

# \*Complications of Diagnostic Cardiac Catheterization in National Heart Centre, Nepal

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## Abstract

Cardiac Catheterization for diagnostic has been routinely used for the last few years in national heart centre in Nepal. Complications have been recognized as an important factor in morbidity and mortality after diagnostic catheterization. Improvements of technique and technology have reduced the morbidity of routine diagnostic catheterization, but occasional mortality seems to be unavoidable. A total of 6074 consecutive diagnostic cardiac catheterization performed in Shahid Gangalal National Heart Centre, Kathmandu, Nepal between 2004 to 2008 were evaluated for their complications. Among them 4584 (75.46%) were coronary angiogram. 894 (14.71%) were right heart study and 596 (9.81%) were left heart study. There were 5 deaths (0.09%). Four deaths occurred following coronary angiogram and 1 death following left heart study in a 3 years old boy with Tetralogy of Fallot. Vascular complications occurred in 20(0.33% patients) with groin haematoma in 8 (0.13%), pseudoaneurysm in 5 (0.09%), arterio venous fistula in 3 (0.05%) and femoral artery thrombosis in 4 (0.06%) patients. Contrast allergy occurred in 7(0.12%), cerebrovascular complication in 3 (0.05%), vasovagal reaction in 5 (0.09%) and pyrogen reaction in 10 (0.16%) of patients. The diagnostic cardiac catheterization in national heart centre has acceptable low rate of complication which includes death.

**Keywords :** Cardiac catheterization, complications, SGNHC

## INTRODUCTION

Cardiac catheterization includes catheterization and related angiography for example coronary angiography, left ventriculography, left heart study and right heart study. Cardiac catheterization is an invasive intervention that being increasingly used both for diagnosis and treatment. With improvement in technology and experience, pharmacologic development, the indications for this procedure are increasing. The decision to perform cardiac catheterization must be based on a careful balance of risk of procedure against the anticipated benefit to the patient. These invasive procedures hence are associated with complications.

Till date no such studies are done regarding catheterization procedures and its complications in Nepal. This study aims to evaluate complications associated with diagnostic catheterizations and hence its safety and anticipated risk in Nepalese context.

## MATERIALS AND METHODS

A total of 6074 consecutive patients, ranging from 1 year to 85 years old (mean, 35±10 Years), who underwent diagnostic catheterization between Jan, 2004, and December, 2008 in Shahid Gangalal National Heart Centre (SGNHC) both from femoral and radial vessel access site were studied. Right heart study was done in diseases like atrial septal defect, ventricular septal defect etc. left heart study include aortogram, peripheral

angiogram, ventriculogram etc (Table).

98% of procedures were done through femoral and 2% cases were done through radial arterial access. Following procedures the femoral arterial access site was compressed manually for at least 20 minutes and the patient was admitted in wards keeping the access site leg for 6 hrs. After 6 hrs. The patient was mobilized gradually and discharged next day. In case of access through radial artery, the access site was compressed for 2 hrs and the patient was discharged the same day after 4 hrs. of procedure if no complications. The vascular complications associated with the procedures were evaluated.

## RESULTS

Complications that occurred in the procedure are given in table 2 The major complication of diagnostic catheterization was death and occurred in 5 patients

**Table 1: Diagnostic Procedures**

Procedures	Number	Percentage
Coronary Angiogram	4584	75.46
Right Heart Study	894	14.71
Left Heart Study	596	9.81
Total	6074	100

(0.09%) of total 6074 procedures. Four deaths occurred following coronary angiogram and 1 patient died following right and left heart study in 3 yrs old boy with Tetralogy of Fallot with cyanotic spell who developed femoral artery thrombosis a femoral artery access site and had thrombo-embolctomy, who later developed septicaemia. Vascular access anerysm, arterio venous fistula, femoral artery thrombosis) were commonest complications and occurred in 20 patients (0.33%). Of those vascular complications 1 patient each with large pseudoaneurysm and arterio venous fistula underwent

