Coronary Artery Surgery Study (CASS): A randomized trial of coronary artery bypass surgery

Quality of life in patients randomly assigned to treatment groups

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ABSTRACT To evaluate the comparative effects of medical and surgical therapy on quality of life of patients with stable ischemic heart disease, 780 patients who had been randomly assigned to medical or surgical therapy in the CASS were systematically followed for a mean of 5.5. years. Analysis was performed according to original treatment assignment. Patients in the surgical group had significantly less chest pain, fewer activity limitations, and required less therapy with nitrates and β-blockers. Treadmill exercise tests performed 6, 18, and 60 months after entry documented significantly longer treadmill time, less exercise-induced angina, and less ST segment depression among surgical group patients. However, employment status and recreational status did not differ significantly between medical and surgical groups. Total number of hospitalizations after randomization was higher in the surgical group owing primarily to rehospitalization during the first year of follow-up for the coronary artery bypass graft surgery. Risk factors, including high blood pressure, cigarette smoking, high cholesterol levels, overweight, and poor exercise habits remained similar between medical and surgical groups. This randomized collaborative study shows that coronary artery bypass graft surgery improves the quality of life as manifested by relief of chest pain, improvement in both subjective and objective measurements of functional status, and a diminished requirement for drug therapy. However, no significant effect on employment or recreational status was observed.
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THE RELATIVE BENEFITS of major interventional procedures such as coronary artery bypass graft surgery can best be addressed by evaluating the effect of the intervention both on *quantity* and *quality* of life. Analysis of quantity of life is relatively straightforward and objective, dealing with conventional and well-established statistical methods of survival analysis.

Quality of life is of substantial importance but is much more difficult to analyze because its descriptors are generally subjective and potentially highly influenced by factors other than the therapeutic intervention. Nevertheless, it is generally accepted that, in the treatment of patients with ischemic heart disease, quality of life is improved when there is improved functional status with amelioration of cardiac-related symptoms and a return to gainful employment and recreational activity after the intervention. Conversely, quality of life is adversely affected by the need for ancillary supportive treatment such as extensive drug therapy or recurrent hospitalizations and by the need for lifestyle modification.

From 1975 to 1979, 780 patients with stable ischemic heart disease were randomly assigned to medical or surgical treatment in the CASS, a multicenter collaborative trial organized by the National Heart, Lung and Blood Institute.[1] Another report from this study group[2] documents survival patterns in patients who were initially assigned to either medical or surgical therapy. The purpose of this report is to examine the observed effect of medical and surgical therapy on descriptors of quality of life in these patients.

Methods

Study design. The CASS is a prospective randomized study designed to compare the results of medical and surgical treatment in subsets of patients with anatomically proved coronary artery disease. The study consists of a registry of 24,959 consecutive patients who underwent coronary arteriography at 15

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cooperating clinical sites in the United States and Canada between 1974 and 1979. From this registry, 780 consenting patients with ≥70% diameter stenosis of one or more operable vessels were randomly assigned to medical or surgical treatment at 11 participating sites. A comprehensive description of the study design has been published previously.[1]

The 780 study patients were prospectively divided into the three following clinical subsets: (1) group A, patients with mild angina (Canadian Heart Association class I or II)[3] and normal left ventricular function (n = 514 patients or 66% of total), (2) group B, patients with mild angina and impaired left ventricular function (n = 106 patients or 14% of total), and (3) group C, patients who were free of angina after myocardial infarction (n = 160 patients or 20% of total).

After randomization all patients were managed medically by their referring physicians. Guidelines were provided by the CASS Steering Committee for treatment of angina pectoris, arrhythmias, and congestive heart failure and for management of risk factors.[1] Patients randomly assigned to surgical therapy underwent coronary revascularization with a mean delay of 54 days (range 5 to 345 days) after randomization. Medical group patients became eligible for coronary revascularization if they and their physicians so desired, typically because of the development of unacceptable angina despite medical therapy.

Data acquired pertinent to the present report included a standardized medical history,[1] results of physical examination, and maximal treadmill test results at baseline and at 6, 18, and 60 months after enrollment. Also, a standardized follow-up questionnaire[1] was administered either at the time of clinical examination or by telephone to each randomly assigned patient at 6 month intervals. Detailed records were obtained for each period of hospitalization. All follow-up data presented in this report were acquired within 30 days of the scheduled follow-up date (60 day "window").

