

Evaluation Of Surgical Results After Coronary Artery Bypass Grafting And Incidence Of Silent Ischemia Post-operatively

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Summary:

The aim of the study was to document the effectiveness of surgery in management of coronary artery disease and to document the incidence of silent ischemia postoperatively. 40 patients were studied after coronary artery bypass grafting (1/2 to 10 years) by treadmill test for exercise induced ischemia and their exercise tolerance, from October 1990 to October 1991. They were divided into three groups: Group I, up to 1 year; Group II, 1 - 5 years; Group III, 5 - 10 years postoperatively. 85.5% in group I; 84.6% in group II and 62.5% in group III had improved exercise tolerance expressed by prolongation of EKG exercise test duration. 47.3% patients from group I, 46.2% patients from group II and 75% from group III were positive for stress induced ischemia and out of them 85% in group I; 77% in group II and 100% in group III had SILENT ISCHEMIA. It is suggested that E.T.T. should be done at about 6 months postoperatively as a baseline and treatment for I.H.D. should not be stopped after CABG unless silent ischemia has been ruled out.

Introduction:

Ischemic heart disease is one of the most common causes of morbidity and mortality in man. Considerable progress has been made over the past decade in this field and now the symptoms can be effectively controlled by medical as well as surgical interventions and a more favourable prognosis can be achieved. The CABG procedure has been proven to improve symptoms in patients suffering from coronary artery disease. Studies have shown that myocardial ischemia, although significantly reduced, is not totally abolished by this procedure and silent myocardial ischemia can be elicited in a substantial number of patients undergoing treadmill exercise

testing or by Holter monitoring postoperatively¹. Presence of myocardial ischemia, whether silent or symptomatic, is known to affect the prognosis adversely¹. This highlights the necessity of regular follow up of patients after CABG. In Pakistan an increasing number of people are undergoing this procedure and these patients pose a special problem in the sense that those who are operated upon abroad as well as in Pakistan are not inducted into a regular follow up programme and those who undergo the operation, somehow, have the false belief that CABG is totally curative and that they need not maintain regular liaison with their cardiologists. We selected at random postoperative patients (whether operated in Pakistan or abroad) undergoing ETT for various reasons at our center and assessed the incidence of myocardial ischemia (whether silent or symptomatic) in them. Silent ischemia in this paper is defined as the presence of ischemic ST depression without anginal symptoms during exercise.

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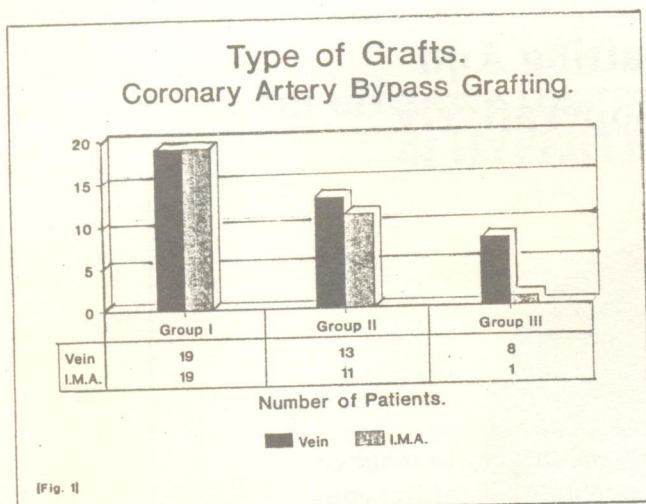


Fig. 1 Type of Grafts. Coronary Artery Bypass Grafting.

Method:

PostCABG patients undergoing ETT at our facility during the period of one year, from September 1990 to August 1991, were used for this evaluation. After recording the history of each patient, a physical examination was done. Patients belonging to the New York Heart Association Class III/IV or with LBBB on their EKG, were excluded from this study. The tolerance test was conducted on the standard Bruce protocol.

Patients were divided into three groups on the basis of time since their CABG. Group I included patients in their first year after the bypass grafting, Group II included patients 1 to 5 years postCABG and Group III were those who had their CABG done more than 5 years ago.

Measurements

Group I comprised 19 patients with an average age of 49.74 years \pm 8.94, minimum age of 30 and maximum of 63 years. The average time since CABG was 8.1 \pm 3.61 months (minimum 3 and maximum of 12 months). 2 patients (10.53%) had double vessel and 17 (89.47%) had triple vessel involvement prior to their CABG. In 18 (94.74%) patients both left internal mammary and vein grafts were used and in 1 (5.26%) only a vein graft was used [Fig. 1]. The

patients exercised for an average time of 8.1 \pm 1.92 minutes [Fig. 2]. On average, 92.16 \pm 8.74% of the target heart rate was achieved. The results were positive for ischemia in 9 (47.3%) patients. Of these 9 patients silent ischemia was present in 85% [Fig. 3].

