''PERCUTANEOUS CORONARY ANGIOPLASTY AND ITS CORRELATION WITH THE COMORBID STATUS OF THE PATIENTS ''

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ABSTRACT

Background- coronary heart disease which is also called coronary artery disease is a clinical syndrome that refers to the failure of the coronary artery circulation to adequately maintain the balance between myocardial oxygen supply and consumption[2]. The most common pathophysiological mechanism of CHD is atherosclerosis. Cardiovascular diseases are considered significant causes of death in developed countries and increasingly in many developing countries. Among these, coronary heart disease (CHD) is the most common cardiovascular disease and is associated with high disability and mortality. Coronary artery disease is managed with medical therapy with or without myocardial revascularization. This article aims at examining issues of management of patients with coronary heart disease undergoing percutaneous coronary intervention (PCI) in particular with selective drug-eluting stent (DES).

Objective-To study ''PERCUTANEOUS CORONARY ANGIOPLASTY AND ITS CORRELATION WITH THE COMORBID STATUS OF THE PATIENTS ''.

Material and method- The present study was a prospective study conducted in the Department of General Medicine tertiary care center at central India on 200 CAD cases who underwent PTCA and were followed up for 1 year to look for any clinical symptom or major adverse cardiac event after discharge from hospital**.**

Result- In the study 37.5% of patients were Diabetic, 63% of patients were hypertensive, 30% of patients had a smoking history and 46% of patients had dyslipidemia. After one year of follow-up, it was found that 9% of the patients developed angina, 6.5% had Reinfarction, and 1.5% of patients expired. There was a higher and more significant incidence of angina, Reinfarction, and mortality in Diabetes patients when compared to non-diabetics. Similarly, the incidence of angina and reinfarction was 11.9% and 8.7% respectively among hypertensives as compared with 4.28% of patients developing angina and 2.7% developing Reinfarction within 1 year after PTCA. There was a significant chance of angina and reinfarction in dyslipidemic when compared to normal lipidemics with p values of 0.004 and 0.005 respectively. Among the smokers 16.6% had angina, 15.38% had reinfarction and 3.33% expired within 1 year of follow-up that was statistically significant when compared with non-smokers, indicating a high incidence of angina and reinfarction among smokers than non-smokers post PTCA with P-value 0.013 and 0.010 respectively. Among 6 patients who discontinued treatment 5 developed angina, 6 presented with Reinfarction, and 3 patients expired during 1 year of follow-up postPTCA, indicating a significantly lower incidence of angina, reinfarction, and death among patients who continued treatment. In the present study occurrence of angina, reinfarction, and death was higher in MVD patients with 11.11% of MVD developing angina, 12.6% having reinfarction, and 3.17% expiring when compared to SVD.

Conclusion- It can be concluded from the present study that angioplasty in myocardial infarction cases is able to bring off sustained good long-term outcomes. Mortality rates in the patients following angioplasty are less and factors contributing are therapy discontinuation and multiple comorbidities.

Introduction

Cardiovascular diseases are considered significant causes of death in developed countries and increasingly in many developing countries. Among these, coronary heart disease (CHD) is the most common cardiovascular disease and is associated with high disability and mortality. It is estimated that by the year 2020, CHD will become the leading cause of death worldwide[1].

Coronary heart disease which is also called coronary artery disease is a clinical syndrome that refers to the failure of the coronary artery circulation to adequately maintain the balance between myocardial oxygen supply and consumption[2]. The most common pathophysiological mechanism of CHD is atherosclerosis.

This coronary artery disease is managed with medical therapy with or without myocardial revascularization[3]. Myocardial revascularization can be achieved with percutaneous coronary angioplasty or Coronary artery bypass graph.

The projects in this article aim at examining issues of management of patients with coronary heart disease undergoing percutaneous coronary intervention (PCI). In particular the following were examined: clinical outcomes following PCI with selective drug-eluting stent (DES)[4].

The introduction of DES has revolutionized interventional cardiology by reducing restenosis and thus target vessel revascularization (TVR) rates[4]. Selective use of DES in those patients at the highest risk of restenosis is a potentially attractive approach as it may allay concerns about the risk of late stent thrombosis (ST) [5] and the need for compliance with dual antiplatelet therapy aspirin, and clopidogrel for 1 year. Hence, clinical outcomes were examined after the adoption of criteria for selective DES use at Jaya Arogya Hospital, Gwalior.

