

Quality of life in patients with ischaemic heart disease: a prospective controlled study

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Abstract. Westin L, Carlsson R, Israelsson B, Willenheimer R, Cline C, McNeil TF (University of Lund, University Hospital, Malmö, Sweden). Quality of life in patients with ischaemic heart disease: a prospective controlled study. *J Intern Med* 1997; **242**: 239–47.

Objectives. To assess quality of life in patients after acute myocardial infarction (AMI), coronary artery by-pass grafting surgery (CABG) and percutaneous transluminal coronary angioplasty (PTCA) as compared with healthy controls.

Design. Self-administered questionnaires were completed 1 month and 1 year after the event.

Setting. Department of Cardiology, University Hospital, Malmö, Sweden; 1989–1992.

Subjects. 296 AMI, 99 CABG, 18 PTCA patients and 88 randomly selected healthy controls were included; 349 patients completed the entire programme.

Main outcome measures. Quality of life in the dimensions of perceived general health, thoracic pain, breathlessness, feeling of arrhythmia, anxiety, depression, self-esteem, experience of social life and sex life.

Results. Patients differed from controls in both psychological and somatic aspects of QL after 1 month. Furthermore, 1 month after the event AMI patients experienced more anxiety ($P = 0.001$) than CABG patients, whilst CABG patients experienced a poorer sex life ($P < 0.001$) than AMI patients. One year after the event patients differed from controls primarily in somatic symptoms; no significant differences were found across patient groups. Patients who sought emergency out-patient care during the follow-up year for clinically diagnosed angina pectoris or cardiac incompensation had reported higher levels of thoracic pain ($P < 0.001$) and breathlessness ($P < 0.001$) at 1 month follow-up than patients who did not seek such care.

Conclusions. Quality of life is considerably affected in patients following a cardiac event, especially during the initial recovery phase. Although substantial improvement in quality of life occurs over time, the persistence of residual distress at 1-year follow-up is a challenge for clinicians concerned with the full rehabilitation of the cardiac patient.

Keywords: acute myocardial infarction, coronary artery bypass grafting, ischaemic heart disease, PTCA, quality of life.

Introduction

Cardiovascular diseases are responsible for about one-quarter of all deaths world-wide, and about one-half of all deaths in developed countries [1]. Ischaemic heart disease (IHD) is the prime cause of death amongst both men and women in Sweden, accounting for 29.2% of all deaths amongst males and 23.8% of all deaths amongst women [2]. Approximately 10% of disability pensions awarded in Sweden are attributed to IHD [3]

As more and more patients benefit from improvements in cardiac care for acute myocardial infarction (AMI) and interventions such as coronary artery by-pass grafting surgery (CABG) and percutaneous transluminal coronary angioplasty (PTCA), considerable interest has focused upon the nature of the patient's situation, somatically as well as emotionally. The cardiac patient is faced with problems in several spheres of life, and it is necessary for any inquiry into this field to cover a wide range of topics. Quality of life (QL) is a widely used collective term aimed at

describing diverse aspects of the patient's situation. Although psychosocial outcome of AMI, CABG as well as PTCA has been the object of extensive investigation [4–16], few studies have directly compared QL in heart disease across groups of patients with different manifestations of the same basic disorder: IHD. Such a comparison would provide insight on the subjectively perceived benefits of a costly intervention such as a CABG or a PTCA, as well as elucidate the possible differential impact of three rather diverse traumatic events, one of which is widely recognized as a potentially life-threatening disease whilst the other two are therapeutic interventions with which patients perhaps may not be as familiar. As reactions to cardiac disease have been less well studied in women [17] it is important to have a non-sex-biased sample.

In this article we present findings related to perceived QL in male and female patients 1 month and 1 year after hospitalization for AMI, CABG, and PTCA, utilizing a new multifaceted self-assessment instrument developed for this purpose. Demographically similar healthy persons were used as controls. We also investigated whether a previous history of AMI influenced QL following the current AMI/CABG/PTCA and whether aspects of QL one month following AMI were associated with a need for intervention (CABG/PTCA) or emergency care during the subsequent year. The ultimate aim was to increase our knowledge of the impact of IHD events on QL in order to help design optimal intervention strategies for these patient categories.