Definition of terms. Definitions of pertinent descriptors used on the admission and standardized follow-up forms are detailed below.

Chest pain status. The patients' average or typical levels of chest discomfort during the 6 weeks before entry into the study and during the interval since the last follow-up were classified as follows[3]: (1) class I, chest pain only with strenuous or prolonged physical activity, (2) class II, chest pain with rapid or moderate-to-extensive walking or stair climbing (more than 2 blocks or more than 1 flight) or in cold or wind or when under emotional stress, (3) class III, chest pain with minimal walking or stair climbing, such as walking 2 level blocks or less or climbing 1 flight of stairs or less at normal pace under normal conditions, (4) class IV, chest pain with any level of physical activity or even at rest.

Heart failure. Heart failure was coded as present if the patient reported ankle edema, dyspnea, and/or orthopnea.

Activity limitation. The patients classified limitations in performing their normal daily activity (hobbies, recreation, job, yardwork, housework, routine) at entry and during the interval since the last follow-up as follows: (1) none, (2) intermittent limitation, (3) mild limitation, (4) moderate limitation, (5) severe limitation, or (6) uncertain due to medical restrictions or recovering from surgery.

Employment status. Each patient's employment status at entry and at the end of the follow-up year was classified as follows: (1) employed — either full- or part-time, or (2) not employed — retired, quit, or other.

Recreational status. The patient's daily recreational or physical activity level at entry and during the interval since the last follow-up was classified as (1) strenuous, (2) moderate, (3) mild, or (4) sedentary. This descriptor referred to activities in addition to regular employment/homemaking. If the patient had quit or was retired, this descriptor referred to all daily activities.

Drug therapy. The patient reported the use of any drugs belonging to the following categories on entry into the study and within the 2 months before follow-up: β-receptor–blocking drugs, nitroglycerin, long-acting nitrates, diuretics, digitalis, tranquilizer/sedatives, antiplatelet, lipid-lowering, hypoglycemic (insulin or oral agent), or antihypertensive drugs (except diuretic), anticoagulants, or antiarrhythmic drugs.

Hospitalization. Detailed information was obtained for all periods of hospitalization after entry and included both the number of days hospitalized and whether the hospitalization was for cardiac reasons.

Smoking. Smoking indicates that the patient smoked cigarettes at entry or during the interval since the last follow-up.

Supervised exercise program. This variable describes whether the patient participated in a supervised exercise program on entry or during the 2 months before follow-up contact.

Miscellaneous. Each patient's blood pressure, cholesterol, and weight (kg) were measured at baseline and at 5 years after entry into the study.

Graded exercise test. Treadmill exercise tests (modified maximal Bruce protocol) were required at baseline and at 6, 18, and 60 months after entry. Details of the exercise test protocol and interpretation have been published.[1] In this report, an "adjusted treadmill time" has been used to normalize exercise duration for patients beginning exercise at treadmill stages 0, ½, and 1. To calculate adjusted treadmill time, 360 sec have been added to the actual exercise duration for patients beginning exercise at stage 1, 180 sec have been added to the actual duration of exercise for patients beginning at stage ½, and the actual treadmill duration has been used for patients beginning exercise at stage 0. Chest pain occurring at any time during the exercise test was classified by the examiner as "definite angina," "probable angina," "probably not angina," or "definitely not angina." Abnormal ST segment depression was defined as depression of the ST segment of ≥0.1 mV (1 mm) for 80 msec or longer, with the ST slope being horizontal or downsloping.

Statistical analysis. In the analysis of differences between medical and surgical groups patients were considered to belong to their original treatment groups; differences in dichotomous variables were assessed by the chi-square test, and differences in continuous variables were determined by the two-sample t test. Number of hospitalizations was compared between medical and surgical groups with the use of the normal approximation to the difference between two Poisson random variables. In the comparisons between medical and surgical group patients with regard to drug therapy and risk factor management, the data presented are from the patients who were alive and who were followed up within the stated time window.

In several instances, when indicated, an additional comparison between medical and surgical groups has been made, censoring data from patients who refused their original treatment assignment. In the censored analysis only data from the time before surgery were used for the medical group, and only data from the time after surgery were used for the surgical group.