OBJECTIVE
The present study was a prospective study conducted in the Department of General Medicine tertiary care center at central India on 200 CAD cases who underwent PTCA and were followed up for 1 year to look for any clinical symptom or major adverse cardiac event after discharge from hospital. Main aim of study is- ''PERCUTANEOUS CORONARY ANGIOPLASTY AND ITS CORRELATION WITH THE COMORBID STATUS OF THE PATIENTS ''

MATERIAL AND METHODS
Duration of study: October 2019-October 2020.

Inclusion criteria: All CAD patients who underwent PTCA with DES as per ACC/AHA/ECS guidelines.

Exclusion criteria: CAD patients who were candidates for medical therapy or were suitable for CABG, according to ACC/ECS were excluded from the study.

After a detailed history, thorough clinical examination and routine investigations (CBC, RFT, LFT, RBS, lipid profile, ECG, 2D-Echo, cardiac biomarkers) were done. Patients were treated and after PTCA, any complications in the Cath lab were reported. Patients were followed up for 1 month/6 month and 1 year for evaluation of clinical symptoms and any MACE (Major adverse cardiac events) were noted.

RESULTS
A hospital-based prospective observational study was conducted among patients with myocardial infarction who have undergone PTCA. The study was conducted among 200 patients with an aim to follow up for a period of 1 year. The clinical endpoints were recorded at 1,6 and 12 months post-PTCA. The mean age of study participants was 55.84±8.83 with a range of 35-77 years. In the study, males were exceeding females with male to female ratio3:1. In the study 72(37.5%) out of 200 patients were Diabetic, 126(63%) patients were hypertensive, 60(30%) patients had a smoking history and 92 patients had dyslipidemia (46%). In the present study, 97 out of 200 patients had Anterior wall MI contributing to 48.5%,93(46%) out of 200 had Inferior wall MI, 4(2%) had Posterior wall MI, and 6 (3%) had lateral wall MI. In the study 73(36.5%) participants had normal LV function, 93 out of 200 (46.5%) had mild LV dysfunction, 25 (12.5%) had moderate LV dysfunction and 9 (4.5%) had severe LV dysfunction. The most common vessel to be involved was LAD (34%), followed by RCA 41(20%), 54 had double vessel disease and 7 had Triple vessel disease. single vessel was involved in 68.5% and multiple vessels in 31.5%; In the study 172(86%) patients had sustained clinical recovery and 28(14%) required admission during 1 year after PTCA.

After one year of follow-up, it was found that 9% of the patients developed angina, 6.5% had Reinfarction, and 1.5% of patients died as shown in table no. 1.

TABLE 1 : Outcomes at the end of 1, 6 and 12 months

Age (yrs)	Post PTCA to 1 month (n=200)	Between 1 to 6 months (n=188)	Between 6 to 12 months (n=162)	Total	Percentage (%)
Angina	6	8	4	18	9
Reinfarction	1	7	5	13	6.5
Death	0	1	2	3	1.5

In the present study, there was a higher and more significant incidence of angina, Reinfarction, and mortality in Diabetes patients when compared to non-diabetics. There was a significantly high chance of Reinfarction in patients with diabetics when compared to nondiabetics with a p-value of 0.009. Out of 72 patients with Diabetes Mellitus who underwent PTCA 10(16.1%) developed angina, 9(12.5%) developed reinfarction, and 2(2.77%) died within 1 year of PTCA as shown in table no.2.

Table 2: Relationship between diabetes mellitus and major cardiovascular events at the end of follow up

Outcome		DM		P value
		Present	**Absent**	
Angina	Present	10	8	0.07
	Absent	62	120	
Reinfarction	Present	9	4	0.009
	Absent	63	124	
Death	Present	2	1	0.26
	Absent	70	127	

In the study out of 126 Hypertensive patients, 15(11.9%) developed angina,11 (8.7%) developed Reinfarction, and 3 died within 1 year after PTCA when compared with non-hypertensive patients in whom 3 (4.28%) developed angina 2(2.7%) patients developed Reinfarction, and 1(1.35%) died showing a higher incidence of angina, reinfarction, and mortality among hypertensives compared to non-hypertensives as shown in table no.3.