Materials and methods

Study population

The current study of 413 patients is part of a larger follow-up investigation of patients with IHD carried out in Malmö, southern Sweden [18]. During the period 23 October 1989 to 30 April 1991 AMI patients who were treated at the Coronary Care Unit, University Hospital, Malmö, CABG patients operated and PTCA patients undergoing angioplasty at the nearby University Hospital in Lund were invited to participate in a follow-up programme at a specialized out-patient unit as one of several investigations carried out within the framework of the programme. Patients had to be residents of Malmö discharged to their homes after the hospital stay. During the first

year all patients below the age of 70 were included, and during the rest of the study only patients between 50 and 70 years of age. The beginning of the study was defined as the date of infarction (AMI) and the date of operation (CABG) or angioplasty (PTCA). Diagnosis of AMI was based on standard criteria of typical chest pain, ECG changes and elevation of cardio-specific serum enzymes. Patients gave their written consent to participate after receiving information about the study. The distribution of the patients in the three categories together with mean age of male and female patients and sex ratios are given in Table 1. Patient allocation to a category was based upon the initial cardiac event (regardless of earlier history) and remained constant even if an intervention (CABG/PTCA) was subsequently performed during the year of follow-up. Amongst patients included after AMI, 39 underwent CABG and nine were treated with PTCA during the year of follow-up. Amongst patients included after CABG, one was reoperated, and one underwent PTCA during follow-up. Some of the patients included in the current study had histories of previous myocardial infarction. Thus, in the total sample, 308 patients (74.6%) had no previous AMI, 72 (17.4%) had one previous AMI, 21 (5.1%) had two previous AMI, and 12 (2.9%) had three previous AMI.

Attrition

Thirty-two AMI patients who met the formal inclusion criteria did not participate for the following reasons: eight had severe noncardiac disease (e.g. stroke with hemiparesis, cancer with metastasis), three had

Table 1 Demographic characteristics of patient groups

Patient group	Number	% males	Mean age in years
Acute myocardial infarction	Males: 226	76.4%	Males: 59.7
	Females: 70		Females: 62.6
	Total: 296		Total: 60.3
CABG	Males: 78	78.8%	Males: 59.9
	Females: 21		Females: 59.6
	Total: 99		Total: 59.9
PTCA	Males: 12	67%	Males: 61
	Females: 6		Females: 55.3
	Total: 18		Total: 59.1
Total	Males: 316	76.5%	Males: 59.8
	Females: 97		Females: 61.5
	Total: 413		Total: 60.2

serious abuse problems, two were not Swedish speaking, 11 did not want to participate in this follow-up because of ongoing contact with other physicians, and six refrained for unknown reasons. Amongst CABG patients nine had contact with other physicians and one was not Swedish speaking. All PTCA patients eligible for the study participated. Mean age (60.4 years) and sex ratio (74% males) amongst non-participating patients were similar to the participating patients.

Control subjects

Residents of Malmö whose age and gender distribution corresponded to that of the patients were randomly selected from a population data base and invited to participate as control subjects if they reported themselves to be free from chronic illness. Letters of invitation were sent to 180 persons, amongst whom 42 were later disqualified: eight persons no longer resided in Malmö or had died, and 34 were too ill to be considered 'not chronically ill', either on the basis of their own information or, in the case of nonresponders to the invitation, on the basis of hospital records (e.g. malignancy, cerebrovascular disease). Of the remaining 138, 88 control persons (64%) participated in the study: 65 males and 23 females (74% males), mean age 59.6 years. 38 males and 12 females (mean age 57.5 years, sex ratio 76% males) who were eligible as controls did not respond to the invitation to serve as controls. There were no significant differences in age between respondent controls, nonrespondent controls, and index patients (independent two-tailed Student's *t*-test index versus controls; $P = 0.55$; responding versus nonresponding controls; $P = 0.12$). Also, there were no significant differences in sex ratio amongst controls, nonrespondent controls, and index patients (Fisher's exact test, index versus controls; $P = 0.58$; responding versus nonresponding controls; $P = 1.0$). No information was available on perceived health status amongst nonrespondent controls. Instead, mortality rates in respondent and nonrespondent controls were examined 6 years after the study onset in order to assess any possible source of bias. No significant difference was found in mortality rates (Fisher's exact test; $P = 0.35$). No social class bias in the nonrespondent controls was evident in the geographical distribution of their place of residence, which corresponded to that of the general population of Malmö.

