing compared to stable angina[25]. This findings is also supported by MankovIH et.al. who found that the incidence of acute coronary syndrome – Unstable angina or myocardial infraction is higher in complex stenosis.[26]

Conclusion:
There is an alarming increase in the proportion of young patients angiographically diagnosed to have significant coronary artery disease. It is essential to identify atherosclerotic risk factors in those patients and treat them more aggressively to prevent devastating cardiovascular events. The atherosclerotic burden is greater in elder group than young as understood from the higher prevalence of obstructive CAD in elder group. Coronary angiography is a useful diagnostic and

therapeutic tool for CAD. Coronary status is significantly different in ACS and stable angina. ACS has more chance of having multivessel stenosis where as stable angina has single vessel, less severe or normal coronaries. Severety of stenosis is also high in ACS than in angina.

Limitations of this study:

Intravascular ultrasound (IVUS), Optical cohorence tomography (OCT) or Fractional flow reserve (FFR) was not used in this study. Hence we are not able to comment anything further on Intermediate lesions.

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