For convenience in illustration and tabulation, only data obtained at 1, 3, and 5 years after patient entry into the study are displayed in portions of this report, but these data are entirely representative of the data trends observed at the serial 6 month follow-up intervals.

Results

Completeness of follow-up. Follow-up was 99.9% complete (779/780) for vital status. Follow-up infor-

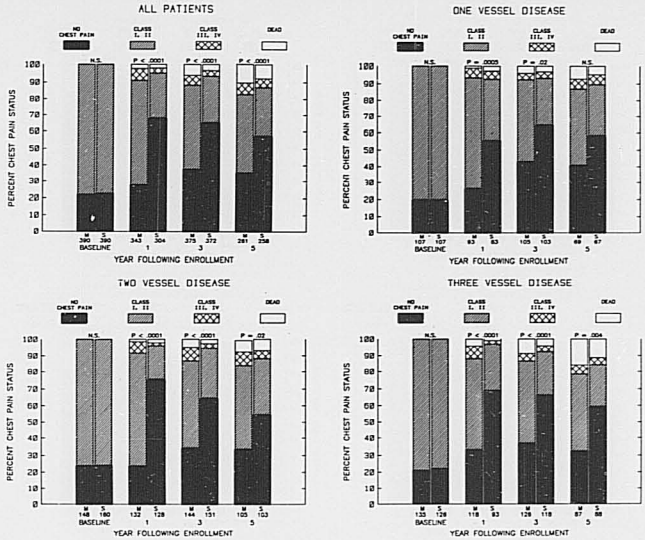


FIGURE 1. Chest pain status. *Top left*, All study patients; *top right*, those with one-vessel disease; *bottom left*, those with two-vessel disease; *bottom right*, those with three-vessel disease. M = medical assignment; S = surgical assignment.

mation for other variables is less complete and this is due in most cases to the fact that data were not obtained or were obtained outside the follow-up window. For each variable the number of patients followed at each time interval is indicated in the tables and figures. Mean duration of follow-up was 5.5 years for the overall group (range 3.8 to 7.7 years).

Compliance with randomized treatment assignment. Of the 390 patients randomly allocated to medical treatment, 100 (26%) subsequently had coronary revascularization surgery. Of the 390 patients randomly assigned to surgical therapy, 41 (11%) initially refused, but of these 41, 10 patients subsequently underwent surgery at a mean of 2.5 years after randomization.

Functional status

Chest pain status. Before randomization, chest pain classification was similar between medical and surgical groups (figure 1, *top left*). At the 1, 3, and 5 year intervals after randomization, there was a significant difference in chest pain statuses in the two groups owing to a substantially greater proportion of the surgical group patients being free of pain at each interval. When medical and surgical groups were compared according to number of diseased vessels at the time of randomization (figure 1, *top right* and *bottom*), a favorable influence of surgical assignment was noted on chest pain class throughout follow-up in all patients, but this influence was most notable among the patients with multivessel disease.

When medical and surgical groups were compared according to clinical subset (group A, B, or C), the favorable influence of surgical assignment was consistently noted in the combined groups A and B (these patients had been symptomatic on entry; figure 2, *top left*), but not in group C (patients who were free of angina after infarction; figure 2, *top right*). In both groups the percent of surgical group patients without chest pain declined over the 5 year follow-up period, whereas the percent of medical group patients without chest pain showed an apparent increase. However, when data from patients who did not follow the assigned treatment (medical or surgical) were censored from the analysis, the percentage of patients in the medical group without chest pain remained more constant during follow-up (figure 2, *bottom*).

Heart failure. Symptoms of heart failure were reported at 1, 3, and 5 years of follow-up in 3.3%, 4.5%, and 2.6% of the patients in the medical group and 3.4%, 2.8%, and 4.6% of those in the surgical group. No significant differences in heart failure prevalence in the two groups were observed.