Tests and investigations during follow-up

The period of follow-up was 1 year. All patients were seen by a nurse specialized in cardiac care 4 weeks after inclusion at which time patients received written and oral information about coronary artery disease in general and lifestyle changes to promote health status within the framework of a secondary prevention programme. A 24-h ECG recording, a symptom limited exercise ECG and a cardiac output measurement by means of thoracic electric bioimpedans were performed [19]. Five weeks after hospitalization patients saw a physician and were then randomized to follow-up either at the above-mentioned specialized unit [18], or outside the unit, for example by their previously attending doctor, community health care physicians or cardiologists not active at the unit. Patients viewed as in need of cardiological expertise were *not* randomized but were followed up at the specialized unit or by a specialist cardiologist at the outpatient facility of the Department of Cardiology.

QL assessment procedure

First QL assessment. The first QL assessment was done at the visit 4 weeks after inclusion when the patients were seen by the specialized nurse. The patient and his/her spouse were each given a self-administered questionnaire designed for assessment of QL and attitude towards heart disease to be completed separately and independently at home. It was returned by mail or at the next hospital visit. In order to determine possible longitudinal changes in the subjective experience of coronary disease, the QL questionnaire was re-administered to *all* patients, randomized and nonrandomized, and to their spouses, at a concluding follow-up visit 52 weeks after inclusion.

Return rate. Seven patients died during the 4-week period between study inclusion and administration of the first questionnaire. Eight patients were unable to respond because of various reasons, for example blindness, severe infection or hemiparesis after bypass operation, or were no longer residents of Malmö. Of the remaining 398 patients, 376 (94%) participated. Mean age was 58.5 years and sex ratio 85% males amongst the 22 nonrespondent patients.

One year after the index event, an additional 13 patients had died, and 10 had dropped out due to serious diseases leaving 375 patients able to partici-

pate. Of these, 93% ($n = 349$) completed the 1 year follow-up.

QL questionnaire components. For the purposes of the present study, QL was operationally defined as a composite construct consisting of various aspects of somatic health, mental health, self-esteem, degree of optimism/pessimism, and the ability to perform and enjoy everyday activities associated with work, home and family life, sexual relationships and hobbies. In order to measure QL as defined, we assembled a multifaceted questionnaire, consisting partly of existing instruments and partly of new sections where, to our knowledge, no relevant instruments were available.

The questionnaire was composed of three parts: A, factors depicting QL at the two measurement occasions; B, factors depicting selected aspects of patient's personality and coping strategies; and C, other factors with potential influence on the patient's current sense of well-being.

This article deals with A, which consists of items forming the following QL dimensions.

- 1 Physical health: *general* (17 items).
- 2 Physical health: *heart-related* symptoms (11 items).
- 3 Mental health: anxiety (20 items), depression (8 items).
- 4 Experience of sex life: function and enjoyment (2–3 items, see below).
- 5 Experience of social life (20 items).
- 6 Self-esteem (5 items).

The questionnaire used at the concluding visit (52 weeks after the index event) was composed of the same items, with minor changes, plus the addition of two new items about general emotional state and two items about family changes during the year of follow-up.

Description and sources of items. The items for general health covered symptoms of gastrointestinal, respiratory, neurological and muscular origin, together with some general items (e.g. appetite, subjective body temperature, 'feeling healthy'). The content was closely related to scales such as the Subjective Symptom Assessment Scale (SSA-P) [20].

The items for heart-related symptoms assessed the presence of thoracic pain during various situations, breathlessness at rest and during exertion, and arrhythmia at rest and during exertion, as in various earlier questionnaires [20–23].

The items for anxiety consisted of the 'state' part of

the *State and Trait Anxiety Inventory* (STAI) in its entirety [24].

The items for depression were derived from the depressive symptom subscale of the *Comprehensive Psychopathological Rating Scale* (CPRS) [25].

The items for experience of sex life covered sexual enjoyment (two items) and changes in interest secondary to disease (one item), similar to other scales [20, 26]. The latter item was used only in comparisons across patient groups.

The items for experience of social life covered conflicts and pleasurable aspects of relationships to family and friends/relatives, as well as enjoyment of leisure activities.

