

Reoperative Coronary Artery Bypass Grafting: Analysis of Early And Late Outcomes

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ABSTRACT

Objectives: To study the Redo CABG (Coronary Artery Bypass Graft) in patients admitted in Shahid Rajaei Heart Hospital in Tehran, Iran.

Materials and Methods: This study was carried out by reviewing patients' records who had undergone Redo CABG in Shahid Rajaei Heart Hospital in Tehran, Iran from 2002 to 2006. This descriptive study was done on 72 patients. Demographic data, risk factors, indications for Redo operation, ejection fraction, mortality, morbidity and events after Redo operation were collected. The statistical analysis was based on the SPSS software through descriptive statistical method.

Results: The prevalence of Redo CABG was 1.72%. Reducing Ejection Fraction (EF) between two operation and stable angina were the most common factors requiring Redo operation. Postoperative morbidity and mortality were higher in Redo CABG

Conclusion: Recurrent ischemia required Redo CABG with higher mortality and morbidity. It is suggested to make dedicated centers with specially trained personnel to do Redo CABG. (Rawal Med J 2008;33:36-39).

Key words: Redo CABG, arteriosclerotic disease, risk factors, outcome of surgery.

INTRODUCTION

The most prevalent intervention after Coronary Artery Bypass Graft (CABG) operation is second CABG operation. Although Percutaneous Coronary Intervention (PCI) is being done in 25% of patients after CABG operation, in some countries secondary CABG operations are also increased. It is estimated that this will reach 90% in 10 years and 65% in 15 years.¹ Some factors which affects the initiation of conditions for secondary bypass and time to perform the said operation are conduit and young age of the

patient at the time of first operation, better performance of left ventricles and atherosclerosis of grafted veins.² Use of Internal Thoracic Artery (ITA) in anastomoses to Left Anterior Descending (LAD) causes considerable reduction of requirement of repeated operation and has increased the period between first and second bypass operation.¹ Angina still is the main reason for necessity of first and second CABG operations. Recovery symptoms after second CABG operation specially were very successful as experience of Cleveland Clinic showed.² The aim of this study was to review the Redo CABG in patients admitted in Shahid Rajaei Heart Hospital in Tehran, Iran. The

specific aims were evaluation of any rise in number of Redo CABG, mean period between two operations, EF in Redo operation, clinical symptoms, comparison of findings in angiography in first and second operation, and to find out if any relationship existed between risk factors and time period between first and second operation.

METHODS

In this descriptive and retrospective study performed between 2002 to 2006, medical records of 72 patients referred for coronary bypass operation were evaluated for age, gender, period between first and secondary operation, clinical symptoms in both the operations, risk factors, EF, coronary vein angiography and grafted vein status in second angiography. Risk factors noted included hyperlipidemia (cholesterol > 200 mg/dl), diabetes (fasting blood sugar > 140 mg/dl), hypertension (BP>14/90), history of consumption of antihypertensive drugs, smoking (regular use of one cigarette everyday in last 2 years) and family history (sudden death myocardial infarction) in first degree relative. Statistical analysis was performed using SPSS Program and P<0.05 was considered significant.

RESULTS

Amongst 4178 CABG operations performed during 2002-2006, only 72 (1.72%) Redo CABG operations were performed. 88.9% of patients were males and 11.1% females. Age of patients in first CABG operation ranged from 28 to 70 years (mean 48.16±8.17), while in second CABG it ranged from 38 to 78 years (mean 58.67±8.43). EF in first operation was between 30 and 77 (mean 52.33±9.68) and in second operation 20 and 65 % (mean 43.7±11.84).

Clinical symptoms in first operation included stable angina (79.2%), unstable angina (2.8%), myocardial infarction (19.4%) and congestive heart failure (1.4%). These in repeat operation were stable angina (87.5%), unstable angina (2.8%), myocardial infarction (6.9%) cardiogenic shock (2.8%) and congestive heart failure (1.4%). First operation was performed in 97.2% of patients as elective and in 2 patients (2.8%) in urgent condition, where as in Redo CABG, 90.3% of patients were in elective, 5.6% urgent and 1.4 in emergency conditions, while in 2 patients it was not clear. Risk factors worsened in second operation except smoking (table 1).