Group II comprised 13 patients with an average age of 53.38 years \pm 8.56, minimum age of 42 and maximum of 66 years. The average time since CABG was 36.92 \pm 14.87 months (minimum 18 and maximum of 60 months). 1 patient (7.69%) had double vessel and 12 (92.31%) had triple vessel involvement prior to their CABG. In 12 (92.31%) patients both left internal mammary artery and vein grafts were used and in 1 (7.69%) only a vein graft was used [Fig. 1]. The patients exercised for an average time of 8.17 \pm 2.29 minutes. On average, 86.54 \pm 17.27% of the target heart rate was achieved [Fig. 2]. The results were positive for ischemia in 6 (46.2%) patients and out of these 6 patients silent ischemia was present in 77% [Fig. 3].

Group III comprised 8 patients with an average age of 58 years \pm 8.78, minimum age of 45 and maximum of 74 years. The average time since CABG was 7.5 \pm 1.7 years (minimum 6 and maximum of 11 years). 1 patient (12.5%) had double vessel and 7 (87.5%) had triple vessel involvement prior to their CABG. In 1 (12.5%) patient both left internal mammary artery and vein grafts were used and in 7 (87.5%) vein grafts were used [Fig. 1]. The patients exercised for an average time of 6.88 \pm 2.34 minutes

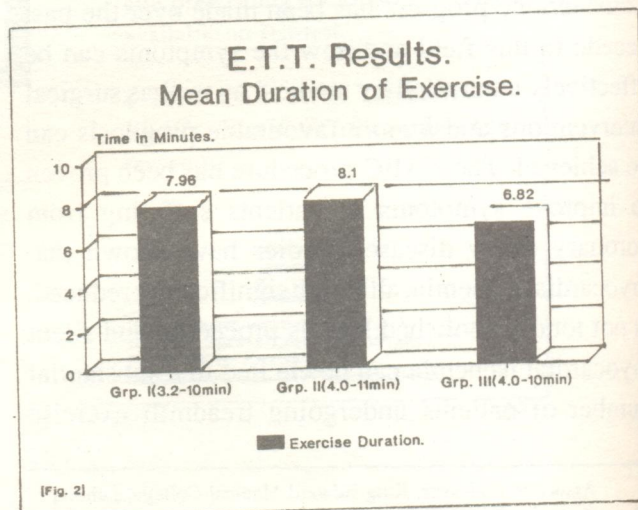


Fig. 2 E.T.T. Results. Mean Duration of Exercise.

[Fig. 2]. On average, $88.38 \pm 14.15\%$ of the target heart rate was achieved. The results were positive for ischemia in 6 (75%) patients and out of these 6 patients no one had any symptoms, i.e., incidence of silent ischemia was 100% [Fig. 3].

MEASUREMENTS

	Group I (0-1 Yr)	Group II (1-5 Yrs)	Group III (5-10 Yrs)
Number of patients	19	13	8
Time since operation (years)	0.675	3.08	7.5
Vessel involvement			
Double vessel	3	1	1
Triple vessel	17	12	7
Type of graft used			
LIMA and Vein	17	12	1
Vein	1	1	7
NYHA Class			
Class I	14	7	3
Class II	3	6	5
Duration of exercise (minutes)	8.08	8.17	6.88
Heart rate achieved (%age of target)	92.16	86.54	88.38
Results			
Positive	9	6	6
Negative	10	6	2
Inconclusive	-	1	-
IMPROVED EXERCISE TOLERANCE	85.5%	84.6%	62.5%
INCIDENCE OF ISCHEMIA (%AGE)	47.3	46.2	75
OVERALL INCIDENCE		52%	
INCIDENCE OF SILENT ISCHEMIA IN PATIENTS WITH POSITIVE ETT	85%	77%	100%

Discussion

Predictive power of exercise test responses and ST segment depression after coronary artery bypass surgery has been a controversial area of discussion. Dubach et al were critical and claimed that these criteria are not predictive at all². Kennedy et al

