Early Clinical Outcomes of Primary Percutaneous Coronary Intervention in Bharatpur, Nepal

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ABSTRACT

Background: Primary percutaneous coronary intervention represents one of the cornerstone management modalities for patients with acute ST-elevation myocardial infarction and has undergone tremendous growth over the past two decades. This study was aimed to determine the early clinical outcomes of primary percutaneous coronary interventions in a tertiary-level teaching hospital without onsite cardiac surgery backup.

Methods: This was a prospective descriptive study which included all consecutive patients who were admitted for primary percutaneous coronary interventions between March 2011 and January 2013 at the College of Medical Sciences and Teaching Hospital, Bharatpur, Nepal. Total 68 patients underwent primary percutaneous coronary interventions as a mode of revascularization. The primary end point of the study was to identify in-hospital as well as 30-day clinical outcomes of primary percutaneous coronary interventions.

Results: The mean age was 56.31 ± 11.47 years, with age range of 32 years to 91 years. Of the 68 primary percutaneous coronary interventions performed, 15 (22.05%) were carried out in women and 10 (14.70%) in patients over 75 years of age. Primary percutaneous coronary intervention for anterior wall myocardial infarction was more common than for non-anterior wall myocardial infarction (55.88% vs. 44.12%). Proximal artery stenting was performed in 38.50% and the non proximal artery stenting in 61.50%. The outcomes were mortality (5.88%), cardiogenic shock (5.88%), contrast-induced nephropathy requiring dialysis (2.94%), arrhythmias requiring treatment (4.41%), early stent thrombosis (2.94%) and minor complications (14.70%).

Conclusion: Primary percutaneous coronary intervention improves the early clinical outcomes in patient with acute ST-elevation myocardial infarction. Despite having no onsite cardiac surgery backup, primary percutaneous coronary intervention was feasible with acceptable complications in a tertiary-care teaching hospital.

Keywords: Primary percutaneous coronary intervention; acute ST-elevation myocardial infarction; clinical outcomes; teaching hospital

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INTRODUCTION

The cornerstone of treatment of ST-segment elevation myocardial infarction (STEMI) patients is the rapid and effective restoration of blood flow. Primary percutaneous coronary intervention (PPCI) in patients with acute STEMI has now become an established and preferable method of revascularization. With the combination of catheter technique, experienced operators and the development of new devices and medications, the procedural outcomes of PPCI have improved, and as compared to the fibrinolytic therapy, PPCI has been shown to be the superior strategy resulting in a markedly lower occurrence of short-term major adverse cardiac events (1,2).

Our center is a tertiary-level hospital without cardiac surgery backup which has provided interventional cardiology services since 2011. There are only a few hospitals in Nepal which provide PCI service, and there is limited data on the outcomes of PPCI in our cohort of patients. Moreover, a limited number of studies have reported favorable outcomes for PPCI in hospitals without onsite cardiac surgery (3,4).

The objective of the present study was to evaluate the in-hospital as well as 30-day clinical outcomes in a cohort of unselected consecutive patients treated with PPCI since over last 2 years.

METHODS

All patients who underwent PPCI for the STEMI from March 2011 to January 2013 in our center were included in this study. Total 68 patients had undergone PPCI with stent deployment, where PCI was performed as a mode of reperfusion, through femoral as well as radial route. Both written and informed consent were obtained. Patients who had prior PCI at other hospitals and all lesions treated with plain old balloon angioplasty were excluded.

All patients received loading dose of aspirin, clopidogrel and atorvastatin in the emergency room. After coronary angiography, if the anatomy was eligible for PCI, additional heparin (100 units/kg) was administered intravenously and PCI was done according to the standard guidelines. However, strategic planning of the procedure and device selection was dependent on the operator’s discretion. After the PCI, patients received 150-300 mg of aspirin daily, clopidogrel 75 mg twice daily for the first month thereafter once daily, and atorvastatin 20-80 mg daily with other standard medications. After discharge from the hospital, patients were asked to come for follow-up at 30 day and also they were followed by a phone survey for 30 days.