Table 1. Prevalence of risk factors in two groups

Variables	First operation (%)	Second operation (%)	P Value
IDDM	1.4	2.8	0.93
NIDDM	6.9	22.2	0.65
Hypertension	4.2	16.7	0.81
Elevated Triglycerids	8.3	29.2	0.01
Smoking	26.4	20.8	0.74
Elevated LDL	4.2	40.3	0.06
Family history of CAD	15.3	19.4	0.17
Other, Such as cancer	1.4	4.2	0.36
Renal insufficiency	-	5.6	0.62

IDDM: Insulin Dependent Diabetes Mellitus, **NIDDM:** Non Insulin Dependent Diabetes Mellitus,

LDL: Low Density Lipoprotein, **CAD:** Coronary Artery Disease

Angiographic evaluation showed that the arteriosclerosis in veins of native vessels was increased in 2nd operation.

Table 2. Arteriosclerosis obstructed veins in 1st and 2nd operation by angiographic studies.

Variables	First operation (%)	Second operation (%)	P Value
LM	6.9	23.6	0.004
LCX	38.9	70.8	0.001
OM1	22.2	30.6	0.18
OM2	8.3	15.3	0.30
LAD	79.2	95.8	0.002
D	25	27.8	0.82
RCA	62.5	87.5	0.001
PDA	5.6	9.7	0.45

LM: Left Main Coronary, **LCX:** Left Circumflex, **OM1:** Obtus Marginalis, **OM2:** Obtus Marginalis, **LAD:** Left Anterior Descending, **D:** Diagonal, **RCA:** Right Coronary Artery, **PDA:** Posterior Descending Artery

Most grafts were performed on LAD (table 3). Condition of grafted vein in 1st and 2nd operation, in angiographic study, showed that 85.3 % of these grafts were completely closed, 8.3% were having narrowed veins and 5.6% were completely open. The rest of the grafts in 0.8% were having intermediate situation. But among ITA grafts only 9.7% were completely blocked, 18.1% with constriction.

Table 3. Incidence of graft performed in 1st and 2nd operation.

Variables	First operation (%)	Second operation(%)
LCX	4.2	1.4
OM1	26.4	56.9
OM2	22.2	31.9
LAD	73.6	80.6
D	26.4	48.8
RCA	45.8	38.9
PDA	13.9	25.8

LCX: Left Circumflex, **OM1:** Obtus Marginalis, **OM2:** Obtus Marginalis, **LAD:** Left Anterior Descending, **D:** Diagonal, **RCA:** Right Coronary Artery, **PDA:** Posterior Descending Artery

Further studies performed on grafted veins during operation showed that 75% of them were completely occluded and 4.2% had stenosis. Incidence of adhesions due to first CABG showed that 59.7% had mild adhesions while, 13.9% had moderate and 23.6% severe adhesions. Cannulation in 86.1% of patients was from aorta, and 4.2% from femoral artery.

