

Experience In Coronary Surgery With Left Main Stem Stenosis Over Thirtytwo Months*

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Summary:

Among 555 patients who underwent Coronary Artery Bypass Grafting (CABG) from January 1992 to August 1994, 48 (9%) patients had Left Main Stem Stenosis (LMS). There were 45 (94%) males and 3 (6%) females with a median age of 52.3 (40-72) years. Patients were divided into three groups with respect to the degree of severity of LMS, Group I greater than 90% stenosis, fourteen (29.2%) patients, Group II 50-89%, twenty-nine (60%) patients, Group III less than 50%, five (10%) patients. Ejection fraction was greater than 40% in twentythree (48%) patients, and less than 40% in thirteen (27%) patients, no record was available in twelve (25%) patients. Pre operatively there were eight (17%) patients in New York Heart Association (NYHA) Class II, thirtyfive (72%) in Class III and five (10%) in Class IV. Exercise duration was short and ST depression with typical angina was observed in many leads in stage I and early stage II. Six (12%) patients underwent emergency surgery, twentyseven (57%) and fourteen (29%) patients underwent urgent and elective surgery respectively. The interval between coronary Angiography and Surgery in the urgent group was mean of 6.9 (1—14) days.

Intra Aortic Balloon Counter Pulsation (IABP) was used pre operatively in two patients in emergency and Intra operatively in two patients. Average number grafts per patient was 3.2 (2—6). Thirtytwo (67%) patients received an Internal Thoracic Artery (ITA) and sixteen (33%) received only Saphenous Vein Grafts (SVG).

The Hospital Mortality was three (6%). Morbidity included CVA 1 (2%), sternal dehiscence 1 (2%), chest infections three (6%), supraventricular arrhythmia's (SVT) five (10%), perioperative infarcts seven (14%).

Twentyfour (50%) patients were followed up to February 1995. There were two (8%) cardiac

related deaths, two (8%) developed left ventricular failure, nine (37%) had a positive stress test for ischemia, eight (33%) tested negative for ischemia. Overall eleven (46%) patients were free of symptoms.

Coronary surgery in LMS carries a significant morbidity because of the severity of the disease and an acceptable mortality in the hands of a experienced surgical team.

Introduction:

From January 1992 to August 1994, 555 patients underwent Coronary Artery Surgery (CAS). Fortyeight were found to have LMS (9%) which is consistent with the literature for the

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incidence of LMS¹. The incidence varies from 0.75 - 8.1%². LMS is traditionally an accepted risk factor for CAS².

It is agreed that the attrition rate is 20% in the first two years for patients under medical management, diagnosed as having 50% or greater stenosis of the LMS. More than half the patients with greater than 50% LMS do not survive five years without operation. Surgical intervention improves survival of these patients.³

Patient and Methods:

Patient Population

During this period 48 patients were diagnosed to have LMS. There were 45 (94%) males and 3 (6%) females with a median age of 52.3 (40-72) years. These patients were divided into three groups with respect to the severity of the LMS. Group I greater than 90% stenosis 14 (29.2%) patients, Group II 50-89% twenty-nine (60%) patients, Group III less than 50% stenosis five (10%) patients. The ejection fraction was greater than 40% in twentythree (48%) patients and it was less than 40% in thirteen (27%) patients, where as no record was available in twelve (25%) patients.

Angiography six (12%) patients underwent emergency surgery, twentyseven (57%) patients had urgent surgery and fourteen (29%) had elective surgery. Two patients in Group I initially refused surgery and four patients from Group II initially refused surgery. The interval between coronary angiography in the urgent group was a mean of 6.9 (1-14) days. Pre operatively two patients had IABP inserted in the Catheter laboratory after they went into cardiogenic shock, they were then shifted to the operating theatre for emergency surgery. One of these patients died during the same hospital admission due to cardiac causes and the other one died six months post operatively (Table 1).

