May 2012

Coronary artery bypass grafting after percutaneous coronary intervention

Syed Shahabuddin
Aga Khan University

Syed Ahmed Sami
Aga Khan University

Junaid Alam Ansari
Karachi Institute of Heart Disease

Shazia Perveen
Aga Khan University

Shumaila Furnaz
Aga Khan University

See next page for additional authors

Authors
Syed Shahabuddin, Syed Ahmed Sami, Junaid Alam Ansari, Shazia Perveen, Shumaila Furnaz, Saulat H. Fatimi, and Hasanat Sharif

SHORT COMMUNICATION

Coronary Artery Bypass Grafting After Percutaneous Coronary Intervention

Syed Shahabuddin[1], Shahid Ahmed Sami[1], Junaid Alam Ansari[2], Shazia Perveen[1], Shumaila Furnaz[1], Saulat Fatimi[1] and Hasanat Sharif[1]

ABSTRACT

Following percutaneous intervention (PCI), restenosis, progression of disease and multi-vessel involvement may require further intervention in the form of surgical revascularization. Patients with coronary artery bypass grafting (CABG) done after PCI were evaluated to find out the reason for the need of surgical revascularization. Over a period of 12 months, 610 patients underwent CABG. Out of them, 34 patients had previous PCI/stenting. Coronary risk factors including hypertension in 85%, diabetes mellitus in 60%, dyslipidemia in 60%, tobacco use in 50% and a positive family history was present in 53% of the patients. All patients were symptomatic. Multi-vessel disease was present in 67% and single vessel in 4.7%. The extent of disease and stenosis of stents were responsible for reintervention. Careful selection of patients is required in presence of multiple risk factors for coronary artery disease to provide maximum benefit by either PCI or CABG.

Key words: *Coronary artery bypass graft. Percutaneous coronary intervention. Coronary stent. Restenosis. Multi-vessel coronary disease.*

Cardiovascular disease including coronary artery disease are a leading cause of death worldwide. Coronary artery disease (CAD) is treated either with medical therapy, interventional therapy including percutaneous coronary intervention (PCI) or surgical revascularization in the form of coronary artery bypass grafting (CABG). The widespread popularity and use of percutaneous intervention (PCI) for coronary revascularization has brought substantial change in the patient population referred for surgical revasculari-zation.[1]

However, after PCI, further interventions or surgery is required for restenosis, progression of disease and multivessel involvement. In this study, the patients with CABG done after PCI were evaluated to find out the reason for the need of surgical revascularization.

From January to December 2006, 610 patients underwent CABG. This cohort included all patients whether the revascularization was on pump, off-pump or re-do CABG. Out of them, 34 patients had previous successful or attempted PCI. Drug-eluting stent were replacing the previous methods of PCI. These patients were eventually referred for surgical revascularization. Indication of surgical revascularization was on the basis of clinical and angiographic findings in terms of restenosis of stent or stented vessel, extension and advancement of primary disease with or without stent involvement and the failed angioplasty.

Standard operating strategy was utilized. Cardio-pulmonary bypass was established using right atrial and aortic cannulation after systemic heparinization. Myocardial protection was done with blood cardioplegia into aortic root along with moderate systemic hypo-thermia (28 - 32°C) and topical cooling. Distal coronary anastomoses were performed on still heart. Proximal end of the vein graft was anastomosed to aorta under partial occluding clamp. Subsequently, the heart was allowed to perfuse and weaned from CPB. Protamine was given to neutralize heparin. Chest closure was done after hemostasis and placement of drains and pacing wires.

In off-pump cases, Genzyme stabilizer was utilized to facilitate construction of distal coronary anastomosis after positioning the heart with the help of either pericardial sutures or warm swab behind the heart.

Intraoperative variables were studied and outcome in terms of mortality and morbidity assessed.

There was no mortality. A total of 34 patients underwent coronary artery bypass grafting after initial PCI. Out of them, 33 were males and one was female. Their median age was 53.5 years, ranged from 40 to 72 years. Half of the patients were tobacco addicted. Among risk factors, hypertension was the mostly found factors with 85.3%. They were all symptomatic.