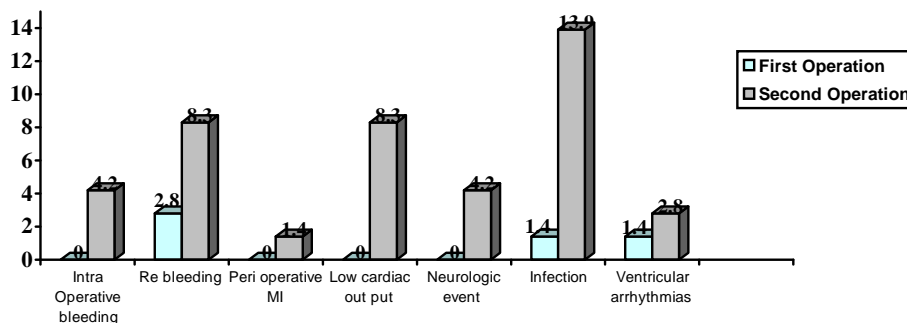


Fig 1. Incidence of morbidity in first and second operation

Infection was most common postoperative complication (Fig 1). It included 14% mediastinitis, pleritis and infection on lower limbs. Duration of hospitalization in ICU after first operation was 2.08 ± 0.29 days while, for second operation 3.53 ± 3.68 days. Average hospitalization was 14.33 ± 7.09 and 15.81 ± 9.76 days for first and second operation respectively. Hospital morbidity in Redo operation was approximately 3.3%, which was due to heart problems. CPB time at the first operation was 109 ± 29.41 minutes and in the second operation, it was 102.31 ± 33.86 minutes. Aortic cross clamp time in the first operation was 64.67 ± 16.43 minutes and in second operative it was 51 ± 18.91 minutes. Among first CABG operations, 36.1% of them were accomplished abroad like United Kingdom, France, Germany and Switzerland, 48.6% in central university hospitals of native country while, only 80.3% were in private centers. PTCA for dilating the constriction before Redo operation was performed in 9.7% of patients. Indication of second operation included incomplete revascularization (1.7%), 25% graft failure, 6.9% advanced atherosclerosis of native vessels, 19.4% advanced graft and was observed in 47.3% patients. Secondary coronary bypass operation in 94.4% was by means of midsternotomy 1.4% by right thoracotomy, s

1.4% was by left thoracotomy in 2 cases is not clear. Out of 72 patients, 69 were operated by CPB and only 4.2% of patients was operated by off pump method. Risk factors were not statistically significantly different.

DISCUSSION

Main etiology of Redo CABG, are recurrent ischemia due to advancement of atherosclerosis in native vessels of first operated graft, or incomplete revascularization.³ Studies have shown that 10-20% of patients operated for CABG operation, in first 10 years of their first operation require Redo CABG operation.⁴ Studies of reoperative risk have focussed on surgical techniques. We sought to determine the risk and predictors of poor outcome in current practice, and the influence of preoperative symptoms.⁵ The prevalence of Redo CABG in 4187 CABG operation was only 1.72%. Our mortality within 30 day after operation was 3.3%. These patients had LVEF less than 30 and were diabetic patients. Surgical morbidity in Redo CABG has been reported to be significantly higher as compare to first CABG operation.^{6,7} In the secondary operation factors like anatomical changes, due to previous operation, hypertension, old age as compare to first operation and development of

risk factors like reduction of LVEF were the cause of increasing the complications. In this study, the average of age of patients in first operation was 48.16 ± 8.17 and in second was increase to 58.67 ± 8.43 years. The average of LVEF decreased from 52.33 ± 9.68 to first operation to 43.7 ± 11.84 in 2nd operation. Infection of operation site was 1.4% in first and was increased to 13.9% in Redo operation. Once patients survived the first 6 postoperative months, advanced age (>65 years) is affecting long term cardiac survival and impaired left ventricular function is the only independent predictor of late cardiac mortality.⁸ Off pump Redo CABG has been safely performed with a relatively low mortality rate and a low rate of target lesion revascularization.⁹ High risk subgroup of patients, who underwent target vessel revascularization without CPB showed a trend

toward a lower rate of major adverse cardiac events.¹⁰

Complete revascularization, without damaging the heart, whichever technique is used, is the target of Redo surgery, to achieve the same quality of results obtained in the first operation.¹¹ Age older than 75 years and NYHA class IV are risk factors for early mortality.¹² Non availability of complete information in the patient files and less Redo operation in recent year is one of the factors which limited the comparison of our operation with the famous centers abroad. In conclusion, recurrent ischemia required Redo CABG with higher mortality and morbidity. Special center with expert manpower for the managing of Redo CABG operation is required in our country.

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