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## **CORONARY ARTERY SURGERY AFTER CARDIAC CATHETERIZATION AND INTERVENTIONAL PROCEDURES; ACUTE COMPLICATION**

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### **Summary**

This study was done to assess the results surgery for coronary artery bypass grafting (CABG) after complicated cardiac catheterization and interventional procedures at Queen Alia Heart Institute (QAHI)-King Hussein Medical Centre (KHMC). Between January 1995 and December 2000, eighty nine patients underwent emergency coronary bypass surgery following either diagnostic or interventional coronary angiography. The following variables were obtained from the medical records. Patients characteristics, mode of presentation, extent and severity of coronary artery disease, preoperative clinical and hemodynamic status, preoperative left ventricular function, previous CABG surgery, types of constructed conduits and associated procedures, use of intraaortic balloon pump (IABP), operative outcome and in hospital major cardiac events. Follow up was obtained on all surviving patients. Emergency CABG patients tended to be males (79.9%) more symptomatic (66.4% in class III and IV) and harboring more left main coronary disease (30%). The overall hospital mortality rate was high (13.3%) compared to the low rate of (4.5%) in our elective CABG population. Internal mammary artery (IMA) grafts were used less frequently (36.6%) compared to (93%) in our CABG population. Ten patients (11.2%) had additional cardiac procedures. A mean follow up duration of 31 months was available on all surviving 79 and (83%) were completely asymptomatic.

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### **Introduction**

**T**he uses of diagnostic coronary angiography as well as the application interventional procedures are omnipresent and increasing in the practice of modern cardiology<sup>1</sup>. In spite of the evolution in cardiology science

and best monitoring of the patient during the procedure still we need standby surgical team for covering the cardiologist during these procedures, with increasing number of such procedures being performed the need for urgent coronary artery bypass grafting (CABG) still exists, organization between all involving medical teams (cardiology, cardiac surgeon, anaesthetic, internal medicine, paramedical

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staff)<sup>1,2</sup> for sure helpful for these patients.

## Patients and Methods

A significant predictor of operative mortality in patients with LVEF between 20%-35% was myocardial protection. This started before trance the patient to the catheterization room by proper evaluation of his general conditions and correct the correctable abnormality.

Between January 1995 and December 2000, 13165 patients underwent diagnostic coronary angiography and 929 underwent elective coronary angioplasty at QAHI. Eighty nine patients needed emergency coronary bypass surgery and these constituted the study population.

Emergency surgery was defined as emergent when severity and distribution of coronary pathology in combination with hemodynamic instability mandated immediate intervention. The management of some of these patients had included vasopressors, intraaortic balloon pump, and cardiopulmonary resuscitation. Patients in whom surgical intervention was promptly undertaken in the face of ongoing ischemia, failed angioplasty, or as a result of unfavorable anatomy (i.e. left main disease), were referred to as urgent.

Myocardial revascularization prevents further ischemic injury to functional myocardium, restores function to hibernating myocardium.

Traditional risk factors urgency of surgery, female sex, reoperation, left main coronary artery stenosis, age and renal impairment predicted operative mortality in patients with LVEF higher than 35%.

A significant predictor of operative mortality in patients with LVEF between 20%-35% was myocardial protection, probably because these patients are more likely to have extensive areas of jeopardized myocardium. Perioperative mortality rates in excellent centres

appear to range from 3%-10% in carefully selected patients with severe LVD, provided that meticulous attention is given to preoperative myocardial protection.

As with all cardiac cases, large intravenous access and central access to the circulation is necessary.

Our monitoring for those patients is ECG, arterial line, CVP, pulse oximeter, temperature, urine output, EtCO<sub>2</sub>. ABG.

Because hemodynamic changes occur rapidly and unexpectedly in CABG surgery we routinely have a vasodilator and vasopressor / intropene ready for immediate infusion.

While nitroglycerin is used universally for vasodilatation, the selection of vasopressor remains varied, the most common choices being adrenaline and dopamine.

The heparin dose we use for CABG is 3mg /kg.

## Results

The initial mode of presentation among the study group are shown in Table I, the extent and distribution of coronary artery disease in the study group is depicted in Table II, which shows that 30% of the study group has significant left main coronary artery disease (isolated 8% and in association with other coronary vessel disease 22%). None of the PTCA patients had significant left main coronary disease.