STEMI was diagnosed on ECG changes with ST segment elevation or new onset left bundle branch block. PPCI was defined as the coronary intervention procedure for the treatment of acute STEMI performed in an emergency setting. The data collected included age, gender, past medical history of hypertension (systolic blood pressure ≥140 mm Hg, and/or diastolic pressure ≥90 mmHg, and/or on medication), dyslipidemia (fasting cholesterol ≥200 mg/dl and/or low density lipoprotein ≥130 mg/dl or on treatment), diabetes (defined as a fasting glucose >126 mg/dl and/or on treatment) and smoking; and the in-hospital as well as 30 day clinical outcomes were recorded. The clinical outcomes included were mortality, arrhythmia requiring treatment, cardiogenic shock, stroke, contrast induced nephropathy (CIN) requiring dialysis, and minor complications. CIN was defined as the impairment of renal function with either a 25% increase in serum creatinine from baseline or 0.5 mg/dl increase in absolute value, within 48 hours of PCI.

STATISTICAL ANALYSIS

Descriptive statistics of different variables of the sample population were computed. Means and standard deviations were calculated for quantitative variables like age and hospital stay. Categorical variables reported in percentages for the gender, history of dyslipidemia, diabetes, hypertension and smoking, and clinical outcomes were considered. Frequency of complications was noted as the primary outcome of the study. The statistical package for social sciences version 13.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. P values <0.05 were considered to be statistically significant.

RESULTS

Sixty eight consecutive patients who underwent PPCI were included in the study. The mean age was 56.31±11.47 years, with age range of 32 years to 91 years. Baseline clinical characteristics of the patients are shown in Ta-
ble 1. Of the 68 PPCIs performed, 22.05% were carried out in women and 14.70% in patients over 75 years of age. Past medical history showed diabetes mellitus in 20 (29.41%), systemic hypertension in 41 (60.29%), dyslipidemia in 7 (10.29%) and current or former smoking in 52 (76.47%) patients. Because more than one stent was required in some patients, total stents used were 76 and in all patients cobalt-chromium bare metal stents were deployed. Mean hospital stay duration was 5±2 days. Characteristics of culprit lesion stenting are shown in Table 2.

Among the clinical outcomes of PPCI, cardiogenic shock in 4 (5.88%), CIN requiring dialysis in 2 (2.94%), arrhythmias requiring treatment in 3 (4.41%), minor complications which were managed conservatively in 10 (14.70%), early stent thrombosis in 2 (2.94%), and death in 4 (5.88%) patients was witnessed. There were no occurrences of stroke or transient ischemic attack. Clinical outcomes of the patients are shown in Table 3. PPCI for anterior wall myocardial infarction was more common than for non-anterior wall myocardial infarction (55.88% vs 44.12%). Direct stenting was performed in 28 (41.18%) patients.

Comparing the type of vessel treated there was no significant difference between proximal LAD artery stenting as compared to proximal LCX/ RCA stenting (34.15% vs. 42.86%) and also the non proximal LAD artery stenting as compared to non proximal LCX/RCA stenting (65.85 vs 57.14%). But the number of non proximal artery stenting was significantly higher as compared to the proximal artery stenting (66% vs. 34% and 57% vs. 43% in LAD and LCX/RCA respectively, P<0.05) Table 4.

**DISCUSSION**

Thrombolytic therapy and PPCI are used as reperfusion strategies in acute STEMI. However, several randomized trials and meta-analyses have shown that PPCI is superior to thrombolysis in the treatment of STEMI in terms of death, reinfarction and stroke (1,5). Therefore, PPCI is now considered to be a superior strategy in the management of patients with acute STEMI and has undergone tremendous growth over the past two decades (1).