Activity limitation. At baseline, there were no signifi-

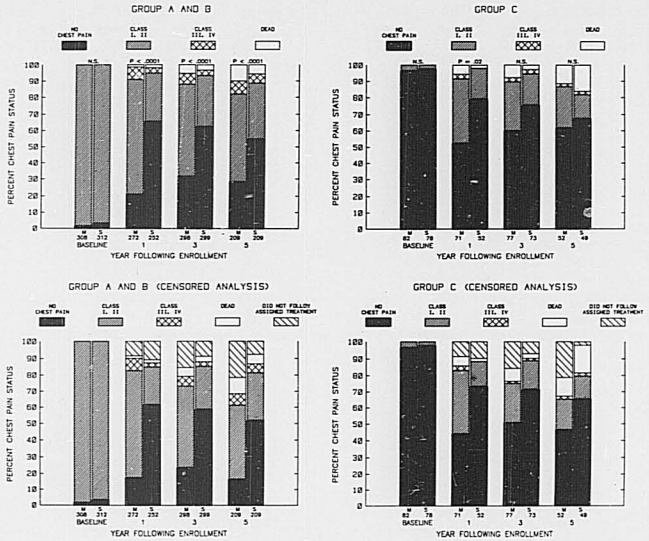
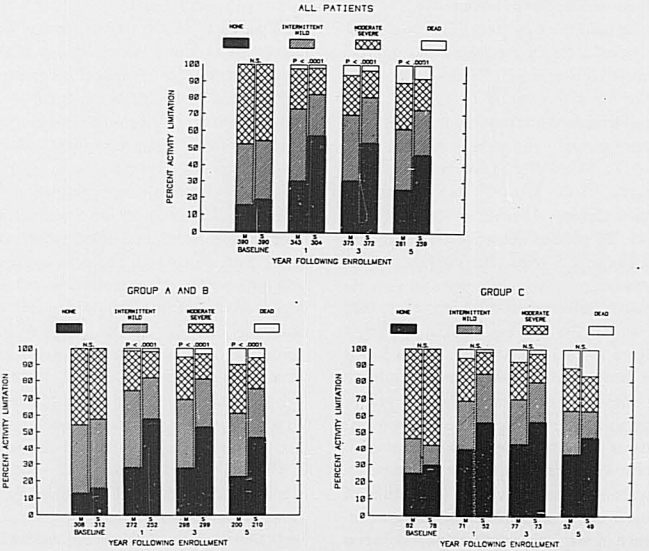


FIGURE 2. Chest pain status. *Top left*, Groups A and B; *top right*, group C; *bottom left*, group A and B (censored analysis); *bottom right*, group C (censored analysis). In the censored analysis, data from medical group patients were removed from the strata at the time of surgery and data from surgical group patients are included only after they actually underwent surgery. Statistical comparisons are provided only for the data shown on the top two graphs (noncensored analysis). M = medical assignment; S = surgical assignment.



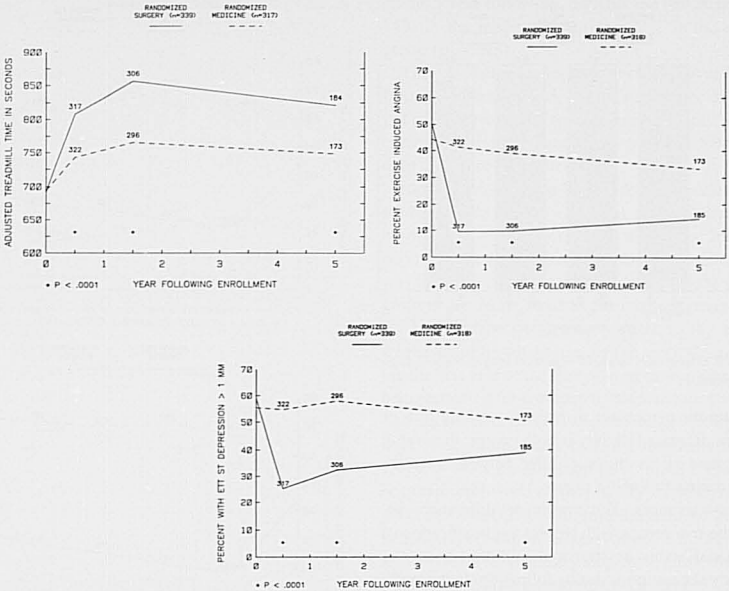


FIGURE 4. Treadmill exercise test results. *Top left,* Adjusted treadmill time; *top right,* exercise-induced angina (definite or probable angina); *bottom,* ST segment depression ≥1 mm. Number of patients for whom treadmill data were obtained is shown for each follow-up interval. ETT = exercise test.

cant differences between the activity levels of the patients in the medical and surgical groups (figure 3). However, at follow-up there were highly significant differences between the degree of activity limitation in the two groups, with more patients in the surgical group reporting no limitation of activity. Within the clinical subsets, this trend favoring surgical treatment was noted in groups A and B, but within group C activity levels were not substantially different in the two treatment groups throughout follow-up.