The items for self-esteem were derived from the *McMaster Questionnaire* [21].

Controls and their spouses received questionnaires equivalent to those used for patients, with the exception that items directly referring to AMI or CABG/PTCA intervention were excluded. Furthermore, 14 items constituting the Hospital Anxiety and Depression scale (HAD) were added at the end of the control questionnaire for the purpose of validating the regular questionnaire items on depression [27].

Questionnaire items were almost exclusively of Likert scale type, i.e. on a scale from 1 to 4, with 1 representing absence of problematic state, and 4 representing the greatest degree of abnormality. (Two items for experience of sex life featured five response alternatives.) Patients were asked to choose the alternative that best described their situation during the past week. Items were grouped into QL dimensions according to the above description, and a mean score was derived for a given group of items forming the dimension by adding the scores for that group of items and dividing this sum by the number of items answered by the respondent.

Reliability

For the purpose of test-retest reliability assessment, eight patients aged 60–69 years with stable coronary heart disease who were attending the coronary outpatient clinic but who were not included in the current study were given the one-month questionnaire during a routine visit. The questionnaire was then re-administered after about 14 days without previous warning. Test-retest reliability for the dimensions of QL was assessed by Spearman rank correlation coefficient analysis.

Internal consistency for QL dimensions included in the questionnaire was assessed by Cronbach's alpha [28].

Statistical analyses

Comparisons of patients versus the control group and across patient groups for QL dimensions were performed by use of a general factorial analysis of covariance (ANCOVA), correcting for sex and age. Due to the ordinal nature of questionnaire items, the scores were rank-ordered prior to performing the ANCOVAs [29]. Between-group comparisons (ANCOVA) were performed on those QL measures for which significant values were obtained. Independent Student's *t*-test was used for comparisons of age and Fisher's exact test for sex ratio. Statistical significance was accepted at a two-tailed *P*-value <0.01. Statistical analyses were performed utilizing SPSS for Windows version 6.0 [28].

Ethics

The study was approved by the Research Ethics Committee of the University of Lund, Sweden.

Results

Reliability, internal consistency, validity of questionnaire items

Satisfactory test-retest values for reliability ($r \geq 0.7$) were obtained for all QL dimensions except experience of social life, indicating that patients' impressions of this area may be somewhat more subject to change within a 2-week period (Table 2). Satisfactory levels of internal consistency were obtained for all dimensions (Table 3). An analysis of the relationship between the HAD items for depression and the questionnaire items for depression used in the patients for the purpose of validity assessment yielded a Spearman correlation coefficient of 0.53. This somewhat low coefficient may partly be due to the fact that the two scales are compared within the control group rather than within the patients.

QL 1 month after inclusion

Those QL dimensions for which the general factorial ANCOVA for the total patient and control population reached significance were further analysed for specific patient group vs. control differences (Table 4). The

Table 2 Test-retest reliability for dimensions of quality of life (QL) by Spearman rank order correlation coefficient (*r*) *n* = 8

QL dimension	<i>r</i>
General health	0.83
Thoracic pain	0.83
Feeling of arrhythmia	0.78
Breathlessness	0.99
Anxiety	0.75
Depression	0.70
Experience of sex life	0.71
Experience of social life	0.57
Self-esteem	0.76

only QL dimension where no significant group effect was found was experience of social life.

All three patient groups had significantly higher levels of arrhythmia, thoracic pain and less self-esteem one month after inclusion compared with normal controls. In some dimensions one or two patient groups differed significantly from controls. Thus, AMI and CABG patients had poorer perceived general health, more breathlessness, higher levels of depression and a less satisfactory sex life. AMI patients had more anxiety. It should be observed that in some dimensions of QL the medians for patients and controls are similar, although a statistical significant difference is reached. However, the distributions in the groups differ, as is shown by the percentile values.

