

EARLY EXPERIENCE OF PERCUTANEOUS CORONARY INTERVENTION IN THE CARDIOLOGY DEPARTMENT OF CHITTAGONG MEDICAL COLLEGE HOSPITAL, CHATTOGRAM

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Abstract

Background : Percutaneous Coronary Intervention (PCI) is one of the popular methods of revascularization for coronary artery disease. Worldwide PCI cases increasing day by day & which reduce the need for Coronary Artery Bypass Grafting (CABG) of many patients. Aim of the study is to see the early success of Percutaneous Transluminal Coronary Angioplasty (PTCA) cases performed in CMCH with their in-hospital and short term outcome.

Materials and methods : It is prospective observational study and an early report of ongoing study. We tested 150 patients from July'14 to May'17 in cardiology ward of CMCH. Acute Coronary Syndrome (ACS) patients are diagnosed in hospital. After initial stabilization of ACS patients, Coronary Angiogram (CAG) was done within 2-6 weeks after discharge. Significant symptomatic lesions treated by Percutaneous Transluminal Coronary Angioplasty (PTCA). Assess the patient during procedure and subsequent in-hospital stay and follow up at 1, 3 month after discharge.

Results : The study population consisted of 150 patients (116 men and 34 women) with a mean \pm SD age of 51.79 \pm 8.6 years. ACS patients diagnosed as Myocardial infarction (35), NSTEMI (11) & UA (29). CAG shown 107 patients single, 30 double lesion & 13 total occlusions. PTCA were done through femoral (98 patients) and Radial (52) approach. Most of the patients need predilatation (134) before stent implantation. DES (Drug Eluting Stent) for 70.4% were deployed in most of the patients, Bare Metal Stents (BMS) deployed rest of the patient (30.6%) and Double stents needed 28 patients with mean diameters (mm) 2.89 \pm 0.2 and mean length of 14.68 mm \pm 2. TIMI Grade 03 flow was in 104 patients (69.3%). All the stent

implantation procedures were successful except one. 148 patients cured & discharge successfully. 2 patients died (1.3%) due to acute stent thrombosis and coronary artery perforation. One case (0.6%) of coronary artery dissection was managed conservatively by Eptifibatide (Integrelin). Other complications like- Cardiogenic shock (6), hypotension (10) arrhythmia (2 cases VT) and cardiac arrest (1) managed successfully. Minimum local complication at vascular access site (Bleeding, Hematoma, etc.) was 2.6%. Subsequent follow up (1, 3 months) shows significant improvement of quality of life and no mortality. In contrary, Jeroudi et al demonstrated PTCA angiographic and clinical success in 50 and 49 patients, respectively out of 54 octogenarian patients (93% and 91%, respectively). In our study angiographic and clinical success rate 92%, 94.6% respectively out of 150 patients.

Conclusion : This is relatively new centre with limited resource & facility. Early result is encouraging. PCI is the choice of revascularization of modern cardiac era.

Key words: ACS- Acute Coronary Syndrome; PTCA- Percutaneous Transluminal Coronary Angioplasty; SD- Standard Deviation, PCI- Percutaneous Coronary Intervention; CMCH- Chittagong Medical College Hospital.

Introduction

Percutaneous Transluminal Coronary Angioplasty (PTCA) also called Percutaneous Coronary Intervention (PCI) is a minimally invasive procedure to open blocked or stenosed coronary arteries allowing unobstructed blood flow to the myocardium. The blockages occur because of lipid-rich plaque within the arteries, diminishing blood flow to the myocardium. The accumulation of lipid-rich plaque in the arteries is known as atherosclerosis. When atherosclerosis affects the coronary arteries, the disorder is known as Coronary Artery Disease (CAD).¹

Coronary Artery Disease (CAD) is the world-wide leading cause of death not only in high-income countries but also increasingly in developing countries.² Although death rates from CAD have decreased in most high- and middle-income countries in the past 2 decades, there are worrying signs of a lessening trend in the United States, Coronary Artery Disease (CAD) is considered

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the leading causes of death with Acute Coronary Syndrome (ACS).³ Percutaneous Coronary Intervention (PCI) improves symptoms and clinical outcome in patients who have Acute Coronary Syndrome (ACS) i.e who are hospitalized and undergo coronary angiography because of a coronary artery stenosis or occlusion with dynamic elevation of cardiac troponins in the blood.⁴