Operative Method:

Median sternotomy with simultaneous harvesting of left Internal Thoracic Artery and the long saphenous vein. Thirtytwo (67%) patients received a ITA, and sixteen (33%) received only SVG. Aortic arch and two stage venous cannulation with moderate hypothermia 28-30°C using a membrane oxygenator. After heparinization and application of aortic cross clamp cold crystalloid cardioplegia (St. Thomas's) at 4°C, 10-15ml/kg body weight was

TABLE 1
Pre-Operative IABP

Name	Age	Sex	NYHA	Date	LMS	LAD	LCX	RCA	LV	Emergency	IABP	Outcome
NB	60	M	III	May-93	60 %	80 %	90 %	95 %	< 40 %	LVF during angiography	Y	Died 6 months post-op.
IQ	60	M	III	Jan-94	95 %	90 %	N	95 %	< 30 %	Cardiac arrest during angio	Y	Died 9th post-op. day

Eighteen (37%) patients were known diabetics, where as pre operative myocardial infarction had occurred in five (35%) patients in Group I, thirteen (44.8%) patients in Group II and one (20%) patient in Group III. There were eight (17%) patients in NYHA class II, thirtyfive (72%) patients in NYHA class III and five (10%) patients in NYHA class IV. Pre operative stress testing was performed using the Modified Bruce Protocol and the exercise duration was short and ST depression with typical angina was observed in Stage I and early Stage II. After undergoing Coronary

administered antegrade, which was repeated through each completed distal vein graft. After completion of all distal anastomosis the patient was rewarmed and the cross clamp released and the proximal anastomosis were performed. The patients were then weaned of cardiopulmonary bypass and after securing haemostasis protamine was administered and the cannula were removed and the chest was closed in the routine manner.

The average number of grafts per patient were

3.2 (2-6), the average cross clamp time was 57.5 (31-124) minutes and the average cardiopulmonary bypass time was 115 (53-405) minutes. Two patients in the elective group required a IABP post operatively, both of these patients had initially refused surgery and they had diffuse coronary artery disease with poor left ventricular function. We were unable to wean one patient off cardiopulmonary bypass in spite of heavy inotropic support and IABP and the other one expired in the ICU the same night. Dobutamine was used in 48% of the patients in the urgent group, which was then weaned of during the next fortyeight hours. Five patients in the emergency group required inotropes (Table 2). In most of our patients the heart resumed normal sinus rhythm (NSR) after the release of the cross clamp and only two patients the heart went into ventricular fibrillation which was cardioverted. Seven patients required temporary pacing, and a transient right bundle branch block was seen in three patients.

TABLE 2

Inotropes

Urgent	Dobutamine	13/27	=	48% for 48 hrs.
Emergency	Dob-Adri	2/6	=	33%
	Dobutamine	3/6	=	50% for 48 hrs.

Post Operative Period:

Our patients were transferred to the cardiac surgical intensive care unit where they were ventilated and invasive monitoring was carried out. The average duration of ventilation was 14.7 (4—35) hours in eighteen patients. The mediastinal blood loss was 825 (350—1600) mls, there were no reopenings for surgical bleeding. Inotropes were weaned of within fortyeight hours and the average ICU stay was 56.2 (30—198) hours. The average post operative hospital stay of our patients was 9.4 days.

Morbidity: We had seven (14%) perioperative infarcts which were proven by elevated cardiac enzymes and post operative ECG changes, five (10%) patients developed a Supraventricular arrhythmia which were treated pharma-

cologically, three (6%) patients developed a chest infection, one (2%) CVA, and one (2%) had a sternal dehiscence.

Mortality: There were three (6%) hospital deaths. Two of our deaths were in our earlier days and it was during this period we were setting up our unit and we had medical and paramedical staff who were not used to managing critically ill patients. The third patient arrested in the Catheter laboratory during coronary angiography and was shifted to the theatre with heavy inotropic support and a IABP, he had a 95% LMS with diffuse coronary artery disease he died on the ninth post operative day due to low cardiac output and multiple organ failure (Table 3).

Follow up:

Twentyfour (50%) patients were followed up to February 1995. There were two (8%) cardiac related deaths, two (8%) developed left ventricular failure and are controlled medically, nine (37%) had a positive stress test for ischemia, eight (33%) tested negative for ischemia. Overall eleven (46%) patients were free from symptoms.