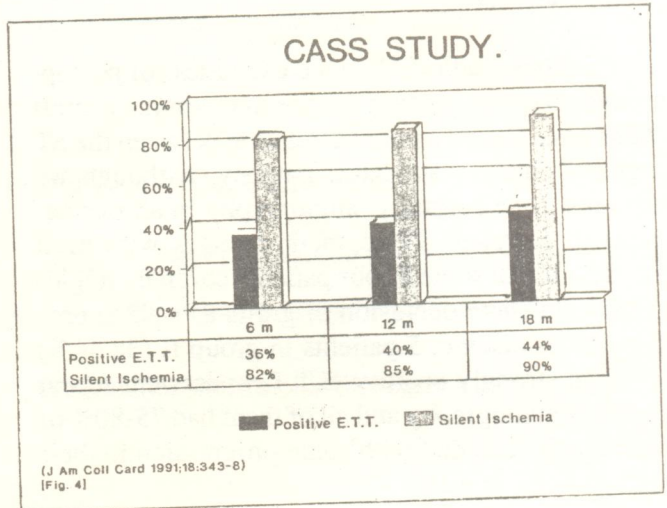
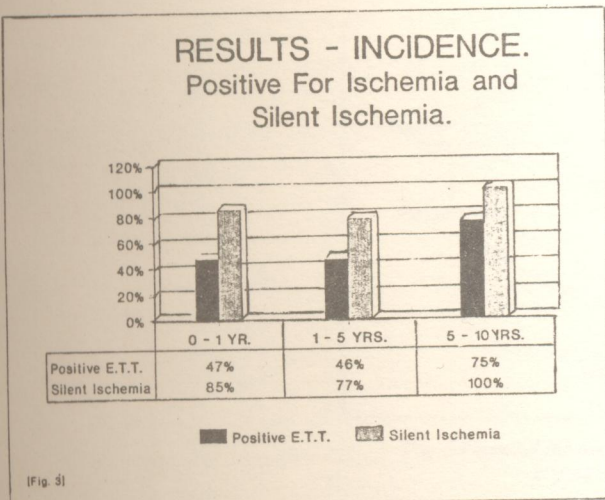


Fig. 4 Cass Study.

reported that silent ischemia was not predictive of an adverse clinical event in the early years after CABG³. But recently Weiner et al, in a report of the Coronary Artery Surgery Study group had clearly demonstrated that prognosis after coronary artery surgery is adversely affected by postoperative ischemia (both silent and symptomatic), documented by postoperative exercise testing. They have documented that ischemia which is mostly silent is present in almost 1/3rd of the patients 6 months postoperatively¹.

In our study out of the 47% patients who had ischemia within 1 year of their surgery, 85% had silent ischemia. This result is quite in accord with the CASS group where out of the 36% of patients who had ischemia during an exercise test 6 months postoperatively, 82% did not have associated anginal chest pain¹. In their study, at 18 months postoperatively, prevalence of ischemia was 44% out of which 90% had silent ischemia [Fig. 4]. In comparison to that in our study group II (1-5 years) 46% had ischemia and out of them 77% had silent ischemia. Similarly in our group III (5-10 years) postoperatively, 75% had ischemia and none of them experienced any symptoms, i.e., 100% had silent ischemia [Fig. 3].

Overall incidence of ischemia (52%) in our study is slightly higher than the 40% prevalence reported by the CASS group¹, 28% prevalence found by Dubach et al² and 27% prevalence found by Kennedy

Fig. 3 Results - Incidence. Positive for Ischemia and Silent Ischemia.

et al³ documented by Holter monitoring at 12 months postoperatively.

Previous studies^{4,5,6} on the usefulness of postoperative exercise testing to predict coronary graft status have shown a poor correlation between the ST segment changes and graft patency. Although we have not done coronary angiography in all our patients to correlate ST segment changes with graft patency, but in some of our patients coronary angiography did show occlusion of grafts as well as progression of disease. 5 patients in group II (38.46%) who had strongly positive E.T.T. underwent repeat coronary angiography and all of them had 75-80% of their grafts occluded with some progression in their native vessel as well.

Weiner et al¹ has shown that both silent and symptomatic ischemia during exercise testing 6 months postoperatively had an adverse effect on long term survival. They have also shown that multivariate analysis of 11 variables showed that silent ischemia was the most powerful predictor of cardiac events⁷. Our results are quite in accord with the results published by Weiner et al and although our study population is small yet the results, if anything, showed slightly increased incidence of Post-CABG silent ischemia in Pakistani population. We strongly recommend that postoperative ischemia with or without associated symptoms should be treated vig-

orously with anti-ischemic medications and, if these are unsuccessful, possibly with revascularization to try to improve prognosis. However, more elaborate studies may be needed to document this hypothesis.

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