Short Term Clinical Outcomes Encountered During Cardiac Catheterization Procedures At A Tertiary Care Hospital In Khyber Pakhtunkhwa

Muhammad Adil, Syed Abid Habib, Muhammad Saad Jibran

ABSTRACT

Background: Cardiac Catheterization procedures have become the cornerstone of modern cardiac care. Although generally safe and effective, the safety and success of these procedures greatly depends on the skill and expertise of the primary operator.

Objective: To determine the immediate clinical outcomes encountered in the cath lab during various procedures performed by a single operator.

Material and Methods: This study was cross-sectional, conducted from January 2018 to December 2018 at cardiology department of LRH, Peshawar. In the study period, various procedures like PTMC (percutaneous transvenous mitral commissurotomy), coronary angiography, PPM (permanent pacemaker) insertion and PCI (percutaneous intervention) were performed. After taking informed consent, a single operator performed all the procedures. We did not include any patient younger than 20 years old. Development of any complication during or up to 24 hours of the procedure were identified. SPSS Version 20.0 was used for statistical analysis.

Results: A total of 644 patients out of which 386 were males were included in the study with a mean age of 56.35±11.2 years. Among these, 480(74.53%) patients underwent coronary angiography, 95(14.75%) underwent PCI, 50(7.76%) underwent PTMC and 19(2.95%) underwent PPM insertion. Complications related to the procedures were found in 29(4.50%) patients whereas no complications were noted in 614(95.4%) patients.

Conclusion: The outcomes for cardiac catheterization lab related procedures are successful when performed by an experienced operator.

Keywords: *Coronary Angiography, Percutaneous Coronary Intervention, Percutaneous Transvenous Mitral Commissurotomy, Permanent pacemaker*

This article may be cited as: Adil M, Habib AS, Jibran SM. Short term clinical outcomes encountered during cardiac catheterization procedures at a tertiary care hospital in Khyber Pakhtunkhwa. J Saidu Med Coll Swat 2019;9(2):257-61.

INTRODUCTION

Over the past three decades, the management of cardiac diseases has evolved tremendously and cardiac catheterization procedures are now a cornerstone to successful treatment in contemporary cardiology[1-4]. These include diagnostic and therapeutic procedures performed on a daily basis like coronary angiography, percutaneous interventions, balloon valvotomy of the rheumatic mitral stenosis and pacemaker insertions. The immediate success of these procedures depend largely on the experience, skill, cath lab inventory and technical expertise of the primary operator[5, 6]. Success of these procedures can vary between institutions, individual operators and patients. Generally, these procedures are associated with 1-3% rates of complications and more than 90% rates of success in good gands[7]. Experts recommend regular audit and reporting of these procedures at institutional level to maintain the minimum standards set forth by the ACC and ESC[8, 9]. There are some states in the US where audit and reporting of cardiac cath procedures is done at the individual level wherein such audits provide an opportunity for the primary operators to improve their skills in light of their performance[10]. The aim of this study was to document the immediate outcomes of cardiac catheterization procedures performed by a single operator to help the operator self-audit and identify areas of improvement at a tertiary care hospital.

MATERIAL AND METHODS

This was a cross-sectional study conducted from January 2018 to December 2018 at cardiology department of LRH, Peshawar. Patients of both genders older than 20 years old who presented to cardiac cath laboratory of our hospital for various cardiac catheterization procedures on every Thursday were included in the study. All patients underwent a thorough history taking and physical examination before they underwent these procedures. These procedures included PTMC (percutaneous transvenous mitral commissurotomy), invasive coronary angiography, PPM (permanent pacemaker) insertion and PCI (percutaneous coronary intervention). After taking informed consent, a single consultant cardiologist performed all these procedures. Development of any complication during or up to 24 hours of the procedure was identified. All data was recorded on a predesigned

1. Department of Cardiology, Lady Reading Hospital, Peshawar.

Correspondence: Dr. Muhammad Saad Jibran,
Post Graduate Resident, Cardiology Unit,
Lady Reading Hospital, Peshawar.
E-mail address; saadjibran25@gmail.com

Received: June 19, 2019 , Accepted: November 25, 2019

proforma. Continuous variables were described as mean±SD whereas categorical variables were described as frequencies (percentages). SPSS Version 20.0 was used for statistical analysis.

RESULTS

A total of 644 patients out of which 386 were males were included in the study with a mean age of 56.35±11.2 years. Out of these, 346(53.7%) patients had history of diabetes mellitus and 382(59.31%) had history of hypertension. At presentation, 131(20.34%), 196(30.43%) and 200 (31.05%) patients had recent history of Unstable angina, NSTEMI and STEMI respectively. Also, 5 (0.77%) patients had past history of CABG surgery and 35(5.43%) were post PCI. All baseline variables are given in Table I.