Graded exercise tests. At baseline there was no significant difference between medical and surgical groups in exercise test performance as assessed by (1) adjusted treadmill time, (2) exercise-induced angina (definite or probable), or (3) exercise-induced ST depression (figure 4). However, at 6, 18, and 60 months after entry, response to exercise testing was significantly different in the medical and surgical groups. Adjusted treadmill time increased in both groups after entry, but increased much more dramatically among those in the surgical group (figure 4, *top left*). The percentage of medical group patients experiencing treadmill-induced angina fell only minimally during follow-up. However, the percent of surgical group patients who experienced treadmill-induced angina fell markedly at 6 months after entry and remained significantly lower than in the medical control group at 18 and 60 months after entry (figure 4, *top right*). The percentage of patients in the medical group with exercise-induced ST segment depression of ≥1 mm remained essentially constant during the follow-up period. However, the percentage of patients in the surgical group with abnormal ST depression fell sharply at 6 months after entry and gradually rose over the next 4.5 years, although at 60 months after entry the percentage was still significantly less than that in the medical control group (figure 4, *bottom*).

Employment status. At baseline more surgical than medical group patients were employed full- or part-time (76% vs 69%, p = .03). At 1, 3, and 5 years of

FIGURE 3. Activity limitation. *Top,* All patients; *bottom left,* groups A and B; *bottom right,* group C. Included within the moderate/severe category are patients for whom amount of activity limitation was uncertain because activities had been limited on physician's advice. M = medical assignment; S = surgical assignment.

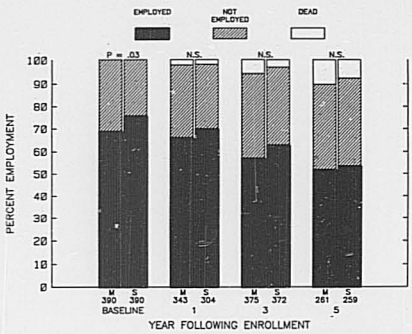


FIGURE 5. Employment status. M = medical assignment; S = surgical assignment.

follow-up the percentage of patients working full- or part-time decreased slightly in both groups; the overall employment status did not differ between the two groups during follow-up (figure 5).

Recreational status. There were no differences between the two groups with respect to classification of recreational status as strenuous, mild/moderate, or sedentary at baseline or during follow-up. In the medical group recreational status was classified as mild or moderate in 71% at baseline, and in 77%, 75%, and 67% at follow-up years 1, 3, and 5, respectively. In the surgical group, recreational status was classified as mild or moderate in 68% at baseline, and in 76%, 77%, and 66% at follow-up years 1, 3, and 5.

Treatment

Drug therapy

β-BLOCKERS. At baseline, 43% of patients in the medical group and 44% of those in the surgical group were on β-blocker therapy. At follow-up, β-blocker use had declined dramatically in the surgical group and increased in the medical group, yielding a striking, highly significant difference between the medical and surgical groups for this variable (figure 6, *top*). This difference is even more marked when data from patients originally assigned to the medical group who subsequently "crossed" to surgical therapy are censored from the analysis following the time of crossover (figure 6, *bottom*).

LONG-ACTING NITRATES. Long-acting nitrates were used by 45% of the patients in the medical group and 47% of those in the surgical group at baseline (p = NS). At follow-up, long-acting nitrate use had declined in surgical group patients, but in medical group patients long-acting nitrate use rose slightly at 1 year after entry