**Table I. Initial mode of presentation among the study group**

NYHA	No.	%
<b>I</b>	0	0
<b>II</b>	26	29
<b>III</b>	54	61
<b>IV</b>	9	10
<b>Total</b>	89	100

**Table II. Number and percentage of vessels involved.**

Diseased vessel	No	%
Single	(L	9
Double	AD)	20
Triple	18	28
Left main (isolated)	25	7
Left main + other	8	33
Total left main	30	31
Total	36	1
	89	

The total study population was 89 (79.7% males). The mean age of the group was 55.8 years ranging from 30-94 years and was comparable to our elective CABG population. Forty seven (53%) patients had emergency coronary bypass surgery after diagnostic coronary angiography and 42 patients (47%) after failed PTCA.

The indications of urgent coronary artery bypass surgery are shown in Table III. Eight patients (9%) had cardiac arrest and required cardiopulmonary resuscitation until the commencement of cardiopulmonary pass. 56 patients (63%) had subjective and objective evidence of refractory myocardial ischaemia but no evidence of low cardiac output state, 25 patients (28%) were in clinical cardiogenic shock and low cardiac output state.

**Table III. Indication for emergency surgery.**

Indication	No.	%
Refractory Myocardial Ischemia	56	63
Cardiogenic shock	25	28
Cardiac arrest	8	9

A total of 223 grafts were constructed (2.5 graft per patient), 32 patients (36.6%) had internal mammary artery as one of the constructed grafts, 5 patients underwent additional mitral valve surgery (3 MVR and 2 mitral valve repair), two patients left ventricular aneurysmectomy and one patient had a stuck PTCA guide wire removed from the right

coronary artery ostium. Five patients had previous CABG. The use of intraaortic balloon pump (IABP) to take patients off cardiopulmonary bypass was necessary in 21 patients (23.5%), eight of whom had preoperative hemodynamic compromise and instability.

The overall hospital mortality was 11% (8 patients) and this is far higher than elective CABG mortality at QAHI (4.5%). Analysis of mortality shows that 4 patients died intraoperatively being unable to be weaned off cardiopulmonary bypass despite IABP and large doses of vasopressors and the other six patients died of perioperative myocardial infarction complicated by low cardiac output state. Those who had preoperative refractory cardiac arrest (6 patients), 4 survived surgery and discharged alive from hospital. Reopening for surgical bleeding occurred in 8 patients (9%). Five patients (6%) developed upper gastrointestinal bleeding. Wound infection was noticed only in three cases (Table IV).

Follow up was available on all surviving patients (79 patients) with a mean follow up duration of 31 months. Eighty three patients (93%) were completely asymptomatic, 5 patients (6%) had post CABG angina requiring antianginal therapy and 2 patients (2.2%) had persistent congestive heart failure.

**Table IV. Hospital major events among the study group**

Event	No.	%
Death	10	11
Periop. MI	8	9
Reopening	9	10
Upper GI bleeding	5	6
Sepsis	3	3

## Discussion

The perioperative condition for these procedures let the surgeons run toward putting the patient on cardio pulmonary

bypass and assess the vessel of the patients, which needs graft. The need for urgent CABG after diagnostic coronary angiography was 0.24% and after PTCA 2.8%. These figures were within the range of other published series<sup>3,4,10</sup>.

Our patients received in average, more grafts (2.5 grafts per patients) than patients in other publications who received on average 1.5 grafts per patients<sup>5,6</sup>. In emergency circumstances the use of the IMA as conduit was much less, this is also seen in most publications on urgent CABG<sup>7,8,9</sup>. In view of the superior long term results of IMA grafts, we believe that this conduit should be used more frequently, even in emergency circumstances. These can be possible by dissecting and preparation of the IMA after the establishment of cardio pulmonary bypass. Mortality and morbidity in our patients was similar to those in other reports<sup>3,4,5</sup> and as expected greater than our elective patient population. The mortality and infarction rate was 11% (all death were due to irreversible infarction) the haemodynamic status of the patients on

commencement of surgery being the most important predictor of outcome. Increase in post operative hemorrhage is probably due to the preoperative use of anticoagulants, and thrombolytic agents in some cases, also hasty operation with little or no homeostasis in the initial phase of surgery. There was slightly more incidence of upper gastrointestinal bleeding in this group of patients, despite a policy of prophylaxis with H2 receptor antagonists, it is encouraging that the intermediate and long term results in terms of survival and freedom from angina were excellent in patients who have emergency surgery.

## Conclusion

Standby surgical team still needed to cover the cardiological procedures. Good preparation of the patients before a diagnostic or interventional procedures, timing of these procedures made the surgical outcome nearly similar to elective procedures.

LIMA is an excellent graft and should be considered in any CABG.

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