Among the included patients, 480(74.53%) underwent diagnostic coronary angiography, 95 (14.75%) underwent PCI, 50 (7.76%) underwent PTMC and 18(2.79%) underwent PPM insertion. The predominant route of coronary angiography was femoral (n=342, 71.23%) and the access site for PCI was radial in majority of cases (n=60, 63.15%). Out of the 480 patients who underwent angiography, we found SVD (single vessel coronary artery disease), DVD (2 vessel coronary artery disease), TVD (3 vessel coronary artery disease) and left-mainstem disease in 159(33.12%), 128(26.6%), 193(40.20%) and 45(9.37%) respectively as shown in Table II. Among these, 265 patients were advised medical followup, 95 underwent PCI and 120 were referred for CABG surgery.

Complications related to the above procedures were found in 29(4.5%) patients whereas no complications were noted in 590(95.4%) patients. Of the patients who underwent angiography, 2 (0.4%) patients developed femoral access site hematoma. The frequency of each complication in those who underwent PCI was as follows: Cardiac Arrest in 3(3.15%), Coronary dissection in 3(3.15%), coronary perforation in 1(1.05%), death in 1(1.05%), puncture site hematoma in 1(1.05%) and pulmonary edema in 1(1.05%). Out of the 50 patients who underwent PTMC, 3(6%) patients developed new MR (during PTMC). The rest of the complication rates are given in Table III.

Table I: Baseline Characteristics

Variable	Mean±SD / Frequency (%)
Age (in years)	56.35±11.12
Age Groups	
15-30 years	39 (6.05%)
31-50 years	199 (30.9%)
51-60 years	203 (31.53%)
>60 years	177 (27.48%)
Gender (male)	386 (59.93%)
Heart Block	18 (2.79%)
Stable Angina	48 (7.45%)
Unstable Angina	131 (20.34%)
NSTEMI	196 (30.43%)
STEMI	200 (31.05%)
Post CABG	5 (0.77%)
Post PCI	35(5.43%)
Diabetes Mellitus	332(51.55%)
Hypertension	368 (57.14%)

Table II: Procedures performed and pattern of CAD.

Variable	Frequency (%)
Coronary Angiography	480 (74.53%)
Percutaneous Intervention	95 (14.75%)
PTMC	50 (7.77%)
Permanent Pacemaker Insertion	19 (2.95%)
Dye (UV)	399 (64.5%)
Dye (WUV)	176 (28.47%)
Patterns of CAD	
LMS	45 (9.37%)
LAD	367 (76.45%)
LCx	255 (53.12%)
RCA	297 (61.87%)
SVD	159 (33.12%)
DVD	128 (26.6%)
TVD	193 (40.2%)
Recommendation	
Medical Follow up	265 (55.2%)
Percutaneous Intervention	95 (19.7%)
CABG surgery	120 (25%)

PTMC: Percutaneous Transvenous Mitral Commissurotomy, CAD: Coronary Artery Disease, LMS: Leftmain stem, LAD: Left Anterior Descending, LCX: Left Circumflex, RCA: Right Coronary Artery, SVD: Sing le Vessel Disease, DVD: Double Vessel Disease, TVD: Triple Vessel Disease, CABG: Coronary Artery Bypass Graft.

Table III: Complications related to catheterization procedures.

Complication	Procedures			
	Coronary Angiography	PCI	PPM	PTMC
Syncope	0	1	2	0
Ventricular Fibrillation	0	1	0	0
Atrial Fibrillation	0	0	0	2
Cardiac Arrest	0	1	2	0
Coronary Dissection	0	3	0	0
Coronary Perforation	0	1	0	0
Death	0	1	0	0
Failure to engage	2	0	0	0
Failure to cross lesion	0	2	0	0
Access site hematoma	2	1	0	1
New MR	0	0	0	3
Pulmonary Edema	0	1	1	1

PCI: Percutaneous Intervention, PPM: Permanent Pacemaker, PTMC: Percutaneous Transvenous Mitral Commissuromtomy

DISCUSSION

Cardiac cath procedures are easily performed with significant success in experienced hands. Moreover, the management of any complication during these procedures is a true test of an interventionist's skill, patience and perseverance. The outcomes of these procedures depends greatly on the underlying baseline characteristics of the patients undergoing these procedures such as coma in patients presenting with ACS, need for specialized circulatory support devices and resuscitation of cardiac arrest at presentation[11, 12]. Moreover, the outcome of these procedures is greatly affected by patient selection. A more experienced interventionist is more likely to perform high risk procedures which are technically more complex and lengthy with potentially higher complication rates[13].

Masoudi et al[14] reported a mean age of 64.6±12.3 in the NCDR CATHPCI registry for patients undergoing percutaneous interventions with the patients being predominantly male (68.7%) and 38.8% had history of diabetes mellitus and 30.4% had history of prior MI. The average age of patients in our study was 56.35±11.12 years and 62.4% of our patients were males. Moreover, 53.7% of our patients had history of diabetes and about 63% of our patients had prior history of MI. Our patients had CAD at a younger age, had history of MI twice that in the NCDR CATH PCI registry and were more likely to have diabetes. Moreover, the complication rates of PCI in our study were also comparable with the NCDR CATHPCI registry. The only patient who died during PCI in our study had history of STEMI complicated by cardiogenic shock and sustained ventricular tachycardia at presentation. One patient had coronary perforation during PCI to circumflex which was sealed by prolonged balloon inflation alone.