QL 1 year after inclusion

Quality of life dimensions for which the general factorial ANCOVA for the total patient and control population reached significance were further analysed for specific patient group vs. control differences (Table 5). There were no significant group effects in the dimensions of anxiety, depression, self-esteem

Table 3 Internal consistency of quality of life (QL) dimensions at 1 month and 1 year by Cronbach alpha

QL dimension	One month	One year
General health	0.80	0.78
Thoracic pain	0.82	0.81
Feeling of arrhythmia	0.75	0.75
Breathlessness	0.70	0.62
Anxiety	0.75	0.75
Depression	0.84	0.87
Experience of social life	0.76	0.75
Self esteem	0.84	0.88

Table 4 Comparisons between controls and patient groups on quality of life (QL) dimensions one month after inclusion by general factorial ANCOVA (corrected for sex and age); *P*-values are two-tailed; medians (10th and 90th percentiles) are shown; higher scores = worse health and poorer QL

QL dimension	Controls <i>n</i> = 88	AMI <i>n</i> = 266	CABG <i>n</i> = 94	PTCA <i>n</i> = 16
General health	1.35 (1.17, 1.76)	1.59 (1.24, 2.14) <i>P</i> < 0.001	1.65 (1.35, 2.09) <i>P</i> < 0.001	1.50 (1.10, 2.29) <i>P</i> = 0.09
Thoracic pain	1.00 (1.00, 1.60)	1.20 (1.00, 2.20) <i>P</i> < 0.001	1.30 (1.00, 2.20) <i>P</i> = 0.001	1.20 (1.00, 2.38) <i>P</i> = 0.009
Feeling of arrhythmia	1.00 (1.00, 1.25)	1.00 (1.00, 1.75) <i>P</i> < 0.001	1.00 (1.00, 1.75) <i>P</i> < 0.001	1.25 (1.00, 1.90) <i>P</i> < 0.001
Breathlessness	1.50 (1.00, 2.00)	1.50 (1.00, 2.50) <i>P</i> < 0.001	1.50 (1.00, 2.50) <i>P</i> < 0.001	1.00 (1.00, 3.00) <i>P</i> = 0.82
Anxiety	1.60 (1.10, 2.11)	1.80 (1.15, 2.90) <i>P</i> < 0.001	1.60 (1.05, 2.55) <i>P</i> = 0.32	1.90 (1.15, 3.31) <i>P</i> = 0.02
Depression	1.50 (1.00, 2.25)	1.75 (1.13, 2.75) <i>P</i> < 0.001	1.75 (1.13, 2.56) <i>P</i> = 0.004	1.88 (1.00, 2.79) <i>P</i> = 0.043
Self-esteem	1.40 (1.00, 2.20)	1.60 (1.20, 3.00) <i>P</i> < 0.001	1.60 (1.00, 2.80) <i>P</i> = 0.006	1.80 (1.00, 3.26) <i>P</i> = 0.006
Experience of sex life	2.50 (1.50, 4.00)	3.00 (2.00, 4.50) <i>P</i> < 0.001	3.50 (2.00, 4.50) <i>P</i> < 0.001	2.50 (2.00, 3.90) <i>P</i> = 0.09

and experience of social life. All patient groups had significantly higher levels of perceived arrhythmia compared with normal controls. In addition, AMI and CABG patients had significantly more breathlessness, more thoracic pain and less satisfactory sex life. AMI patients had poorer perceived general health.

QL comparisons across and within patient groups

The across-patient groups (AMI, CABG, PTCA) analyses at 1 month follow-up yielded significant values for the following QL dimensions: anxiety, experience of sex life and general health. AMI patients were found to have significantly higher levels of anxiety than CABG patients, whilst CABG patients had less satisfactory sex life than AMI patients and poorer general health than PTCA patients (Table 6). No significant across-group differences were found in the QL dimensions not shown in Table 6. After 1 year there were *no* statistically significant differences in QL dimensions across patient groups.

AMI patients with previous myocardial infarction had significantly more perceived thoracic pain (two-tailed *P* = 0.001), arrhythmia (two-tailed *P* = 0.007), poorer general health (two-tailed *P* = 0.002) and more breathlessness (two-tailed *P* = 0.009) at 1 month, as compared with AMI patients with no previous infarction. At 1-year follow-up AMI patients with previous infarction had poorer general health (two-tailed *P* = 0.009) than those with no previous infarction.

CABG patients with previous myocardial infarction had significantly more arrhythmia (two-tailed *P* = 0.007) and breathlessness (two-tailed *P* = 0.004) at one month compared with CABG patients with no previous AMI. No significant differences were found at 1-year follow-up.

