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

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

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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 revascularization.\(^1\)

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. Cardiopulmonary 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 hypothermia (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

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\(^1\) 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 I, Gulshan-e-Iqbal, Karachi.

E-mail: syed.shahab@aku.edu

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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 CAGB 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.

It has been shown that PCI did not reduce the risk of death in cases of myocardial infarction when added to optimal medical therapy. 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. CABG compared to medical treatment or PCI remains superior in terms of repeat revascularization and long-term relief of angina.

This study has shown that the reason for reinter-vention 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.

There is a considerable literature investigating the effect of previous PCI on outcome after CAGB and have shown difference of opinion with more inclination towards poorer outcome when compared to first time CAGB. 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 CAGB is complimentary to other forms of treatment.

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**


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

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