

Percutaneous Coronary Intervention in Nepal

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Abstract: *Introduction:* Percutaneous coronary intervention (PCI) is an important aspect of management of ischemic heart disease. The use of PCI has expanded with importance on minimizing post-procedural vascular and bleeding complications while maintaining procedural success. The radial artery has emerged as an alternative to the femoral artery for the access site for the procedure.

Objectives: The main objective of the study was to assess the trend of PCI, procedural outcome and complications.

Methods: This is a retrospective study which included four thousand two hundred and eighty eight patients who had underwent percutaneous coronary intervention during the study period of ten years from 2002 to 2012. The data on demographic profile, angiographic characteristics, outcome and complications of the procedure were analyzed.

Results: The mean age of the patients was 50 ± 10.5 years ranging from 21 to 91 years. The 79.5% (3409) were male and 20.5% (879) were female. The 75.3% (3228) of the PCI were elective procedure. The 94.38% (4047) of the patient had single vessel PCI and 241 (5.62%) had multivessels PCI. The PCI to LAD was the most common in 2153 (47.43%) followed by RCA 1401 (30.87%) and then LCX 957 (21.08%). Overall success rate of the procedure was 95.03%. The mortality was observed in 1.07% (46) of the patients. The use of radial artery access for the PCI has a rising trend over years. The 43.5% of the procedure were performed from the radial access in 2012.

Conclusion: Percutaneous coronary intervention in Nepal is increasing every year with accepted success rate and complication. With experience more complex cases are being done. Radial PCI has increasing trend.

Keywords: Percutaneous coronary intervention (PCI), Femoral access, Radial access.

INTRODUCTION

Percutaneous coronary intervention (PCI) was first performed by Andreas Gruentzig in 1977 [1]. The treatment of obstructive coronary artery atherosclerosis using percutaneous balloon dilatation techniques has undergone rapid evolution in last 25 years. Bare metal stents are permanently placed to relieve the obstruction to the coronary flow and drug eluting stents produce more predictable long term improvement [2]. PCI use, over time, has expanded to include more patients with acute coronary syndromes and complex, multivessel disease and having severe comorbidities [3]. The evolution of PCI has given importance on minimizing post-procedural vascular and bleeding complications while maintaining procedural success [4]. The history of transradial intervention appears to date back to 1989 when Campeau *et al.* [5] performed catheterizations through this access. The first transradial PCI was performed in Amsterdam [6]. PCI was started in Nepal in January 2002 and first Radial PCI was performed in 2005. Study on PCI and its outcome is lacking in Nepal. This study aims to analyze the trends of PCI,

procedural outcomes and complications of the procedure in Nepal.

METHODS

This is a multicentre retrospective study. The data of all consecutive patients undergoing percutaneous coronary intervention at all the seven hospitals with the cardiac catheterization facility in Nepal were collected. PCI was performed according to the standard practice. Data collected from 2002 to 2012 from the hospital registry regarding the demographic variables, angiographic findings, procedural outcomes, complications of the procedure. The descriptive and inferential statistics were used for analysis.

RESULTS

Four thousand two hundred and eighty eight patients had underwent Percutaneous coronary intervention in Nepal during the study period of 10 years starting from 2002 to 2012. The hospitals have started their facility at different time with only two centers in initial 8 years and rest five hospitals started in the last two years. The hospitals with cath lab in the country during the study period are Norvic international hospital, Kathmandu (2002), Shahid Gangalal National Heart Center, Kathmandu (2003), BPKIHS, Dharan

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(2011), College of medical sciences, Bharatpur (2011), Dhulikhel hospital (2012), Manhohan CTVTC, Kathmandu (2012), Vayoda Hospital, Kathmandu (2012).