Table 3: Relationship between hypertension and major cardiovascular events at the end of follow up

Outcome		Hypertension		P-value
		Present	**Absent**	
Angina	Present	15	3	0.06
	Absent	111	71	
Reinfarction	Present	11	2	0.09
	Absent	115	72	
Death	Present	3	0	0.0181
	Absent	123	74	

In the present study out of 92 dyslipidemic patients 14 developed angina, 12 had reinfarction and 2 died when compared to non-dyslipidemic showing significant chance of angina and reinfarction in dyslipidemics when compared to normal lipidemics with p value of 0.004 and 0.005 respectively as shown in table no.4.

Table 4: Relationship between dyslipidemia and major cardiovascular events at the end of follow-up

Outcome		Dyslipidemia		P Value
		Present	**Absent**	
Angina	Present	14	4	0.004
	Absent	78	104	
Reinfarction	Present	12	1	0.005
	Absent	80	107	
Death	Present	2	1	0.47
	Absent	90	107	

Among the smokers 16.6% had angina, 15.38% had reinfarction and 3.33% expired within 1year of follow-up that was statistically significant when compared with non-smokers, indicating high incidence of angina and reinfarction among smokers than non-smokers post PTCA with P-value 0.013 and 0.010 respectively as shown in table no. 5.

Table 5: Relationship between smoking and major cardiovascular events at the end of follow-up

Outcome		Smoking		P-value
		Present	Absent	
Angina	Present	10(16.66%)	8 (6.06%)	0.013
	Absent	50	132	
Reinfarction	Present	8(15.38%)	5(3.7%)	0.010
	Absent	52	135	
Death	Present	2(3.33%)	1(0.71%)	0.162
	Absent	58	139	

In the present study, among 6 patient who discontinued treatment 5 developed angina, 6 presented with Reinfarction and 3 patients expired during 1 year of follow up post PTCA, indicating a significantly lower incidence of angina, reinfarction, and death among patients who continued treatment as shown in table no. 6.

Table 6 Relationship between treatment discontinuation and major cardiovascular events at the end of follow-up

Outcome		Treatment discontinued		P Value
		Present	Absent	
Angina	Present	5(83.33%)	13	0.0001
	Absent	1	181	
Reinfarction	Present	6(100%)	7	0.0001
	Absent	1	186	
Death	Present	3(50%)	0	0.0001
	Absent	3	194	

In the present study occurrence of angina, reinfarction, and death was higher in MVD patients with 11.11% MVD developing angina, 12.6% having reinfarction, and 3.17% expiring when compared to SVD as shown in table no.7.

Table 7 : Comparison of outcome at the end of 1 ,6 and 12 months in between SVD and MVD patients

	SVD	Percentage	MVD	Percentage
Angina	11	8.02	7	11.11%
Reinfarction	5	3.6%	8	12.6%
Death	1	0.07%	2	3.17%

DISCUSSION

A hospital based prospective observational study was conducted among patients with myocardial infarction who had undergone PTCA. The study was conducted among 200 patients with an aim to follow up for period of 1 year. The clinical endpoints were recorded at 1 ,6 and 12 months post PTCA.

The mean age of study participants was 55.84±8.83 with in a range of 35-77 years which was comparable to study by Shillveri et al[6] in which the mean age of participants was 56.7±9.6years with in a range of 2-81 years. In study by Vincens Marti[7] A total of 38 nonconsecutive patients mean age was 69±8. Males were exceeding females with male to female ratio3:1. Whereas in study by Shillveri et al[6] the male to female ratio was3.1:1. In study by Takeshi et al[8], male constituted 79% of the study population.

In the study 72(37.5%) out of 200 patients had Diabetes Mellitus, 126(63%) patients had Hypertension, 60 patients had smoking history (30%) and 92 patients had dyslipidemia (46%). Which was comparable to study by shillver et al[6] which shows history of smoking was present in 74 (30.8%) and alcohol in 61(25.4%) cases. Out of 240 cases,157 (65.4%) had history of Hypertension and 82 (34.2%) had history of diabetes mellitus. The laboratory investigations revealed that 101

cases(42%) had dyslipidemia. In study by Takeshi et al[8] history of smoking was present in 26% and 44% had history of Hypertension and 29% had history of diabetes, hypercholesterolemia was present in 32% of the study.

In the study 97 out of 200 patients had Anterior wall MI contributing to48.5% .93(46%) out of 200 had Inferior wall MI. while4 had Posterior wall MI and 6 had lateral wall MI. In study by Shillveri et al [6] 50% of patients had anterior wall MI ,31.2% had inferior wall MI and 13.8% had lateral wall MI .9(3.8%) patients had global ischemia.