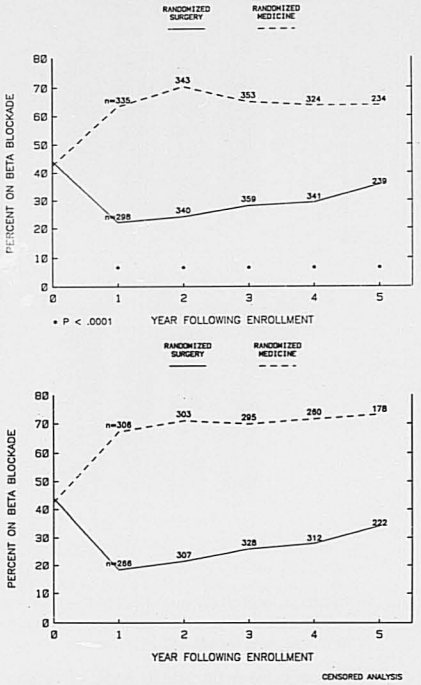


FIGURE 6. Use of β-receptor–blocking drugs. *Top,* Noncensored analysis; *bottom,* censored analysis. Statistical comparisons are provided only for the noncensored analysis.

and then tended to decline somewhat with each subsequent year of follow-up (figure 7, *top*). When data from patients in the medical group who crossed to surgical therapy are censored following the time of crossover, it appears that the use of long-acting nitrates was somewhat more constant during follow-up in the medical group (figure 7, *bottom*).

MISCELLANEOUS DRUG THERAPY (TABLE 1). Nitroglycerin use paralleled that of the long-acting nitrates, being similar at baseline in medical and surgical groups but markedly lower thereafter in the surgical group. At baseline, diuretics were used by 13% of patients in the medical group and by 17% of those in the surgical group (p = NS). There was an increase over time in diuretic use in both groups, so that by year 5, 26% of the medical group and 28% of the surgical group patients were taking diuretics (p = NS).

Digitalis was used at baseline by 9% of the medical group and 7% of the surgical group patients (p = NS).

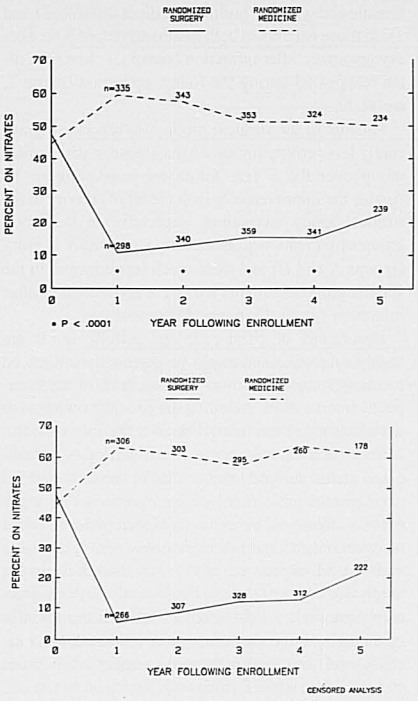


FIGURE 7. Long-acting nitrate use. *Top*, Noncensored analysis; *bottom*, censored analysis. Statistical comparisons are provided only for the noncensored analysis.

At the 5 year follow-up, digitalis use had increased to 14% in the medical group and 11% in the surgical group (p = NS).

The use of antiplatelet drugs increased over fourfold from baseline to year 5, but the prevalence of use did not differ between the two treatment groups. No other clinically important changes or striking differences in drug use were encountered.

Hospitalization. Of the 780 randomized patients, 286 medical group and 374 surgical group patients were hospitalized one or more times during the follow-up period. The total number of periods of hospitalization was significantly higher among patients in the surgical group than among those in the medical group (figure 8). The difference is primarily explained by a higher frequency of hospitalization in the surgical group during the first year of the study, when these patients were being admitted for coronary revascularization surgery. The total number of days hospitalized per 1000 patient-days of exposure was 8.43 in the medical group and 13.79 in the surgical group (p < .0001). Excluding hospitalization for coronary artery bypass graft surgery, the total number of days hospitalized per 1000 patient-days of exposure was 6.56 in the medical group and 6.41 in the surgical group (p = .28). Excluded from these analyses are hospitalizations (297 medical and 276 surgical) for coronary arteriography done on patients at approximately 18 and 60 months after entry as part of the study protocol. Of the 763 total periods of hospitalization in the medical group, 495 (64.8%) were for cardiac reasons. Of the 954 total periods of hospitalization in the surgical group, 681 (71.3%) were for cardiac reasons.