Patient were between the age of 21 to 91 years (mean age 50 ± 10.5 yrs). Among 4288 patients, majority of them were male 3409 (79.5%) and female were 879(20.5%). Among four thousand two hundred and eighty eight patients, 3228 (75.3 %) patient had elective PCI, 832 (19.4%) patient had underwent primary PCI whereas 228 (5.3%) patient had Rescue PCI. The data inside the capital Kathmandu Valley showed elective PCI in 3178(84%) patient and primary PCI in 605(14%) however the data outside the Kathmandu Valley shows a different trend with primary PCI in 225(81.5%) and elective PCI in 51(18.5%). Majority of the patients 4047 (94.38%) had single vessel PCI and only 241(5.62%) had multivessel PCI. PCI to LAD was the most common in 2153 (47.43%) followed by RCA 1401(30.87%) and then LCX 957 (21.08%). Sixteen patient had PCI in the previous CABG while twelve patient had PCI in left main lesion. Four thousand three hundred and ninety nine stents were deployed. Among them 2575(58.54%) had drug eluting stent and 1824 (41.46%) had bare metal stent.

Outcomes

Among four thousand two hundred and eighty eight patients, PCI was Successful in 4075 (95.03 %). Femoral artery was used for access in 3668 (85.5%) while Radial in 611 (14.2%), whereas 9 (0.3%) patient had other access like ulnar and brachial artery.

Complications

The mortality was observed in 46(1.07%) and 8 patients required emergency CABG. Stroke occurred in 6 patients. Minor vascular complications like hematoma, pseudoaneurysm occurred in 102 patients. Most of the mortality occurred in patients undergoing primary or rescue PCI. Six mortality were reported inelective PCI.

Figure 1 shows the trends of total PCI, Radial access for PCI and Primary PCI in Nepal. PCI started in Nepal in 2002, 26 PCI was done that year. After this there is continuously rising trend with 557 PCI in 2009, 649 cases in 2010 followed by 879 PCI in 2011 that raised up to 1025 PCI in 2012. There is a slow rise upto 2008, then there is a rapid increase in the number of interventions. Radial PCI was started in Nepal in 2007. Out of total 282 PCI done in 2007, only 11 PCI were through radial access (3.9%). PCI was performed by radial access in 30(8.2%) in 2008, 31(5.56%) in 2009, 82(12.6%) in 2010, 217(24.68%) in 2011 and 445(43.5%) in 2012. From 2007 to 2010 was a learning curve period. In 2011, there is increase of radial PCI to 24.68% of total PCI followed by 43.5% radial PCI in 2012. Primary PCI started in 2005 with only 8 PCI that year followed by slow rise with the 33.5% of PCI being primary in 2012.

DISCUSSION

In Nepal, PCI was started on January, 2002. After five years, first radial PCI was performed in 2007. In this retrospective study, rising trends in the proportion of the radial PCI was observed with 3.9% in 2007 to

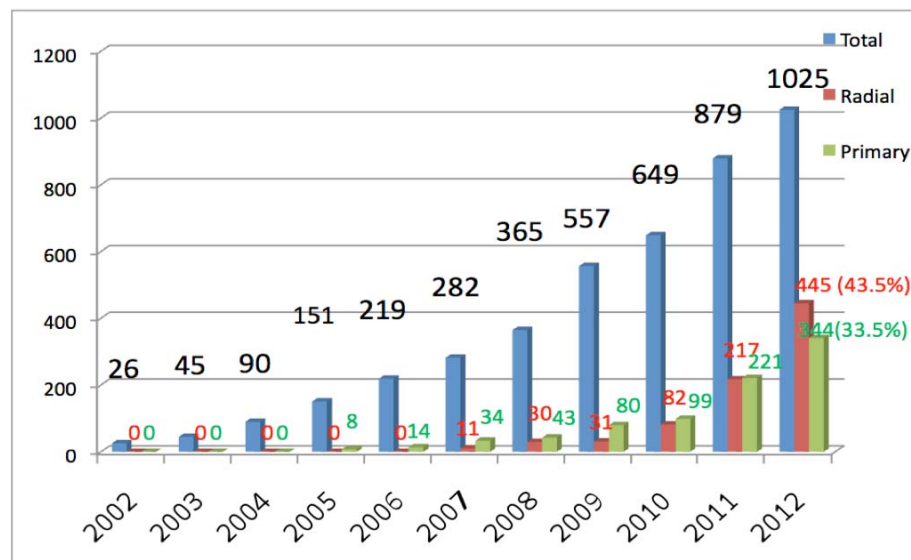


Figure 1: Trends of Total PCI, Radial access and Primary PCI.