In the study 73 participants had normal LV function ,93 out of 200 (46.5%) had mild LV dysfunction ,25 (12.5%) had moderate LV dysfunction and 9 (4.5%) had severe LV dysfunction which was similar to study done bt shilveri et al[6] in which findings of 2D echo showed that ejection fraction was less than 35% in 18 (7.5%) cases. Ejection fraction was 35%45% in 184 (76.7%) and more than 45% in 38 (15.8%) cases.

In the study most common vessel to be involved was LAD (34%) i.e , followed by 41(20%) had RCA involvement ,54 had double vessel disease and 7 had Triple vessel disease. Single vessel was involved in 68.5% and multiple vessel in 31.5%.In study by Shillveri et al[6] around 151 (63%) patients had single vessel disease ,79(32.9%) had double vessel disease. The most common vessel involved was left anterior descending artery. All the three vessels (LCX ,LAD , and RCA) were involved in 10 (4.2%).In study by Takeshi etal[8] single vessel involved in 44% and multivessel disease in 49% and prior coronary artery involvement in 6 %.In this study also most common artery involved is LAD (43%) and RCA (43%) followed by LCX (11%) , and Left main coronary artery (3%).

In the study 6 patients developed angina with in 1 month after PTCA and 8 developed angina within 1-6 month after PTCA and 4 developed angina with in 6 month-1 year contributing to a total participants of 18 developed angina . So angina rate was 9 % at the end of one year follow up. Also 1 patient developed Reinfarction within 1 month, 7 with in 16 month and 5 developed Reinfarction within 6month- 1 year after PTCA. Reinfarction rate was 6.5 % at the end of one year follow up. 2 patients expired with in a duration of 6 month -1 year contributing to a total of 3 participants. Mortality rate was 1.5% at the end of 1 year follow up.In study by shillveri et all All the 240 cases had follow up at the end of 3 months post PTCA. At the end of 3 months, 7 (2.9%) had angina, 3 (1.3%) had reinfarction and 1 (0.4%) died during the study period. At 6 months post PTCA 231 cases had follow up, out of which 7 (3%) had angina, 6 (2.6%) had reinfarction and 4 (1.7%) died. At 12 months post PTCA 216 cases had follow up, out of which 6 (2.8%) had angina, 5 (2.3%) had reinfarction and 4 (1.8%) died during the study period .

Comparison of outcomes after angiography in different studies

	Present study	Shilveri et al[6]	Kimura et al[9]	Holubkov et al[10]	Carozza et al[11]
Angina	9%	8.33%	-	24.5%	
Reinfarction	6.5%	5.8%	4.9%	-	
Death	1.5%	3.3%	6.3%	-	2.3%

Study results are also comparable to Shiomi et al study[12].

Kimura et al [9], follow-up study after PTCA had reported that during the 1st year, reinfarction was present in 4.9% cases and 6.3% died.

 A report from NHLBI Dynamic Registry by Holubkov et al[10], had reported that at 1-year follow up, 24.5% cases had angina which was higher than that observed in present study may be due to the sophisticated infrastructure and drug eluting stents available nowadays

In the study out of 137 patients with Single Vessel disease 11 developed angina at the end of one year and the rate is 9.5% ,5 presented with Reinfarction at the end of 1 year (4.3%), 1 patient developed (0.86%). In the study out of 63 patients with DVD 7 patients presented with angina (11.11%), 8 patients with Reinfarction (12.6%) and 2(3.17%) expired with in one year of follow up. In our study occurrence of angina Reinfarction and Death was higher in MVD patients when compared to SVD.