Andreas Gruentzig first developed PCTA in 1977, and the procedure was performed in Zurich, Switzerland that same year. By the mid 1980s many leading institutions adopted this procedure throughout the world as a treatment for coronary artery disease.⁵ PTCA is a hallmark procedure and basis of many other intracoronary interventions. It is one of the most common procedures performed in the United States making up 3.6% of all operating room procedures performed in 2011. Percutaneous Coronary Intervention (PCI) is one of the popular methods of revascularization for coronary artery disease. Worldwide PCI cases increasing day by day & which reduce the need for Coronary Artery Bypass Grafting (CABG) of many patients. We want to see the early success of Percutaneous Transluminal Coronary Angioplasty (PTCA) cases performed in CMCH (Chittagong Medical College Hospital) with their inhospital and short term outcome.

Material and methods

It was a prospective, observational study. The study population consisted of patients with a diagnosis of Acute Coronary Syndromes (ACS) who were admitted to Coronary Care Unit (CCU) Department of Cardiology of Chittagong Medical College Hospital between July 2014 and May 2017 and who subsequently underwent coronary angiography within 2-6 weeks. A total of 150 Patients with Acute Coronary Syndrome (ACS) patients are diagnosed in hospital. After initial stabilization of ACS patients, Coronary Angiogram (CAG) was done within 2-6 weeks after discharge. Significant symptomatic lesions treated by Percutaneous Transluminal Coronary Angioplasty (PTCA). Assess the patient during procedure and subsequent inhospital follow up at 1, 3 month.

Coronary angiography : The coronary angiography was done by percutaneous Judkin's technique via femoral route & radial route in cath lab, Department of cardiology, CMCH to identify the culprit

artery. Coronary angiography was performed between 2 - 6 weeks after the Acute Coronary Syndrome (ACS). Coronary angiography films were reviewed by investigators. The infarct related artery was identified from total occlusion or significant stenosis (> 70%) of the LAD, RCA or LCX or their major branches or from arteriographic evidence of intraluminal thrombosis.⁶

PCI challenges : Providing proper management and rehabilitation for patients could be very challenging. Certainly, this becomes more sophisticated if a more invasive procedure such as PCI is required. Factors that make interventional cardiologists more resistant to perform PCI for a patient can be either general factors related to the patient's general status such as frailty, co-morbidities, functionalities of their cardiovascular and other systems or local factors related to coronary lesions such as the complexity of these lesions.⁷

Definitions of PCI success : PCI procedure may have the following components of success- angiographic success, procedural success and clinical success.

Angiographic success : A successful PCI produces substantial enlargement of the lumen at the target site. Previously definition was the achievement of a minimum stenosis diameter reduction to <50% in the presence of grade 3 TIMI flow.⁸ With the advent of advanced adjunct technology, including coronary stents, a minimum stenosis diameter reduction to <20% has been the bench mark of an optimal angiographic result.

Procedural success : A successful PCI should achieve angiographic success without in hospital major clinical complications eg. death, myocardial infarction, emergency coronary artery bypass surgery during hospitalization.^{8,9}

Clinical success : clinically successful PCI includes anatomic and procedural success with relief of signs and or symptoms of myocardial ischaemia after the patient recovers from the procedure^{10,11}. Definitions of procedural complications. According to the 1998 coronary interventional document.¹⁰

The statistical significance for observed differences was assessed by student T test, test of proportions & analysis of variance used to compare differences between variables.^{9,10} p value < 0.05 was

considered statistically significant, p value < 0.001 was considered statistically extremely significant, p value > 0.05 was considered statistically not significant.

Results

The study population involved 150 patients (116 males and 34 female) with a mean \pm SD age of 51.79 ± 8.68 years with the diagnosis of Acute Coronary Syndrome (ACS). In this study 56 (37.3%) had history of hypertension, 37 (24.7%) were smokers, 32 (21.3%) were diabetic, 21 (14%) had family history of ischaemic heart disease. Average Left Ventricular Ejection Fraction (LVEF) was 55.2 ± 5 (Table-I). Most of the patients presented as a case of ST elevated Myocardial infarction 70 (46.6%), NSTEMI 22 (14.6%) & 58 (38.6%) patients as a Unstable Angina (Table I).

