Results of Coronary Artery Bypass Graft Surgery.

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SUMMARY

Between December 1981 and May 1985, 106 patients underwent coronary artery bypass graft surgery. Their mean age was 49 years. Seventy-seven (72%) had 3 vessel disease, 24 (23%) 2-vessel and 5 (5%) had 1-vessel disease. A total of 301 grafts were inserted (2.8 grafts per patient), of which 128 (43%) were to LAD, 90 (30%) to RCA and 83 (27%) to Cx. Forty-seven patients required additonal endarterectomy to 58 arteries, the majority of which were on RCA. Cold cardioplegia was used in 74 (70%) and intermittent aortic cross-clamping in 32 (30%).

The overall mortality was 6%, of which 4 (9%) were in Group I (endarterectomy) and 2 (3%) in group II (non-endarterectomy) During a mean follow up of 24 months, there were 7(7%) late deaths. P.M.I. occurred in 9 (8%), of which 4 (9%) were in Group I and 5 (8.5%) in Group II. Late M. I. occurred in 3 patients. 80% of the patients were asymptomatic, 16 (18%) improved and 3 (2%) unchanged or worse. The overall early graft patency rate was 78%.

INTRODUCTION .

The aim of coronary artery bypass graft surgery is to relieve angina, protect from late myocardial infarction and possibly prolong survival.[1,2,3,4] In Pakistan, this operation is still in its evolutionary stage. It has been thought that Asian patients have smaller calibre and more diffusely diseased coronary arteries which may produce less satisfactory results after surgery than in the western patients.

The purpose of this paper is to analyse the early and medium term results of myocardial revascularisation at AFIC Rawalpindi.

PATIENTS AND METHODS :

Between December 1981 and May 1985, 106 patients underwent coronary artery bypass graft surgery at AFIC Rawalpindi. There were 104 males and 2 females ranging in age between 33 and 65 years (mean 49 years). The age distribution is shown in Table-I. The majority were between 41 and 60 years of age.

All the patients presented with stable angina pectoris inadequately controlled by medical treatment. 38 (36%) of the patients had a history of previous myocardial infarction. Single vessel disease was present in 5 (5%) patients, 2-vessel disease in 24 (23%) and 3-vessel disease in 77 (72%). Six patients (6%) had left main coronary

TABLE – I
AGE DISTRIBUTION
N = 106

AGE (YEARS)	NO. OF PTs	PER CENT
31 – 40	11	10%
41 – 50	44	42%
51 – 60	42	40%
60+	9	8%

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TABLE – II
RISK FACTORS

RISK FACTOR	GROUP – I ENDARTEREC-TOMY (n = 47)		GROUP – II NON-ENDARTE-RECTOMY (n = 59)	
SMOKING	22	47%	36	61%
OBESITY	15	32%	19	32%
HYPERTENSION	10	21%	11	19%
DIABETES	4	9%	7	12%
FAMILY HISTORY	4	9%	8	14%

artery disease in addition.

An analysis of the results was performed comparing the results in 47 patients who required additional endarterectomy for diffuse coronary artery disease (Group-I) with those who did not (Gp B of 59 patients).

RISK FACTORS :

Analysis of the risk factors in group A&B including smoking, obesity, diabetes mellitus, hypertension and family history revealed no significant differences between the two groups (Table-II).

LEFT VENTRICULAR FUNCTION (TABLE-III) :

Visual assessment of left ventricular (L.V.) function was performed. The absence of segmental hypokinesia, dyskinesia or akinesia was classified as normal LV function, whilst the presence of one or two akinetic or dyskinetic segments represented moderate L.V. function and the presence of three or more abnormal segments represented poor L.V. function.

In group I, 10 (21%) patients had normal L.V. function, 31 (66%) had moderate and 6 (13%) had poor left ventricular function. In group-II, 23 (39%) had normal, 30 (51%) moderate and 6 (10%) poor L.V. function. These difference were not significant.

TECHNIQUE :

Coronary artery bypass surgery was performed using a median sternotomy incision, cardiopulmonary bypass, utilising a BOS 10 Bubble Oxygenator, with non-haemic prime and Sarns Roller pumps and moderate hypothermia. Cold cardioplegia was used in 74 (70%) patients and intermittent aortic cross-clamping in 32 (30%) patients for myocardial protection.

TABLE – III
LEFT VENTRICULAR FUNCTION
n = 106

FUNCTION	GROUP-I (47)		GROUP-II (59)	
GOOD	10	21%	23	39%
MODERATE	31	66%	30	51%
POOR	6	13%	6	10%

TABLE - IV
GRAFT AND ENDARTERECTOMY DISTRIBUTION

	GRAFT		ENDARTE-RECTOMY	
LAD System	128	43%	14	11%
Cx System	83	27%	9	11%
RCA	90	30%	35	39%
TOTAL	301	–	58	19%

GRAFT DISTRIBUTION (TABLE-IV) :

A total of 301 grafts (2.8 grafts per patient) were inserted, of which 128 (43%) were to the left anterior descending coronary artery (LAD), 90 (30%) to the right coronary artery (RCA) and 83 (27%) to the left circumflex coronary artery (Cx).

