

Peculiarity of Surgical Tactics for Management of Ischemic Heart Disease in patients with Left Main Coronary Artery Stenosis

A HASAN Z PERVEZ W ISMIT F A CHAUDHARY

Department of Cardiothoracic Surgery, Shaikh Zayed Hospital, Lahore.
Correspondence to Zahid Parvez, Assistant Parvez, Assistant Professor

The left main coronary artery disease has poor natural history. Sudden death, massive myocardial infarction, angina and poor quality of life indicate the ominous nature of the disease. Coronary artery bypass grafting remains the ultimate choice of its management. A relatively high mortality and morbidity of its surgical treatment described in literature leads to the actuality of this disease. This work is a part of our continuous effort for refinements in anesthetic and surgical techniques to reduce mortality and morbidity in such patients and is in the clinical practice at our institute for the last few years. During the period from February 1998 to October 2005, 74 patients underwent coronary artery bypass surgery for left main coronary artery stenoses, at Federal Postgraduate Medical Institute, Shaikh Zayed Hospital, Lahore. All patients presented with angina, unstable in 62.2%. An old myocardial infarction was present in 52 (70.3%) patients. An emergent surgery was needed in 5(6.8%), urgent operation was performed in 45(60.8%) patients and elective procedure was done in 24(32.4%). Average stay in the hospital was 9.0±2.7 days. There were 2 hospital deaths and one late non cardiac death. The post operative recovery was eventless in majority of the patients. The return of patients to their jobs improved significantly ($P < 0.005$) three months after operation. Our current surgical results are certainly improved than many previous studies on coronary artery bypass grafting for left main stem stenoses.

Key words: IHD, Coronary artery stenosis, surgical tactics

The left main coronary artery through its branches is a major source of blood flow to the ventricular free wall apex and intraventricular septum. Atherosclerotic obstruction of left main coronary artery carries risks and hazards in its natural course, invasive investigations, clinical course, operative and post operative period^{1,2,3,4} ominous nature of the obstruction is reflected in clinical reports and autopsy documentation of the lesion in case of sudden death⁵⁻⁷. Occlusion of left main coronary artery is surgical disease⁸. The surgical mortality and morbidity is reported higher in patients with left main coronary artery obstruction than in other patients with ischemic heart disease^{4,9}. Sudden death, massive myocardial infarction, ventricular arrhythmia and relatively high mortality and morbidity of its surgical treatment described in literature leads to the actuality of this disease. This work has been done for improvement in the surgical tactics to manage these patients and is in the clinical practice at our institute for the last few years.

Patients and methods

During the period from February 1998 to October 2005, 74 patients underwent coronary artery bypass surgery for left main coronary artery stenosis, at Federal Postgraduate Medical Institute, Shaikh Zayed Hospital, Lahore. The patients needing associated procedures were excluded from the study. Clinical, catheterization and operative variables were analyzed, considering age, sex, diabetes mellitus, systemic hypertension, chronic obstructive pulmonary disease, chronic renal failure, peripheral and cerebrovascular disease. Angina was classified according to Canadian Cardiovascular Society classification¹⁰. The assessment of myocardial infarction was made according

to Timothy¹⁰. The criteria for elective, urgent and emergent surgery was used according to Gianmaria¹¹. A significant disease of left main coronary artery was considered with 50% or more reduction in luminal diameter. Three of the 74 patients were on IABP (intra aortic balloon pump) prior to surgery.

Invasive monitoring lines were placed under local anesthesia. Isokit and adrenaline infusions were primed through separate ports of triple lumen central venous pressure catheter. Pre oxygenation for three minutes followed induction with Midazolam 0.1-0.15 mg/kg, morphine 0.1-0.2mg/kg and sleep dose of thiopentone 50-150mg. Muscle relaxation for intubation was achieved by Norcuron 0.1-0.15mg/kg and size 8 endotracheal tube was passed after 3 minutes of manual ventilation with 100% oxygen.

Anesthesia was maintained with 100% oxygen in isoflurane 0.5-1.0%. Regular top up doses of Norcuron 0.03mg/kg were repeated to maintain adequate muscle relaxation. Emphasis was paid on maintaining base line blood pressure during induction and maintenance by titrating infusions of adrenaline and isoket incremental bolus were used specially to avoid hypotension. Propofol infusion 4-6mg/kg was used for maintenance. Top up dose of norcoran and medazolam was given just before putting on pump to maintain depth of anesthesia.

Cardiopulmonary bypass was established with one arterial and one venous canula. Temperature reduced to 25 C when crystalloid cardioplegia was used in first few years of study and Temperature reduced to 28 C when blood cardioplegia was used. The cardioplegia was repeated after 30 minutes. Retrograde cardioplegia was used in selected

patients when stenosis in the left main coronary artery was equal to or more than 70% of the luminal diameter. Arterial blood pressure 60-80mmHg. Central venous pressure 0-5 cm of H₂O. Perfusion index 2.4 l/minute/m². Hematocrit 25%. LIMA was harvested in hemodynamically stable patients. Distal anastomosis was performed first and after its completion 50ml of cold cardioplegia was injected to enhance myocardial protection. The proximal anastomoses performed on beating heart during rewarming. A regular follow up was made after two weeks, one month, three months, six months and then yearly bases in outpatient department. Follow up period ranges from 01- 07 Years. Mean and standard deviation were calculated & Chi Square Test was used for nominal values to test the level of significance.