TABLE 1
Miscellaneous drug use (% on drug)

	Baseline		Year 1		Year 3		Year 5	
Drug	Med (n = 390)	Surg (n = 390)	Med (n = 335)	Surg (n = 298)	Med (n = 353)	Surg (n = 359)	Med (n = 222)	Surg (n = 232)
Nitroglycerin	54.9	56.2	50.7	14.1^	39.7	18.7^	41.0	22.2^
Diuretic	13.3	17.2	20.9	16.4	22.9	26.5	25.6	27.6
Digitalis	9.0	6.9	10.4	10.4	13.9	12.3	14.1	10.9
Tranquilizer	30.8	30.8	28.0	22.8	26.1	20.6	18.8	17.6
Antiplatelet	6.9	5.6	25.1	32.2	29.7	30.6	26.5	29.7
Lipid lowering	3.1	3.6	5.1	2.3	3.7	2.5	3.4	2.5
Hypoglycemic	2.8	2.6	3.3	2.0	5.4	4.2	5.1	6.3
Antihypertensive	5.9	8.2	7.5	8.4	8.2	7.8	4.3	7.5
Anticoagulant	6.7	5.9	3.6	3.0	4.2	4.2	4.3	3.3
Antiarrhythmic	9.0	9.7	14.3	9.4	11.3	7.5	14.1	8.8

Med = medical group; surg = surgical group.
^p < .0001 (medical vs surgical group).

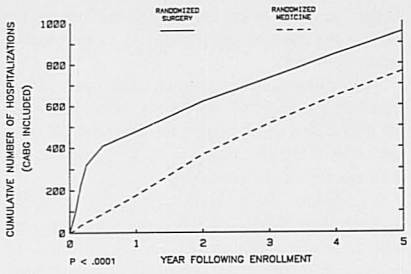


FIGURE 8. Total number of hospitalizations including those for coronary artery bypass graft surgery (CABG). Excluded are scheduled hospitalizations for coronary arteriography done on some patients at approximately 18 and 60 months after entry as part of the study protocol.

Risk factor management. Risk factors for coronary artery disease recorded serially in this study included high blood pressure, high cholesterol levels, overweight, and smoking. No significant differences in these parameters existed at baseline or at follow-up between the medical and surgical groups (table 2). The percentage of patients who smoked fell slightly 1 year after randomization in both the medical and surgical groups, but it did not change significantly thereafter and was not significantly different between the two groups (figure 9). The percentage of patients participating in a supervised exercise program was less than 5% throughout the first 5 years of follow-up and the number of patients from each group that participated did not differ significantly.

Discussion

This prospective, randomized, multicenter collaborative trial of medical and surgical therapy in subsets of patients with stable ischemic heart disease has shown 5 year survival to be equally good in medical and surgical groups[2]; however, patients who undergo surgery enjoy a significantly better quality of life, as demonstrated by a variety of both subjective and objective descriptors.

Functional status. Patients entered into this clinical trial were, by design, either asymptomatic after infarction or only mildly symptomatic (angina class II or less); therefore, marked amelioration of symptoms by either mode of therapy would not have been expected. Although a small minority of symptomatic patients in the medical group did become asymptomatic during follow-up (figure 2, *top left*), it was the patients in the surgical group who more frequently reported relief of chest pain, especially those who on entry were symptomatic and who had multivessel disease (figures 1 and 2). In those patients in both treatment groups who were asymptomatic after infarction (group C) chest pain often reappeared during the follow-up period (figure 2, *top right*).

Patients in the surgical group also reported significantly less activity limitation than those in the medical group over the 5 year follow-up period (figure 3). Again, the improvements in the level of activity in the surgical group were most impressive in the larger group of patients who had been symptomatic at entry (groups A and B) and were much less apparent in the smaller group of patients who were asymptomatic after infarction (group C, figure 3, *bottom*).

Descriptors of chest pain and activity levels are highly subjective and might be potentially influenced by many factors in addition to the effects of the therapeutic intervention, including the patient's own bias or desire to have symptom relief after the intervention.[5] More objective, however, are the descriptors of functional status derived from results of the serial graded exercise tests performed by a large portion of the study patients (figure 4). Surgically assigned patients tended to have longer treadmill work times with less angina and less ST depression of $\geq$1 mm than those in the medically assigned group. These treadmill descriptors nicely parallel, validate, and underscore the findings of the more subjective descriptors (chest pain and activity level) and confirm the improvement in functional status in the surgical group.