There has been a good progress in the field of interventional cardiology and the number of PCI procedures has increased considerably in Nepal in recent years. Till date there are only two hospitals outside the capital city Kathmandu that are equipped with a cardiac catheterization laboratory facility, and this number is too small to satisfy the medical needs of patients with CAD. This procedure has been carried in College of Medical Sciences since 2011. We started doing PCI without cardiac surgery backup and the first PPCI was done in June, 2011.

Initially, PCI was performed at clinical sites with surgical backup as complication rates and need of urgent surgery were high. With the im-
provement in catheter technique, experienced operators and the development of new devices, overall complication rates of PCI are low and emergency cardiac surgery rates resulting from PCI procedure are at 0.2% (6).

Our study revealed that the early clinical outcomes including death following PPCI in a newly emerging cardiac catheterization laboratory is considerable low. Our study represents the analysis of PPCI in a tertiary care hospital from an underdeveloped world without on-site cardiac surgery backup, and reflects a more challenging cohort of patients than those included in randomized controlled trials (7, 8).

Our study had in-hospital as well as early 30 day mortality of 5.88%, which is slightly higher as compared to international data which showed in-hospital mortality of 3% in ASSENT 4 trial (9) and Kenney and colleagues who reported 30-day mortality of 1.47% in 546 PCI procedures performed in a low volume center (10). However, mortality following PPCI in our study is comparable to another study conducted in the National Heart Center, Nepal which showed in hospital mortality of 7.5% (11). Among four deaths, two patients died who were in cardiogenic shock and one patient died next day due to retroperitoneal hematoma. One patient died 3 days after discharge at home who had multivessel disease where the culprit lesion stenting in LAD was done.

Anterior wall STEMI was more common than non anterior wall MI (55.88% vs. 44.12%). There were more stenting in LAD artery (n=41) as compared to RCA (n=26) and LCX artery (n=9). Management of proximal CAD is important due to the large areas of myocardium that lie downstream of the stenosis. The proximal LAD artery supplies nearly 40-50% of the total left ventricular myocardium, thus the proximal LAD stenosis could result in ischemia to a large area of myocardium (12,13). Alidoosti and colleagues (14) have reported that the outcomes of PCI in patients with proximal LAD stenosis were similar to patients with proximal LCX/RCA and non proximal LAD stenosis. In our study, there was no difference in number of stenting to the proximal LAD as compared to the proximal LCX/RCA, however, there was significantly higher number of stenting in the non proximal LAD and LCX/RCA as compared to the proximal parts (61.50% vs 38.50%, p<0.05). This finding showed that non proximal stenting in our study was higher than the proximal artery stenting.

In 68 PPCI cases, total 76 stents were deployed. At least 5 to 10% of patients who undergo cardiac catheterization experience a transient rise in the plasma creatinine concentration of more than 1.0 mg/dL (88 μmol/L) due to contrast-induced renal dysfunction (15). The incidence of CIN related to CAG or PCI is about 3.3% to 20% in the general population (16). In our study, CIN developed in 6 (8.88%) patients who underwent PPCI. Among those who developed CIN, four patients recovered on conservative management, however, 2 (2.94%) patients required hemodialysis. Moreover, two patients had documented early stent thrombosis and were managed with plain old balloon angioplasty only.

Door to balloon (D2B) time is an important determinant of quality of care. Guidelines recommended D2B time of less than 90 minutes, however achieving this time is possible only in ideal world scenario. In our study, the median D2B time was 110 minutes and only in 35% of patients PPCI was performed at or less than 90 minutes. In developing countries like ours, financial constraints, insurance coverage problems, and delay in decision making due to lack of knowledge are the major obstacles in following D2B time recommendations (17).

There are some limitations of our study. This study was performed in a single center and the number of patient included in the study was less. Moreover, only 30-day clinical outcomes were analyzed. Bare metal stents were used in our cases because of the financial constraint of the patient and lack of national health insurance facility in this underdeveloped country.

In conclusion, PPCI improves the early clinical outcomes in patient with acute STEMI, moreover, despite having no cardiac surgery backup, early clinical outcomes including death following PPCI were acceptable in our center.

Conflict of interest: none declared.
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