Discussion:

Most of the literature about Coronary Artery Disease (CAD) is derived from the West, little is said or written about the pattern of CAD in the Sub-continent especially Pakistan. Recent reports regarding isolated coronary ostial stenosis⁴, shows that the incidence of ostial stenosis is more in the orient as compared to the West. In another series the operative results, mortality and perioperative infarcts were comparable to the West⁵.

In our experience we have seen that the CAD is more severe with diffuse involvement of the coronary arteries. The Asian population often presents relatively late in the progress on of disease due to a denial of symptoms and inadequate assessment. Their CAD tends to be more diffused compared to the Caucasian population based on clinical experience although no exact comparison has been done. The coronary artery size in this group tends to be smaller⁶. We have found this to be true.

TABLE 3

Mortality

Name	Age	Sex	NYHA	Date	LMS	LAD	LCX	RCA	LV	Type of Operation	Outcome
ME	67	M	III	Mar-92	60 %	90 %	80 %	N	< 30 %	Elective	Unable to wean from CPB in spite of Adri/Dob/IABP.
HNA	66	N	III	Jan-92	30 %	80 %	70 %	N	< 30 %	Elective	Off CPB with Adri./Dob/IABP. Died in ICU same night due to low CO.
IQ	55	M	III	Jan-94	95 %	90 %	N	95 %	< 30 %	Emergency	Pre-op. IABP. Post-op. Adri/Dob/IABP. Died 8th post-op. day Low CO, Septisemia, MOF

Note:

Both patients ME and HNA refused surgery initially and discharged themselves against medical advice.

We defined emergency as patient going for surgery straight from the catheter laboratory, urgent was when the operation took place during the same admission and elective when the patient was given an appointment for admission. It has been proven that the results of CABG are significantly better however if the patient is stabilized before operation. Every effort is now taken to do so with aggressive medical management that is with coronary vasodilators, calcium channel blockers, beta blockers, after load reduction and control of arrhythmia's. Revascularization is now preferred on a planned urgent basis and only rarely as an emergency⁷. This is consistent with our approach and the mean time between coronary angiography in our series was 6.9 (1-14) days, where as in some series it has been reported to be upto 39 days⁸.

We have used at least one ITA in 66% of our patients which is consistent with other series of LMS⁸. Since it has been documented that ITA have a longer patency rate the trend is towards using bilateral ITA in patients with LMS provided them are stable is on a increase⁹.

The association of LMS disease with carotid artery disease and peripheral vascular disease has been reported in the West. In one series of LMS 28% patients had a large extracranial carotid

artery disease and 16% had vascular disease of the limb¹⁰. We had only one patient with asymptomatic carotid artery disease preoperative, he suffered a CVA postoperatively from which he made a complete recovery.

It is well known that the presence of stenosis of the LMS will increase the operative mortality¹¹. Those who have less than 50% stenosis are at a low risk and the mortality progressively increases with the severity of the stenosis. This has been evaluated in the CASS (Coronary Artery Surgery Study). It has also been established by the CASS and VA study (Veterans Administrative Cooperative Study of Surgery for Coronary Artery Occlusive Disease) that patients with greater than 50% lumen narrowing of LMS did better with surgery than medical management¹².

Seven (14%) of our patients had a perioperative infarct which is well within the reported figures for CAS in LMS. In the oriental series upto 11.8% patients⁵, and in the West upto 18% patient can have a perioperative infarct⁸.

In conclusion we would like to say that patients with stenosis of the left main stem are at a higher mortality if they are not operated and during operation they are at a higher risk of

suffering from complications than other patients with coronary artery disease undergoing surgery. But following surgery the outlook is better as compared to medical management.

They should have an operation during the same admission preferably after they have been stabilized medically 13.

Use of bilateral internal thoracic artery should be encouraged.

CABG in Pakistan is still in early development stages. The number of operations for IHD will increase significantly during the next decade.

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