**Table 2. Complications**

Death	5
Vascular complication:	20
- Groin Hematoma	8
- Pseudo aneurysm	5
- Arterio Venous fistula	3
- Femoral artery thrombosis	4
Contrast allergy	7
Cerebrovascular complications	3
Vasovagal reaction	5
Pyrogen reaction	10

Surgery. Four patients with femoral artery thrombosis at access site had thromboem-bolectomy and 1 patient died subsequently due to septicaemia. Contrast allergy occurred in 7 patients (0.12%). All these patients were treated with injection hydrocortisone and prochlorperazine. One patient with unstable angina with triple vessel disease who had contrast allergy developed acute pulmonary oedema requiring mechanical intubation and subsequently discharge after 5 days.

Cerebrovascular complications occurred in 3 patients (0.05%). One patient had cerebral infarct and was referred to general hospital while 2 patients had transient ischaemic attack. Vasovagal reaction induced by pain occurred in 5 patients (0.09%). Pyrogen reaction manifested by fever and chill occurred in 10 patients (0.16%).

## DISCUSSION

Death following diagnostic catheterization is a major complication. This study showed 4 deaths (0.09%) following 4584 coronary angiograms. The mortality associated with coronary angiography has improved considerably. Previous rate was in excess of 1% in many laboratories, but with widespread use of heparinization the death rate with coronary angiography has fallen to its current low level of 0.1 to 0.3%, depending on case mix. Among 4 deaths, 2 patients who died because of massive retroperitoneal bleeding. One patient died despite massive blood transfusion and another patient who died developed adult respiratory syndrome with acute renal failure following massive blood transfusion. The rest 2 patients who died had severe unstable angina with ongoing recurrent chest pain, in which coronary angiogram showed severe triple vessel disease with diffuse peripheral vascular disease who were not suitable candidates for revascularization. There was 1 death following diagnostic catheterization in a 3 year old boy with Tetralogy of Fallot who developed femoral artery thrombosis at access site. This boy had thrmboembolectomy who later died of septicaemia. In a study the mortality rate for

diagnostioc catheterizations. In another sutdy the procedure-related mortality rates was 0.1% for diagnostic procedure, respectively. There were two catheter related deaths (0.1%), both of which occurred within 24 hours of the procedure, and a further nine major cardiovascular complications with residual morbidity (0.45%). These were myocardial infarction in two (0.1%), cerebrovascular events in two (0.1%), and surgical vascular complications in five (0.25%). In addition, there were eight successfully treated, life threatening arrhythmias (0.4%).

Vascular complication at access site is the commonest complication. They were groin haematoma, pseudoaneurysm, arterio venous fistula, femoral artery thrombosis and occurred in 20 patients (0.33%). Potential local complications are haematoma with or without vascular and neural compression, arterial thrombosis, pseudoaneurysm, and arterio venous fistula, distal embolization. Femoral artery thrombosis requires urgent survical intervention. Pseudo aneurysm is painful and may rupture. Improvements in technique and technology have reduced the morbidity of routine diagnostic coronary angiography, but occasional mortality seems to be unavoidable. Most series report a mortality between 0.1% and 0.2%. in a total of 10,271 consecutive patients undergoing cardiac catheterization who ere followed up prospectively over a period of three years, the incidence of iatrogenic arteriovenous fistula was found to be 0.86%. the independent risk factors for arteriovenous fistula were identified as high heparin dosage, coumadin theapy, puncture of the left groin, arterial hypertension and female gender.

Cerebrovascular complications occurred in 3 patients (0.05%). One patient had cerebral infarct and was referred to general hospital while 2 patients had transient ischaemic attack and recovered fully. Retrospective analysis of as many as 20 000 patients revealed that clinically apparent cebral individuals in cardiac catheterization and percutaneous coronary interventions.

Contrast allergy occurred in 7 patients (0.12%). This was in mild from in 6 patients. 1 patient had anaphylaxis and developed pulmonary oedema due to underlying ischemia who had severe triple vessel disease with low ejection fraction. He had to intubated and subsequently recovered. The incidence of contrast media complications in the catheterization laboratory is 0.23% with 1 death per 55,000. anaphylactoid reactions are non-immune mediated, but histamine release and other mediators produce a clinical presentation indistinguishable from anaphylaxis.