Forty-seven patients required a total of 58 endarterectomies (1.2 per patient) of which 14 (24%) were performed on LAD, 35 (60%) on RCA and 9 (16%) on Cx.

RESULTS :

MORTALITY (TABLE-V) :

Early mortality was defined as death occurring during the hospital admission and late mortality as death occurring after discharge from the hospital.

The early mortality rate in the whole group was 6% (6 out of 106). There were 4 (9%) early

TABLE - V
MORTALITY

	GROUP – I n = 47		GROUP – II n = 59		GROUP – III n = 106	
EARLY	4	9%	2	3%	6	6%
LATE	4	8%	3	5%	7	7%

deaths in group-I, and 2 (3%) in group-II. The causes of death were perioperative infarction in 4 (three of which were related to LAD endarterectomy), renal failure in 1 and septicaemia in 1.

The early morality in the first 60 patients in the series was 7% compared with 4% in the last 46 patients and there have been no early deaths in the last thirty consecutive patients.

PERIOPERATIVE MYOCARDIAL INFARCTION (PMI) :

PMI was defined by a set of electrocardiographic criteria including the development of (1) new pathological Q waves, (2) persistent intraventricular conduction defects and (3) poor R wave progression across chest leads.

Nine (8%) patients developed PMI in the whole group. In group I, 4 (9%) developed PMI compared with 5 (8.5%) in group-II. The rate of PMI in the first 50 patients was 10% compared with 7% in the last 56.

The influence of cardioplegia and intermittent aortic cross clamping on the incidence of PMI was compared. Of 74 (70%) patients who received cardioplegia, 3 (4%) developed PMI compared with 6 (19%) of 32 patients in whom aortic across clamping was the method of myocardial preservation (Table-VI). Cardioplegia also significantly reduced PMI in Groups I & II.

LATE MYOCARDIAL INFARCTION :

Late MI occurred in 3 patients at 3,5 and 6 months after surgery and all of them died due to low cardiac output.

SYMPTOMATIC STATUS :

During a mean follow up of 24 months (range 4 months to 4 years), 93 (88%) patients were alive. Of these, 74 (80%) were asymptomatic, 16 (18%) improved and 3 (2%) unchanged or worse.

REINVESTIGATION :

Graft restudies were performed routinely in 18 consecutive patients after informed consent was obtained between 2 and 4 weeks postoperatively.

The early graft patency was 85% (22/26) in the grafts to LAD, 75% (9/12) in RCA and 67% (10/15) in Cx. The overall early graft patency rate was 78%.

DISCUSSION :

It is widely accepted that the aims of coronary artery bypass graft surgery include relief of angina, protection from late myocardial infarction and possibly improved survival[2,3,4]. However, perioperative myocardial infarction may

TABLE - VI
PERIOPERATIVE MYOCARDIAL INFARCTION

	GROUP – I (47)		GROUP - II (59)		TOTAL	
OVERALL PMI	4	9%	5	8.5%	9	8%
CARDIOPLEGIA	1/30	3%	2/44	5%	3/74	4%
INTERMITTENT CROSS CLAMPING	3/17	18%	3/15	20%	6/32	19%

occur in 5—20% of the cases[5,6], late myocardial infarction may occur in upto 10% of cases, and complete or partial relief of symptoms may be obtained in upto 90% of patients at 5 years.[7] These results are not necessarily applicable to the Asian patients, as it is believed that this group of patients has smaller, diffusely diseased coronary arteries and smaller calibre long saphenous veins. These variables may produce results which could be expected to be worse than the Western population. There is, thus, a need to evaluate the long term results of coronary bypass surgery in the Asian patients.

We have found no influence of risk factors on the incidence of diffuse coronary artery disease. There may possibly be a genetic or racial predisposition, but this has not been confirmed. The rate of endarterectomy in our study is similar to some of the other series.[8]

Coronary bypass surgery has been increasingly performed in Europe and USA over the last 15 years. In Pakistan, however, only in the last few years has it become possible to perform this operation. Over the next few years, as has happened already in the other major centres of the world, we will have to go through a learning period in order to produce better results. It is, therefore, imperative that our results are evaluated critically from an early stage so that this learning period can be kept as short as possible.

This paper makes an attempt to achieve these aims. This is a small series with a short follow up. Nevertheless, the early results including the operative and late mortality, incidence of perioperative and late myocardial infarction and relief of symptoms are encouraging and compare fairly well with the early reports published in the West[8,9]. The graft patency is rather low (78%) but this also is a part of the learning curve and should improve with further experience.

It has been shown that additional endarterectomy combined with bypass grafting may have a slightly deleterious effect on the late results, as in our series, resulting in a slightly higher operative mortality, higher incidence of PMI and with a higher percentage of patients obtaining partial or no relief of symptoms.[8,10] Also cardioplegia offers better myocardial protection than intermittent aortic cross clamping and is the method of choice at our centre. This report forms a part of an on-going programme of evaluation of coronary bypass surgery at the AFIC/NIHD, Rawalpindi.

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