Effect of Diabetes on Outcome and Changes in Quality of Life After Coronary Artery Bypass Grafting

Otso Järvinen, MD, PhD, Juhani Julkunen, PhD, Timo Saarinen, LicA(Psych), Jari Laurikka, MD, PhD, and Matti R. Tarkka, MD, PhD

Heart Center, Department of Cardiac Surgery, Tampere University Hospital, Tampere, Rehabilitation Foundation, Helsinki, Department of Psychology, University of Helsinki, Helsinki, Finland

Background. **An increasing proportion of patients undergoing coronary artery bypass grafting are diabetics who are known to carry a higher mortality and morbidity in association with operation, but data on whether health-related quality of life improves similarly after coronary artery bypass grafting in diabetic and nondiabetic patients are limited. We assessed in detail changes in health-related quality of life (RAND-36 Health Survey) during the first year after coronary artery bypass grafting.**

Methods. **Seventy-four of the 508 patients (14.6%) operated on in a single institution had a history of diabetes and were compared to nondiabetics. The RAND-36 Health Survey was used as an indicator of quality of life. Assessments were made preoperatively and repeated 12 months later.**

Results. **Thirty-day mortality was 2.7% versus 1.6% ($p = 0.511$) and one-year survival was 94.6% versus 97.0% ($p = 0.287$) in the diabetics and nondiabetics, respectively. Diabetics improved significantly ($p < 0.005$) in seven, nondiabetics ($p < 0.001$) in all eight RAND-36 dimensions. Physical component summary and mental component summary scores on the RAND-36 improved significantly ($p < 0.001$) in diabetics as well as in nondiabetics. Both groups experienced closely similar freedom from anginal symptoms at one year (86.2% vs 90.5%, $p = 0.280$).**

Conclusions. **Although diabetic patients differ from nondiabetics having slightly inferior quality of life before and one year after coronary artery bypass grafting, they gain similar improvement of quality of life in one year after surgery when compared to nondiabetics.**

(Ann Thorac Surg 2005;79:819–24)

Diabetes is a well-established risk factor for atherosclerotic coronary heart disease [1], and coronary heart disease is the leading cause of death among adult diabetics accounting for three times as many deaths among diabetics as among nondiabetics [2]. Coronary artery disease is not only more prevalent in diabetic patients compared with the rest of the population but tends to be more extensive, involving multiple vessels and being rapidly progressive [3]. Diabetes is also a risk factor in association with myocardial revascularization procedures [4, 5] but, according to recent studies, coronary artery bypass grafting (CABG) may be the treatment of choice in this group of patients [6, 7].

During the past two decades, progress in surgical technique, in anesthesia, and in postoperative care has improved the results of coronary artery bypass surgery. At the same time, however, the profile of patients undergoing CABG has altered towards higher age with frequent preoperative comorbid conditions, especially diabetes, and increased postoperative morbidity [8–10]. Their gain in added years of life achieved by the CABG may be limited. Quality of life (QOL) thus becomes a pertinent issue as providers and consumers of health care debate on the benefits to be gained from expensive medical and surgical interventions. However, there are limited data available on whether health-related QOL improves similarly after CABG in diabetic and nondiabetic patients. We therefore assessed the changes in health-related QOL (RAND-36) during the first year after CABG surgery in diabetics. We also compared the preoperative risk profiles, perioperative variables, early postoperative outcome, 1-year symptomatic status, and hospital readmissions between the diabetics and nondiabetics.

Patients and Methods

Procedure and Subjects

The data were obtained from Tampere University Hospital between May 2, 1999 and November 30, 2000. The cohort comprised 508 patients who underwent isolated CABG. The study was approved by the institutional review board of Tampere University Hospital (April 15, 1999) and each patient gave written informed consent to participate. There were 420 (82.7%) male patients in the sample. Age range was from 34 to 92 years (median, 63). Three hundred and ninety-eight (78.3%) of the procedures were performed electively and 110 (21.7%) urgently or as emergencies. Four hundred and fifty-three (89.2%) patients underwent bypass grafting through a sternotomy incision with cardiopulmonary bypass (CPB; on-

Accepted for publication Aug 18, 2004.

Address reprint requests to Dr Järvinen, Tapulinkatu 20 33400 Tampere, Finland; e-mail address: otsojarvinen@koti.soon.fi.