Vasovagal reaction developed in 5 (0.09%) patients. Vasovagal reaction is common and may be serious if prolonged hypotension and bradycardia are unnoticed and untreated, this was precipitated by pain a very anxious patient and usually responded to intravenous injection of atropine and normal saline. Pyrogen reaction manifested by fever and rigor were also noted. Due to cost factro instruments like fcoronary guidewires, vascular sheaths, catheter etc. are reused after proper sterilization in developing country like Nepal. The source could be foreign protein, endotoxin or other antigenically active substance introduced into blood.

Other transient complications noted were transient bradycardia, tachyarrhythmias, complete heart block etc.

## STUDY LIMITATIONS

This study is a retrospective study. The incidence of complication after diagnostic catheterization is low. Attempts have been made to include all reported complications.

Major complications like death, stroke are all reported and documented. However, minor transient complications like transient arrhythmias, hypotension may all not be recorded and missed. Finally, we did not evaluate vascular complications after discharge from the hospital there was no data regarding renal impairment following diagnostic catheterization. However, no patient had post procedure dialysis.

### CONCLUSION

The diagnostic catheterization procedure in national heart centre has acceptable low complications including death. With increase in use of more complex procedure, use of modern technology, pharmacologic therapy and devices, these complications may increase. Low complications not only ensure patient safety and comfort, but also reduce costs, and improving efficiency in the cardiac catheterization laboratory.

### REFERENCES

1. Wyman RM, Safian RD, Portway V, et al. Current complications of diagnostic and therapeutic cardiac catheterization. *J Am Coll Cardiol.* 1988; 12:1400-1406
2. Chandrasekar B, Doucet S, Bilodeau L, et al. Complications of cardiac catheterization in the current era: A single-center experience. *Catheter and Cardiovasc Interv.* 2001, 52, 289-295
3. Papaconstantinou HD, Marshall AJ, Burrell CJ. Diagnostic cardiac catheterisation in a hospital without on-site cardiac surgery. *Heart* 1999;81:465-469
4. Judkins MP, Gander MP. Prevention of complications of coronary arteriography. *Circulation* 1974;49:599-602
5. De Bono D. Complications of cardiac catheterisation: results from 34 041 patients in the UK confidential enquiry into cardiac catheter complications (CECCC). *Br Heart J* 1993;70:297-300
6. Kennedy JW chairman and the Registry Committee of the Society For Cardiac Angiography. Symposium on catheterisation complications. Complications associated with cardiac catheterisation and angiography. *Catheter cardiovasc Diagn* 1982;8:5-11
7. Oldroyd KG, Phadke KV, Phillips R, et al. Cardiac catheterisation by the judkins technique as an outpatient procedure. *BMJ* 1989;298:875-876
8. Kelm M, Perings SM, Jax T, et al. incidence and clinical outcome of iatrogenic femoral arteriovenous fistulas implications for risk stratification and treatment. *J Am Coll Cardiol*, 2002;40:291-297
9. Segal AZ, Abernethy WB, Palacios IF, et al. Stroke as a complication of cardiac catheterization: risk factors and clinical features. *Neurology* 2001;56:975-977.
10. Fuchs S, Stabile E, Kinnaird TD, et al. Stroke complicating percutaneous coronary interventions: incidence, predictors, and prognostic implications. *Circulation* 2002;106:86-91.
11. Leker RR, Pollak A, Abramsky O, et al. Abundance of left hemispheric embolic strokes complicating coronary angiography and PTCA. *J Neurol Neurosurg Psychiatry* 1999;66:116-117.
12. Goss JE, Chambers CE, Heupler FA. Systemic anaphylactoid reactions to iodinated contrast media during cardiac catheterization procedures: guidelines for prevention, diagnosis, and treatment. *Laboratory Performance Standards Angiography and Interventions. Cathet CardiovascDiagn.* 1995;34:99-104