In the study out of 72 patients with Diabetes Mellitus who underwent PTCA 10(16.1%) patient developed angina wihin 1 year when compared to 128 non diabetes patients only 8(6%) patient developed Angina showing a higher incidence of Angina in Diabetes patients. Also out of 72 diabetes patients 9(12.5 %) developed Reinfarction within 1 year .and only 4(3.125%) out of 128 nondiabetic patient developed Reinfarction and 2(2.77%) out of 72 diabetetic patient died within 1 year of PTCA. This shows a higher and significant incidence of angina ,Reinfarction and mortality in Diabetes patient

when compared to nondiabetics. There is significantly higher chance of Reinfarction in patients with diabetics when compared to nondiabetics with pvalue of 0.009. The results was almost comaparable to study done by shillveri et alwhich also showed at the end of follow-up period, the major cardio vascular events were significantly higher in diabetes when compared to the non-diabetic patients (angina 13.4% vs. 5.7%, reinfarction 10.9%vs. 3.2% and death 7.3% vs. 1.3%) .Similar to the present study Kip et al.[13], study on coronary angioplasty in diabetic patients had reported that at the end of 6 months during follow up, in diabetic cases the reinfarction rate was 9.3% and in nondiabetic cases it was 5.9%.Similar to the present study Yao et al.[14], predictors for death had reported that diabetes mellitus had significant association with mortality. However, Klugherz et al.[15], had reported that no significant association between events free survival and diabetes mellitus which was in contrast to the present study due to strict dietary habits maintained by the population after being diagnosed as diabetic

In the study out of 126 Hypertensive patients 15(11.9%) developed angina ,11 (8.7%) developed Reinfarction and 3 died with in 1 year after PTCA . among 74 non hypertensive patient 3 (4.28%) developed angina and 2 (2.7%) patients developed Reinfarction and 1(1.35%) died with in 1 year after PTCA showing a higher incidence of angina, Reinfarction, and mortality in Hypertensive patient compared to non-hypertensive. Chance of angina and reinfarction in hypertensive and non-hypertensive patients are not statistically significantly related which is comparable to study by shilveri et al in which at the end of follow-up period, the major cardio vascular events were significantly high in hypertension when compared to the non-hypertensive patients (angina 10.2% vs. 4.8%, reinfarction 8.3% vs. 1.2% and death 5.1% vs. 0%). Klugherz et al.[15], had reported that there was no significant association between events free survival and hypertension which is in contrast to the present study. Cecchi et al.[16], had found that hypertension alone is not independently associated with increased mortality, either at short term or long term follow-up, in STEMI and NSTEMI patients. Abrignani et al[17], had also reported that that in patients with history of hypertension first attack of myocardial infarction had a better in-hospital outcome than no hypertensives which was contrast to the study findings

In the study , out of 92 Dyslipedemic patients 14 (15.2%) developed angina 12 readmitted with Reinfarction (13%) and 2 patient expired with 1 year after PTCA .in the study out of 108 normolipidemic4 had angina (3.7%) 1 developed Reinfarction (0.9%) and 1 patient died with in 1 year showing an higher prevalence of angina ,reinfarction and death in patients with Hyperlipdemic as compared to normolipidemics. There is significant chance of angina and reinfarction in dyslipidemics when compared to normal lipdemics with p value of 0.004 and 0.005 respectively. In study by shilveri et al [6]At the end of follow-up period, the major cardio vascular events were significantly high in patients with dyslipidemia when compared to the patients with abnormal lipid levels (angina 14.8% vs. 3.6%, reinfarction 9.9% vs. 2.9% and death 6.9% vs. 0.7%).In accordance with the study findings Corrozza et al[11].], had reported a statistical significant association between comorbidities and restenosis in post PTCA patients. Zibaeenezhad et al.[18], had reported Major Cardiovascular Events (MACE) in 29.2% cases if multiple comorbidities were present during the follow up and a statistical significant association found between multiple comorbidities and MACE.

There is significant chance of angina and Reinfarction following PTCA in smokers when compared to nonsmokers with P value of 0.013 and 0.010 respectively. In study by Rui –ting et al [19],it was observed that in patients undergoing percutaneous coronary intervention with stent implantation, smoking is not associated with MACE :however smoking is an independent risk factor for MACE

In the study 6 patient who discontinued treatment 5 developed angina ,6 presented with Reinfarction and 3 patient expired during 1 year follow-up PTCA. There is significant higher incidence of angina ,Reinfarction and death in treatment discontinued participants in contrast to treatment continued participant.

CONCLUSION

It can be concluded from the present study that angioplasty in myocardial infarction cases is able to bring off sustained good long-term outcome. Major cardiovascular adverse events were higher in patients with history of smoking, Diabetes , Hypertension and Dyslipidemia. Mortality rates in the patients following angioplasty are less and factors contributing are therapy discontinuation and multiple comorbidities. Those patients with comorbidities and history of smoking need monitoring and proper follow up. Patient who were on regular treatment and proper follow up are likely to have normal life

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