Table 1: Clinical variables (n = 74)

Age in year	54.60 ± 6
Male	62(83.8%)
Female	12(16.2%)
Angina	
Stable	20 (27.0%)
Unstable	46(62.2%)
Dyspnoea on exertion only	8(10.8%)
CCS Class	
I	0
II	0
III	26(35.1%)
IV	48(64.9%)
Myocardial Infarction (old ≥ 20 days)	52(70.3%)
Smoker (present +ex-smoker)	40(54.1%)
Family history of IHD	45(60.6%)
Hypertension	54(73.0%)
Diabetes mellitus	35(47.3%)
Chronic renal failure	7(9.5%)
Chronic obstructive pulmonary disease	9(12.2%)

Results

The clinical variables analyzed are shown in Table 1. All patients presented with symptoms. Left main coronary artery was significantly involved in all the 74 patients. Ostium was involved in 13 patients, middle part in 26 and distal part in 35 patients. Complete occlusion of this vessel was demonstrated in one patient. The angiographic data is given in table-2. Associated 3 vessel disease was present in 63, two vessel disease in 9 and single vessel disease in 2 patients. The operative data is given in table 3.

An urgent operation was performed in 45(60.8%) patients. Emergent surgery was needed in 5(6.8%) and elective procedure was done in 24(32.4%). Average stay in the hospital was 9.0±2.7 days.

One patient had cardiac arrest during shifting to ICU from operation theatre, reopened immediately, managed accordingly and shifted to ICU in stable condition. There was 2 hospital deaths. The post operative recovery was eventless in majority of the patients. The patients remained on ventilator for 4.75±2.9 hours before extubation. Average stay in ICU was 2.5 days before the patients were

shifted to surgical ward. Post operative atrial fibrillation was developed in 11patients (14.9). Five (6.8%) patients had superficial skin infection at the sternotomy site. Three patients had unstable sternum post operatively, settled with chest binder. No patient went into grade 2 hemodynamic instability other than the 3 patients those were on IABP prior to surgery. There was one late non cardiac death 3 months after surgery due to drug induced vasculitis. Sixty five patients are asymptomatic 1to 7 years of follow up. Graded exercise testing was not performed in asymptomatic patient on routine clinical follow up. The anginal status of the patients improved significantly after operation (P < 0.001). Seven patients had return of angina, four of them improved on medical management and are in CCS class II. One female patient remained with symptoms started six months after surgery, underwent graft study which showed tight stenosis of saphenous vein graft to diagonal branch at aortic site. Another male patient with return of angina 7 months post operatively underwent coronary angiogram which showed closure of saphenous vein graft to diagonal 1, saphenous vein graft to Obtuse 1 showed concentric stenosis at insertion site. One patient lost during follow up period. The return of patients to their jobs improved significantly (P < 0.005) three months after CABG. Before operation only 16(21.6%) patients were working while after CABG 58(78.4%) patients were returned to their original jobs.

Table 2: Severity of stenosis of left main trunk and coexistent coronary artery disease in 74 patients

% Stenosis	LMCA	LAD	CXF	RCA
≥50 < 70	11	7	14	10
≥70 < 90	37	38	30	16
≥90	26	26	20	37
Normal vessels	-	3	10	11

LMCA= Left main coronary artery, LAD=Left anterior descending coronary artery, CXF= Left circumflex, RCA = Right coronary artery

Table 3: Operative Date (n = 74)

Average no of grafts	3.6
Left Internal Mammary Graft	43(58.1%)
Average Bypass time	139.8 ± 19.9 (minutes).
Average Cross Clamp Time	54.3 ± 12 (minutes)

Discussion

Ischemic heart disease is a wide spread entity and one of the main cause of death. Inspite of using measurements for its primary prevention¹³, and secondary prevention¹⁴ and having a number of methods for its treatment the problem persist. The disease of the left main coronary artery of the heart has poor natural history. Sudden death, massive myocardial infarction, angina, and poor quality of life indicate the ominous nature of the disease⁵. Medical treatment is not much effective and if at all provides only temporary stabilization of the condition in a small number of patients¹⁰. Percutaneous transluminal coronary angioplasty remains a relative strong contraindication in similar patients because of earlier reports of delayed

sudden death^{6,7,8}. A few initial reports were in favour of surgical angioplasty of left main stenoses^{15,16} this procedure is not in routine practice now. Occlusion of left main coronary artery is a surgical disease¹⁷. A relative high morbidity and mortality has been reported with surgical treatment^{7,12} although it is the most acceptable method of treatment^{18,19}. This has led to the need to work out aggressive treatment techniques in all our patients presented with angina. The clinical picture of the severe and progressive angina as well as sudden death are reported prominent features in patients with left main coronary artery disease^{4,5}.

The surgical treatment approach holds promise for the relief of angina, prevention of myocardial infarction and sudden death as shown by our follow up results. An attempt was made to avoid hypotension during induction of anesthesia as a part of continued refinements in anesthetic techniques to reduce the morbidity in such patients.

Critical coronary artery stenoses limits the distribution of cardioplegic solution delivered into the aortic root²³. We performed coronary saphenous anastomosis first following which the cardioplegic solution was instilled down the graft as well as in to the coronary ostia via the aortic root to increase the distribution of cardioplegia beyond the stenoses. Alternatively a retrograde cardioplegia technique²⁴ was used in 63(85.1%) to enhance myocardial protection in patients with severe stenoses (≥ 70) of left main coronary artery disease. An average 3.6 grafts were performed. Multiple bypass grafts to the patients with left main coronary artery disease are advocated for complete revascularization. Surgical treatment has brightened the outlook for patients with left main coronary artery disease. In addition of the longer survival surgical treatment has improved the quality of lives of the operated patients. The return of patients to their jobs improved significantly three months after surgery. Our current surgical results are certainly improved than many previous studies²⁰⁻²² on coronary artery bypass graft for left main stem stenosis. The immediate and long term results of surgery are excellent. Coronary artery bypass grafting remain standard for management of significant left main coronary artery disease.

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