Rauf MA[15] et al reported an incidence of new mitral regurgitation in 21 (12%) patients and severe mitral regurgitation in 9% patients during PTMC. Gul et al[16] reported frequency of severe mitral regurgitation during PTMC as 3.4% owing to careful choice of balloon size and dilatation. We found 3 (6%) patients who developed new mitral regurgitation during PTMC diagnosed on echo immediately post PTMC but the patients were asymptomatic and none of our patients developed severe mitral regurgitation requiring MVR during the procedure.

CONCLUSION

Cardiac catheter interventions can be safely performed with excellent short term results by an experienced and skillful operator with acceptable complication rates in a tertiary care hospital of Khyber Pakhtunkhwa.

REFERENCES

1. Fihn SD, Blankenship JC, Alexander KP, Bittl JA, Byrne JG, Fletcher BJ, et al. 2014 ACC/AHA/AATS/PCNA/SCAI/STS focused update of the guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines, and the American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. J Am Coll Cardiol. 2014 Nov 4;64(18):1929-49.
2. O'Gara PT, Kushner FG, Ascheim DD, Casey DE, Chung MK, De Lemos JA, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2013 Jan 29;61(4):e78-140.
3. Ibanez B, James S, Agewall S, Antunes MJ, Bucciarelli-Ducci C, Bueno H, et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). Euro Heart J. 2017 Aug 26;39(2):119-77.
4. Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP, Fleisher LA, et al. 2017 AHA/ACC focused update of the 2014 AHA/ACC guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol. 2017 Jul 3;70(2):252-89.
5. Strom JB, Wimmer NJ, Wasfy JH, Kennedy K, Yeh RW. Association between operator procedure volume and patient outcomes in percutaneous coronary intervention: a systematic review and meta-analysis. Circ Cardiovasc Qual Outcomes. 2014 Jul;7(4):560-6.
6. Badheka AO, Patel NJ, Grover P, Singh V, Patel N, Arora S, et al. Impact of annual operator and institutional volume on percutaneous coronary intervention outcomes: a 5-year United States experience (20052009). Circulation. 2014 Oct 14;130(16):1392-406.
7. Slicker K, Lane WG, Oyetayo OO, Copeland LA, Stock EM, Michel JB, et al. Daily cardiac catheterization procedural volume and complications at an academic medical center. Cardiovasc Diagn Ther. 2016 Oct;6(5):446.
8. Frey P, Connors A, Resnic FS. Quality measurement and improvement in the cardiac catheterization laboratory. Circulation. 2012 Jan 31;125(4):615-9.

9. Klein LW, Uretsky BF, Chambers C, Anderson HV, Hillegass WB, Singh M, et al. Society of Cardiovascular Angiography and Interventions. Quality assessment and improvement in interventional cardiology: a position statement of the Society of Cardiovascular Angiography and Interventions, part 1: standards for quality assessment and improvement in interventional cardiology. Catheter Cardiovasc Interv. 2011 Jun 1;77(7):927-35.
10. Peberdy MA, Donnino MW, Callaway CW, DiMaio JM, Geocadin RG, Ghaemmaghami CA, et al. Impact of percutaneous coronary intervention performance reporting on cardiac resuscitation centers: a scientific statement from the American Heart Association. Circulation. 2013 Aug 13;128(7):762-73.
11. Resnic FS, Normand SL, Piemonte TC, Shubrooks SJ, Zelevinsky K, Lovett A, et al. Improvement in mortality risk prediction after percutaneous coronary intervention through the addition of a "compassionate use" variable to the National Cardiovascular Data Registry CathPCI Dataset: a study from the Massachusetts Angioplasty Registry. J Am Coll Cardiol. 2011 Feb 22;57(8):904-11.
12. Sunde K, Pytte M, Jacobsen D, Mangschau A, Jensen LP, Smedsrud C, et al. Implementation of a standardised treatment protocol for post resuscitation care after out-of-hospital cardiac arrest. Resuscitation. 2007 Apr 1;73(1):29-39.
13. Brennan JM, Curtis JP, Dai D, Fitzgerald S, Khandelwal AK, Spertus JA, et al. Enhanced mortality risk prediction with a focus on high-risk percutaneous coronary intervention: results from 1,208,137 procedures in the NCDR (National Cardiovascular Data Registry). JACC Cardiovasc Interv. 2013 Aug 1;6(8):790-9.
14. Masoudi FA, Ponirakis A, de Lemos JA, Jollis JG, Kremers M, Messenger JC, et al. Trends in US cardiovascular care: 2016 report from 4 ACC national cardiovascular data registries. J Am Coll Cardiol. 2017 Mar 13;69(11):1427-50.
15. Rauf MA, Khan N, Mehmood N, Gul AM, Hafizullah M. short term clinical outcomes after percutaneous mitral commissurotomy for mitral stenosis. Pak Heart J. 2017 Nov 17;50(3).
16. Gul AM, Hafizullah M, Fahim M, Khan SB. Efficacy and safety of percutaneous transvenous mitral commisurotomy (PTMC) performed through patent foramen ovale (PFO). Pak Heart J. 2012 Jul 7;45(1).