AMI patients who underwent CABG or PTCA during the follow-up year had at 1-month follow-up significantly more thoracic pain (two-tailed *P* = 0.001), breathlessness (two-tailed *P* = 0.01), lower self-esteem (two-tailed *P* = 0.003), more depression

Table 5 Comparisons between controls and patient groups on quality of life (QL) dimensions 1 year after inclusion by general factorial ANCOVA (corrected for sex and age); *P*-values are two-tailed; medians (10th and 90th percentiles) are shown; higher scores = worse health and poorer QL

QL dimension	Controls <i>n</i> = 88	AMI <i>n</i> = 244	CABG <i>n</i> = 89	PTCA <i>n</i> = 16
General health	1.35 (1.17, 1.76)	1.47 (1.12, 2.00) <i>P</i> = 0.002	1.47 (1.12, 1.81) <i>P</i> = 0.05	1.38 (1.04, 1.99) <i>P</i> = 0.86
Thoracic pain	1.00 (1.00, 1.60)	1.20 (1.00, 2.00) <i>P</i> < 0.001	1.00 (1.00, 2.00) <i>P</i> = 0.001	1.20 (1.00, 2.04) <i>P</i> = 0.04
Feeling of arrhythmia	1.00 (1.00, 1.25)	1.00 (1.00, 1.75) <i>P</i> < 0.001	1.00 (1.00, 1.50) <i>P</i> < 0.001	1.13 (1.00, 1.95) <i>P</i> < 0.001
Breathlessness	1.50 (1.00, 2.00)	1.50 (1.00, 2.50) <i>P</i> = 0.004	1.50 (1.00, 2.50) <i>P</i> = 0.007	1.50 (1.00, 2.60) <i>P</i> = 0.90
Experience of sex life	2.50 (1.50, 4.00)	3.00 (2.00, 4.50) <i>P</i> < 0.001	3.00 (2.00, 4.50) <i>P</i> < 0.001	2.50 (2.00, 3.30) <i>P</i> = 0.95

(two-tailed *P* = 0.01), less satisfying sex life (two-tailed *P* = 0.01) as compared with the other AMI patients. At the follow-up after 1 year they did not differ significantly from other AMI patients.

Study patients whose condition compelled them to seek treatment at the emergency clinic due to angina pectoris as diagnosed by the attending physician at least once during the year of follow-up had previously reported significantly higher levels of thoracic pain at 1-month follow-up than patients who were not seen at the emergency clinic for this reason during the follow-up (1.60 vs. 1.20; two-tailed *P* < 0.001).

Study patients whose condition compelled them to seek treatment at the emergency clinic because of breathlessness diagnosed as heart failure by the attending physician at least once during the year of follow-up had previously reported significantly high-

er levels of breathlessness at 1-month follow-up than patients who were not seen at the emergency clinic for this reason during the follow-up (2.00 vs. 1.50; two-tailed *P* < 0.001).

Discussion

The heart has traditionally been regarded not only as a vital organ, but also as the centre of the entire individual. This view is manifest in a wide variety of literary and cultural contexts [30–32], and is perhaps best exemplified by the use of the expression ‘Lift up your hearts’ (Sursum corda) which is found in several western and eastern Christian liturgies. An injury to the heart may consequently be perceived as a threat to the whole person, body and soul, a condition described as a ‘forfeiting of life’s pleasures’ or ‘ego infarction’ [10]. Moreover, the necessity of life-style changes in several areas simultaneously following a cardiac event enhances the patient’s burden perhaps more than in other diseases.

In the current study the impact upon QL (both on a short- and long-term basis) of three types of cardiac events was assessed. From the patient’s point of view, the three events may have a strong common denominator: they involve the heart, the prime organ of life; thus, the emotional reactions could conceivably be similar. From the physician’s point of view, however, these events are quite different. CABG and PTCA are

Table 6 Comparisons across patient groups at one month follow-up. All comparisons by general factorial ANCOVA (corrected for sex and age); *P*-values are two-tailed. Significant differences and non-significant trend levels (*P* < 0.05) are shown. Bold type indicates the patient group with greater degree of disturbance