43.5% in 2012 which is consistent with the situation in other countries. In UK has Radial PCI raised from 10% in 2004 to 58% in 2011, however, US has low rate of radial procedures with rising trend from 2% in 2009 to 11% in 2011 [7]. Norway, Malaysia, and Bulgaria have high rates of transradial access (70–80%). In a retrospective study, conducted in a North Indian tertiary care centre from 2004 to 2011, 25.4% of PCI were performed by transradial route [8]. Overall in Asia, total 42% of PCI is performed by transradial access [7]. The mean age in the study by Tewari S, *et al.* [8] was 56.97 ± 9.70 years similarly in our study the mean age was 50 ± 10.5 years with the range from 21 to 91 years. Among 4288 patients, majority of them were male 3409 (79.5%) and female were 879(20.5%) which is similar to the observation by Tewari S, *et al.* male: female being 86%:14%. In the same study, among 2246 patients undergoing transradial PCI, Single vessel PCI was 79.22%. In another study from Pakistan [9] shows among the transradial PCI, single vessel PCI was 68 (80%) and multivessel PCI 20%. In our study most of the patients 366(94.8%) had single vessel PCI and only 21(5.42%) had multivessel PCI. Tewari S, *et al.* [8] had PCI to LAD was 57.90%, followed by RCA in 32.81% then LCX in 20.84%. Similarly, in our study PCI to LAD was the most common in 173 (42.5%) followed by RCA 129 (31.7%) and then LCX 105 (25.8%). Four hundred and twenty two stents were deployed. Among them drug eluting stent was in 276 (65.4%) and bare metal stent in 146(34.6%) of cases. In the study by Tewari S, *et al.* [8], successful PTCA was achieved in 99.6% and 98.1% of patients who underwent PTCA through femoral and radial artery, respectively. However, in our study, PCI was Successful in 4075 (95.03 %) of the patients. The failure to complete PCI from radial access has been relatively high and related to radial artery spasm, radial loops, subclavian artery tortuosity and dilated aortic root. Radial access for PCI has a learning curve period and failure rate is high during this period. With experience, failure rate could be reduced from 10% to 1% after 1000 cases [10]. Radial versus femoral access for coronary angiography and intervention in patients with acute coronary syndromes (RIVAL) study [11] showed among the patient having radial access, the PCI success was in 95.4%. In our study, the mortality was observed in 46 (1.07 %), which is higher than the study by Tewari S, *et al.* [8] in which the total study mortality were five in the radial group and three in the femoral group. Most of the mortality occurred in patients undergoing primary or rescue PCI. Six deaths were reported to occur in elective PCI. Eight patients required emergency CABG. Stroke occurred in

six patients. Minor vascular complications like hematoma, pseudoaneurysm occurred in 102 patients. Likewise, in a study by Khan M, *et al.* [9], one patient (0.37%) suffered minor forearm hematoma and asymptomatic radial artery occlusion occurred in 4 (1.5%). Absent radial pulse was noted in 2.1% of the patient which is lower than the study by Tewari S, *et al.* [8] who have noticed among 2246 patient undergoing transradial PCI, 120 (5.34%) of the patients had loss of radial pulse at discharge. The compartment syndrome in forearm occurred in two patients due to puncture by standard guidewire which was detected late and underwent surgery (fasciotomy) and were discharged later. Overall the complication of the procedure was low and acceptable. Due to the steep learning curve, failure rate of radial PCI is higher in our study compared to studies in experienced centre. Radial percutaneous intervention has increasing trends. Despite the initial failure rate due to operator learning curve period the complication are low and acceptable.

LIMITATION OF STUDY

This is retrospective study of PCI from 2002 till 2012 of all 7 PCI performing hospitals. Attempts have been made to analyze all available data especially outcome and complications. There is no national data of PCI in Nepal till date. This is a first study giving the overview of PCI trend in Nepal highlighting growing popularity of radial access compared to femoral access.

CONCLUSION

Percutaneous coronary intervention in Nepal was started late and is increasing every year with accepted complications and success rate. Radial access is gaining popularity over femoral access.

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