Disease profile shows 67.6% had multi-vessel disease while 14.7% had single vessel disease. Two patients were operated after failure of PCI. Fourteen patients were having progression of the disease with patent stent and other 14 patients had stenosis of their stent. Rest of

[1] *Department of Surgery, The Aga Khan University Hospital, Karachi.*

[2] *Department of Cardiac Surgery, Karachi Institute of Heart Disease (KIHD), Karachi.*

Correspondence: *Dr. Syed Shahabuddin, House No. A-115, Block 1, Gulshan-e-Iqbal, Karachi.*
E-mail: syed.shahab@aku.edu

Received July 04, 2011; accepted March 13, 2012.

the 4 patients had both progressions of the disease in the native coronaries as well as stent disease. The distribution of PCI and its type along with the reason for surgical revascularization is given in Table I. The median time from PCI to CABG was 3 years. Amongst all, Internal Mammary Artery (IMA) was predominantly used (94.1%), with an average of 3 grafts per patient. Postoperatively 2 patients developed atrial fibrillation and one patient required reopening for bleeding.

Table I: Identified reasons for revascularization (n=34).

	Total	Blocked	Extended	Blocked/ extended	Failed	No contact
Type of stents						
DES	19	6	11	2	-	-
Non DES	7	4	2	1	-	-
Rotablade	1	1	-	-	-	-
Balloon	2	-	1	1	-	-
Failed	2	-	-	-	2	-
No contact	3	-	-	-		3
Total	34	11	14	4	2	3

It has been shown that PCI did not reduce the risk of death in cases of myocardial infarction when added to optimal medical therapy.[2] This large study supports recommendation of optimal medical therapy to begin with in patients with stable CAD. PCI has established role in patients presenting with acute coronary syndrome.[3] CABG compared to medical treatment or PCI remains superior in terms of repeat revascularization and long-term relief of angina.[4]

This study has shown that the reason for reintervention is two fold, firstly patients presenting with primary (CAD) represent a group of patients in whom atherosclerotic process is already set in and is well established. However, aspirin, statins and other secondary preventive measures may have promising role to some extent in preventing the progress of the atherosclerosis. Secondly and the most important is the inherent risk of failure and restenosis of stents that may be attributed to thrombotic closure of the stent. In addition, there may be significant contribution by a variable local vascular immunologic and inflammatory reaction in each patient.[5]

There is a considerable literature investigating the effect of previous PCI on outcome after CABG and have shown difference of opinion with more inclination towards poorer outcome when compared to first time CABG. Therefore, to begin with optimal medical therapy for stable CAD is entirely acceptable and reasonable. The PCI stands as a valid option for acute coronary syndrome and refractory angina with discrete coronary lesion without multi-vessel involvement. The surgical revascularization has remained long lasting and superior to medical treatment and PCI. Even in large clinical trials patients do cross-over to surgical revascularization reinforcing that the CABG is complimentary to other forms of treatment.

The limitations of the study are that it was a retrospective review, having small sample and single centre study over a period of one year. Despite showing the reasons for CABG after PCI its results cannot be generalized. However, it will be useful for the awareness of our medical community and to guide patient in the right direction.

Percutaneous interventions are successful method of revascularization and delays surgery, but future reinterventions are common and both extent of disease and stenosis of stents are responsible for reintervention. This needs careful selection of patients especially in presence of multiple risk factors for coronary artery disease to provide maximum benefit.

REFERENCES

1. Ferreira AC, Peter AA, Salerno TA, Bolooki H, de Marchena E. Clinical impact of drug-eluting stents in changing referral practices of coronary surgical revascularization in a tertiary care centre. *Ann Thorac Surg* 2003; **75**:485-9.
2. Boden WE, O'Rourke RA, Teo KK, Hartigan PM, Maron DJ, Kostuk WJ, *et al*; Courage Trial Research Group. Optimal medical therapy with or without PCI for stable coronary disease. *N Engl J Med* 2007; **356**:1503-16.
3. Keeley EC, Boura JA, Grines CL. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review of 23 randomised trials. *Lancet* 2003; **361**: 13-20.
4. Sim I, Gupta M, McDonald K, Bourassa MG, Hlatky MA. A meta-analysis of randomized trials comparing coronary artery bypass grafting with percutaneous transluminal coronary angioplasty in multivessel coronary disease. *Am J Cardiol* 1995; **76**:1025-9.
5. Toutouzas K, Colombo A, Stefenadis C. Inflammation and restenosis after percutaneous coronary interventions. *Eur Heart J* 2004; **25**: 1679-87.