QL dimension	Patient groups
Anxiety	AMI vs. CABG; <i>P</i> = 0.001
Sex life	CABG vs. AMI; <i>P</i> < 0.001 CABG vs. PTCA; <i>P</i> = 0.02
General health	CABG vs. AMI; <i>P</i> = 0.02 CABG vs. PTCA; <i>P</i> = 0.007

therapeutic measures whilst AMI is regarded as a life-threatening disorder. Both CABG and PTCA patients should experience improved QL with normalization of subjective physical distress. The results indicate that patients do indeed have a period of emotional turmoil during a period after the event, where perceived anxiety, depression and self-esteem by and large set them apart from normal controls of their own age, and this emotional disturbance is present regardless of whether patients have undergone a therapeutic intervention or a myocardial infarction. After a year this emotional crisis reaction has passed, but the somatic problems are still evident, together with problems in the sexual area, compared with controls. Thus, contrary to the expectations of the physician, CABG and PTCA patients are not entirely symptom-free 1 year after these interventions, nor are the AMI patients fully restored despite 1 year of follow-up.

A possible limitation in the study design is that the control group is only assessed once but it is improbable that any major age-related change would have occurred in this group during the 1-year study interval. Whilst not all the controls responded, we found no difference in age, sex ratio, and 6-year mortality rates amongst the nonrespondent controls compared with the respondent controls, nor did the distribution of the nonresponders' place of residence differ from the population of Malmö in general.

It is interesting to note the predictive validity of the dimensions 'thoracic pain' and 'breathlessness', as measured by the questionnaire, as higher scores at the baseline assessment predict more need for intervention and emergency care during the following year.

Angina pectoris is manifest in varying degrees in cardiac patients as also shown in the current study. In an epidemiological study, Hagman *et al.* [23] found that 60% of patients who had undergone myocardial infarction reported post-infarctional angina pectoris. Angina pectoris still persists in approximately 27% of patients after 'successful' PTCA for unstable angina [33]. Although the ACC/AHA Task Force Report on guidelines and indications for coronary artery bypass grafting states that the probability of freedom from the first return of angina after CABG is 95% at 1 year after the operation [34], Mayou & Bryant noted atypical chest pain in 25% of patients 1 year after surgery in a study of QL after CABG [13].

Reporting emotional reactions in patients 2 months after myocardial infarction, Wiklund *et al.*

[4] found that mental symptoms were considerably more frequent than in a sample of population controls, in accordance with the present findings. Havik & Maeland's [8] investigation of emotional reactions (anxiety, depression, irritability) after myocardial infarction showed a wide range of emotional disturbance. Anxiety was found to be more pronounced than depression at all assessments. The prevalence of depression, however, has varied across studies, possibly as a function of the illness phase during which such assessments have been performed [9]. In the study by Mayou & Bryant [13], the investigators found that there was considerable individual variation in changes in QL before and after CABG. For one-fifth of patients global QL was no better or was worse than before surgery. In a study of QL after PTCA, McKenna *et al.* [16] report that at follow-up 6–12 months after PTCA 52% of patients reported that angioplasty had affected their health and well-being in a markedly beneficial way.

It is obvious from the data presented that after AMI, CABG and PTCA patients face a critical period in life. Thus, both a careful familiarization with the impending interventions and a well-organized follow-up strategy for this patient group may be required to facilitate rehabilitation. Symptoms such as experienced breathlessness and thoracic pain, which differentiated patients from controls, even at 1-year follow-up, are phenomena which may have several causes, both cardiac and noncardiac [35]. Invasive procedures, e.g. angiograms, may frequently be needed. The patient should be given opportunity to discuss sexual problems.

In chronic diseases such as IHD the question often arises whether medical care adds life to years or merely years to life. QL research with its focus on the patient's point of view is of vital importance in answering this question. In this respect, ST-deviations and patency rates are to be considered as 'soft' data in comparison with the 'hard' data, i.e. the patient's evaluation. To further elucidate which patients need extra attention after a cardiac event remains a most important task.

Acknowledgements

The great work performed by Elisabeth Hansson RN and Carin Alm RN in patient care and record keeping is gratefully acknowledged. We are grateful to Elizabeth Cantor-Graae for invaluable stylistic advice.

Professor Jan Lanke and statistician Jan-Åke Nilsson BS provided valuable statistical guidance.

This study was supported by grants from the Ernhold Lundström foundation, the Swedish National Association against Heart and Chest Diseases and Malmö General Hospital research funds.

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Received 9 August 1996; accepted 29 April 1997.

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