Drug therapy. The need for extensive drug therapy may negatively influence the quality of life. Although medication use was similar in the two treatment groups at entry, there was subsequently a marked reduction in use of both β-blockers and nitrates in the surgically assigned patients (figures 6 and 7, table 1). Furthermore, these differences between the groups were maintained over the 5 year observation period, and again reflect an improved quality of life in the surgically assigned patients, correlating temporally with the improved chest pain status, activity levels, and exercise test results in these patients. A substantial increase in use of diuretics, digitalis, and antiplatelet drugs was observed in both groups over the 5 year observation period (table 1), but no difference in the prevalence of use of these drugs was noted between medical and surgical groups.

As a descriptor of quality of life, the prevalence of drug use is only partially objective, like many of the other descriptors included in this report. The possibility exists that some patients or physicians, aware of the assigned treatment, might have altered drug therapy

TABLE 2
Risk factors

Variable	Baseline				At 5 years			
	Medical		Surgical		Medical		Surgical	
	n	%	n	%	n	%	n	%
Systolic pressure ≥ 160 mm Hg	390	9.2	390	6.7	179	10.6	187	11.2
Diastolic pressure ≥ 100 mm Hg	390	9.5	390	8.5	179	7.3	187	7.5
Cholesterol ≥ 250 mg/dl	330	33	325	32	147	33	147	40
Overweight[A]	384	21	389	21	179	27	190	25
Participation in supervised exercise program	390	0.5	390	1.5	234	1.7	239	4.2

No significant differences exist between the prevalence of variables in medical and surgical groups.
[A]115% or more of normal age-sex-height adjusted weight.[6]

according to a preconceived bias, but this would probably only account for a small fraction of the difference.

Hospitalization. The need for hospitalization has a negative impact on quality of life. In this trial, the majority of hospitalizations were for cardiac reasons (medical group 65%, surgical group 71%). There was a significantly greater number of hospitalizations among surgically assigned patients during the first year after enrollment, owing primarily to rehospitalization for the coronary artery bypass graft surgery itself (figure 8). During the subsequent 4 years of follow-up the number of hospitalization periods in the surgical group generally paralleled those in the medical group.

Risk factor management. The number of ischemic heart disease risk factors present was similar in patients in the medical and surgical groups at entry and had not changed importantly 5 years later (table 2). Of particular interest was the large number of cigarette smokers in both the medical (41%) and surgical (39%) groups at entry. The number of patients who smoked had diminished slightly 1 year later but remained relatively constant thereafter. There was no significant difference between the number of patients in the medical and surgical groups who smoked (figure 9).

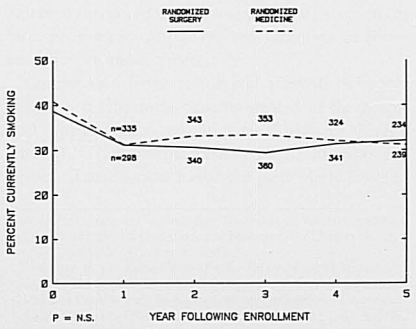


FIGURE 9. Percentages of patients who were cigarette smokers at various time intervals.

Clinical implications. This prospective randomized study demonstrates that, in patients who are asymptomatic after infarction or who have chronic stable angina of class II severity or less, a strategy of elective coronary artery bypass surgery, when compared with conventional medical management, offers no advantages in terms of prolonging life.[2] Surgery, however, may offer advantages in terms of improving the quality of life through reduction in chest pain, improvement in both subjective and objective descriptors of activity, and reduction in the need for daily drug therapy with agents such as nitrates and β-blockers. However, neither medical nor surgical therapy appears to offer a significant advantage in helping patients return to work or in modifying recreational status. These observations generally parallel the results of other major clinical trials of medical vs surgical therapy for stable ischemic heart disease.[6–9] Frequency of hospitalization after treatment assignment, a variable not yet reported by the other major trials, is shown in the current study to be greater among surgical group patients owing to the initial hospitalization necessary for coronary revascularization surgery itself.

In view of these findings, we believe that patients who are asymptomatic after infarction or who have mild chronic stable angina should be managed initially with appropriate medical therapy to prevent or control

ischemic symptoms. Should the patient's symptoms worsen or should dissatisfaction arise with limitations on lifestyle imposed by symptoms or by need for drug therapy, coronary artery bypass graft surgery can be performed electively with the reasonable expectation that it will improve quality of life.

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