Table I : Baseline characteristics of study population (n=100).

Demography/other features n (% SD)	Mean age (Year) 51.79+8.6
Male	116 (77.3%)
Female	34 (22.7%)
Risk factors	
Hypertension	56 (37.3%)
Smoking	37 (24.7%)
DM	32 (21.3%)
Dyslipidaemia	22 (14.6%)
Positive F. History	21 (14%)
Clinical diagnosis	
ST Elavated MI	70 (46.6%)
Non ST Elavated MI	22 (14.6%)
Unstable Angina	58 (38.6%)
Ejection fraction (mean)	LVEF- 55.2 \pm 5

Single vessel disease was 107 (71.3%), double vessel disease was 30 (20%) & total occlusion was 13 (8.6%) (Figure-I). Majority of the patient had Type A Lesion 95 (63.3%). 138 (92%) patients had clinical success, 142 (94.6%) patient had angiographic and procedural success (Table-III).

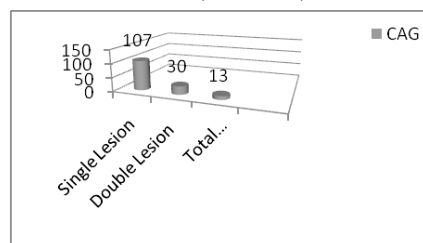


Figure 1 : Patients diagnosed as 107 patients single lesion, 30 double lesion & 13 total occlusions on CAG.

PTCA were done through femoral (98 patients) and Radial (52 patients) approach. Most of the patients need predilatation (134) before stent implantation. DES (Drug Eluting Stent) for 70.4% were deployed in most of the patients, Bare Metal Stents (BMS) deployed rest of the patient (30.6%) and Double stents needed 28 patients with mean diameters (mm) 2.89 ± 0.2 and mean length of $14.68 \text{ mm} \pm 2$. TIMI Grade 03 flow was in 104 patients (69.3%) (Table II). All the stent implantation procedures were successful except one.

Table II : TIMI flow of the target vessels (n= 150).

Parameter (TIMI flow)	Before procedure Number (%)	After procedure Number (%)
Grade -0	10 (6.6%)	4 (2.6%)
Grade -1	95 (63.3%)	0 (0%)
Grade -2	45 (30%)	43 (28.6%)
Grade -3	0 (0%)	104 (69.3%)

148 patients cured & discharge successfully. 2 patients died (1.3%) due to acute stent thrombosis and perforation with cardiac arrest. Vascular access site local complication (Bleeding, Hematoma etc.) was very minimum 2.6%. Other Complications occurred during and after procedure were cardiogenic shock (6), hypotension (10) arrhythmia (2 cases VT) and failed PTCA (1) managed successfully.

Table III : Result of stentangioplasty of study population (n =100).

Results	Total number	Percentage %
Clinical success	138	92%
Angiographic success	142	94.6%
Procedural success	142	94.6%

Table IV : In-hospital clinical outcome of study population (n=100).

Parameters	Total number Patient	Percentage (%)
Local / Puncture site (Bleeding, Hematoma, etc.)	04	2.6
Cardiogenic Shock	06	4
Acute stent thrombosis	1	0.6
Coronary artery dissection	1	0.6
Acute MI	0	0
Hypotension	10	6.6
Major arrhythmias (e.g. VT, VF)	2	1.3
Failed PTCA	1	0.6
Death	2	1.3

Subsequent follow up (1, 3 months) shows significant improvement of quality of life and no mortality.

Discussion

There is no specific age beyond which PCI cannot be performed, however, with increasing age less invasive therapy is usually preferred. In the literature, even a few centenarians underwent successful PCI procedures.^{12,13}

Age of patients presenting with ACS has a significant prognostic value and it is considered the second most important predictor of mortality after Killip class as it has been shown that the in-hospital mortality risk of a patient with ACS increases by 1.7 fold for each 10 years and by 2 folds for each Killip class deterioration.¹⁴

In our study, the population involved 150 patients (116 males and 34 female) with a mean \pm SD age of 51.79 ± 8.68 years with the diagnosis of Acute Coronary Syndrome (ACS). 64 (42.6%) highest number represent age group 51-60 years, 4 (2.6%) patients were > 70 years and second highest 41-50 years group 38 (25.3%).