Published by Elsevier Inc

0003-4975/05/$30.00
doi:10.1016/j.athoracsur.2004.08.030

Ann Thorac Surg
2005;79:819–24

Abbreviations and Acronyms

AMI	= acute myocardial infarction
BMI	= body mass index
CABG	= coronary artery bypass grafting
CCU	= coronary care unit
CI	= confidence interval
CK-MB	= creatine phosphokinase isoenzyme MB
COPD	= chronic obstructive pulmonary disease
CPB	= cardiopulmonary bypass
ICU	= intensive care unit
IDDM	= insulin dependent diabetes mellitus
LV	= left ventricule
MCS	= mental component summary
NIDDM	= noninsulin dependent diabetes mellitus
NYHA	= New York Heart Association
OR	= odds ratio
PCS	= physical component summary
PTCA	= percutaneous coronary angioplasty
QOL	= quality of life
RAND-36	= RAND-36 Health Survey
SD	= standard deviation

pump) and 55 (10.8%) were operated without CPB (off-pump).

Seventy-four (14.6%) patients had a history of diabetes mellitus on admission that had necessitated active therapy with medication. Thirty-nine (52.7%) of these patients had a noninsulin dependent diabetes mellitus (NIDDM) and 35 (47.3%) patients had an insulin dependent diabetes mellitus (IDDM). In the analysis, these diabetes types were treated together because the number of patients in the subgroups was relatively small for a reasonable statistical handling.

During the primary hospital stay a comprehensive preoperative, perioperative, and postoperative medical data body was collected. Most patients were discharged on the sixth day (median) after the operation to the local district hospital. The data from these eighteen secondary discharge hospitals were collected by referring physicians and sent to the first author (OJ) for analysis. All outcome events, including thirty-day mortality and complications, were recorded for joint analysis with the primary hospital data. Statistics Finland provided causes and dates of death after discharging. Major postoperative complications included mortality, stroke, mediastinitis, sepsis, low output syndrome, prolonged ventilatory support (> 36 hours), acute renal failure requiring dialysis, perioperative myocardial infarction (a new Q-wave in the electrocardiogram or a peak level of CK-MB > 150 μmol/L), pulmonary embolism, and severe cardiac failure or severe ventricular arrhythmia requiring intensive care unit (ICU) or coronary care unit (CCU) stay in the primary or secondary referral hospital. Atrial fibrillation was recorded as a minor complication.

Assessment of Health-Related Quality of Life and Functional Capacity

All assessments were made preoperatively and repeated 12 months later. The baseline self-report questionnaire was given to the patients the day before surgery. The follow-up questionnaire including the same measures was mailed to the participants one year after the bypass operation. Seventeen (3.3%) had died during this postoperative period. Four hundred and sixty-five (94.7%) of the 491 surviving patients returned the follow-up questionnaire, mean time of follow-up being 12.6 (standard deviation 1.2) months. Compared with the 465 patients who completed the form, those 26 patients who did not were younger (median age, 54 vs 63 years, $p = 0.006$). However, there were no significant differences in the majority of variables, including sex, Euroscore risk sum, priority of operation, or in the New York Heart Association (NYHA) class.

We used the Finnish adaptation of the RAND-36 generic health-related QOL scale, for which there are reference values available for the Finnish population [11]. The RAND-36 is a widely used and validated scale, which yields scores for eight dimensions of health-related QOL: (1) general health, (2) physical functioning, (3) role limitations due to physical problems, (4) bodily pain, (5) emotional well-being, (6) role limitations due to emotional problems, (7) social functioning, and (8) energy [12, 13]. The scores for each domain range from 0 to 100, 0 being the poorest and 100 the best possible health status. To reduce the number of outcome variables two summary scores can also be used: the Physical Component Summary (PCS) equals the mean value of the physical subscales [1–4] while the Mental Component Summary (MCS) equals the mean value of subscales [5–8] reflecting psychosocial functioning [14–16]. Preoperative and postoperative functional capacity was ranked according to the NYHA classification.

Exclusion Criteria

Patients unable or unwilling to complete the baseline survey were excluded from the study. The total number of patients undergoing CABG in our institution during the study period (May 1999 to November 2000) was 1,128. Of these, 508 (45.0%) completed a baseline survey. Compared with the 508 included patients, exluded ones proved to be older (median age, 68 vs 63 years, $p < 0.001$), less often men (64.8% vs 82.7%, $p < 0.001$), and had a higher Euroscore risk sum (median, 4 vs 2, $p < 0.001$); they were more often operated urgently (47.1% vs 21.3%, $p < 0.001$), and more often had three-vessel disease (68.0% vs 60.4%, $p = 0.029$).

Statistical Analysis

Patient and outcome variables are expressed mostly as a percentage of the total. Categorical variables between the diabetic and nondiabetic groups were compared using Pearson's χ^2 test. Continuous variables were compared by the independent samples t test for variables with normal distributions and the Mann-Whitney test for variables with nonnormal distributions. Baseline and follow-up variables were compared using paired-samples t