Elective stenting was done in most (80%) of patients. Similar elective stenting have also been reported by Moussa et al, Colombo et al and Kimura et al (70%, 67% and 71% respectively)^{15,16}. This study showed stenting as modality of treatment for suboptimal PTCA, acute vessel closure, dissection during PTCA and restenosis following PTCA similar to those reported as an indications for stenting by various authors.¹⁷⁻²⁰. Hence unlike PTCA, this success of intracoronary stenting is not influenced by lesion morphology.

Check angiogram of them were done which showed normal functioning of the stents. Thrombus containing lesions have been considered as contraindication for stentangioplasty. Stents were successfully deployed in two patients containing thrombus in LAD (Mid) and LCX (Distal) after treatment with low molecular weight heparin. Studies have shown that presence of angiographically visible thrombus as a risk factor for subsequent stent thrombosis. Vascular access site local complication (Bleeding, Hematoma etc.) was very minimum 1.6%. Studies have shown that presence of angiographically visible thrombus as a risk factor for subsequent stent thrombosis.²¹ However, other have represented coronary stenting as safe and effective therapy for thrombus containing lesion.^{21,22}

Recently developed drug eluting stents have reduced the incidence of restenosis drastically to 8 to 10%. Ten years follow up of initial Cohort of patients treated PTCA revealed 89.5% survival rate (95% with single vessel disease, 81% in-patients with multivessel disease).²³

Percutaneous Intervention (PCI) of the Chronic Total Occlusion (CTO) lesion present great challenge including reduced success rate, prolonged procedure time, large amount of contrast use, high occlusion rate, and costs. The goal of intervention in CTO is to penetrate the total occlusion and pass the wire in the true lumen of the distal vessel without causing stent angioplasty intimal dissection. Accordingly we have successfully done stentangioplasty in 20 patients with CTO and failed in three patient due to failure of passing the wire.

PTCA is widely practiced and has risks, but major procedural complications are rare. The mortality rate during angioplasty is 1.2%.²⁴ People older than the age of 65, with kidney disease or diabetes, women and those with massive heart disease are at a higher risk for complications. Possible complications include hematoma at the femoral artery insertion site, pseudoaneurysm of the femoral artery, infection of skin over femoral artery, embolism, stroke, kidney injury from contrast dye, hypersensitivity to dye, vessel rupture, coronary artery dissection, bleeding, vasospasm, thrombus formation, and acute MI. There is a long term risk of restenosis of the stented vessel.²⁵

In our study, Vascular access site local complication (Bleeding, Hematoma etc.) was very minimum 2.6%. Other Complications occurred during and after procedure were cardiogenic shock 4%, hypotension 6.6%, arrhythmia 1.3% (2 cases VT) and failed PTCA 0.6% (1) managed successfully.

In contrary, Jeroudi et al demonstrated PTCA angiographic and clinical success in 50 and 49 patients, respectively out of 54 octogenarian patients (93% and 91%, respectively).²⁶ In our study angiographic and clinical success rate 92%, 94.6% respectively out of 150 patients.

Limitation

This is single center observational prospective study to assess the safety and short-term clinical and angiographic outcome of small number of patients. Further randomized trial may be needed for the better result.

Conclusion

PCI is the choice of revascularization of modern cardiac era. Percutaneous Coronary Intervention (PCI) have revolutionized the effective management of coronary artery disease and their symptoms. It has been increasingly demonstrated to reduce the risk of adverse events in patients with Acute Coronary Syndrome (ACS).

Recommendations

Prospective Multi Centre Study is required for confirming the result.

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Contributions of authors

AA- Conception, design, acquisition of data, drafting & final approval

KSAM- Interpretation of data, critical revision & final approval

AD- Interpretation of data, critical revision and final approval

MIC- Acquisition of data, drafting & final approval

PKD- Design, Interpretation of data, critical revision & final approval

NT-Acquisition of data, drafting & final approval

AHS- Data analysis, drafting & final approval

SD- Acquisition of data, data analysis, drafting & final approval.

Disclosure

All the authors declared no competing interest.

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