

Quality of life after coronary artery bypass graft surgery in the elderly

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Abstract

Background: The aim of this study is to explore the quality of life of elderly patients after coronary artery bypass graft (CABG) surgery. **Methods:** The present study employed a pre–post test design. Sixty three elderly patients (≥ 65 years), operated in one big general hospital in Athens, were interviewed before, 4 months and 12 months after CABG with the MacNew Heart disease health-related quality of life questionnaire. **Results:** The majority of the sample were male ($N=48$, 76.2%), married ($N=49$, 77.8%) and pensioners ($N=54$, 61.7%). After the operation and before discharge 42 (66.6%) patients presented complications. One year after the operation, 45 (80.4%) patients experienced improvement and only 11 (19.6%) deterioration in their reported quality of life. Despite this postoperative improvement in all domains, a high percentage of patients (>60%) continued to report exacerbation in questions related to self confidence and dependence to others indicating an overprotective environment. Approximately one in two patients reported signs of cognitive dysfunction during the postoperative period. Elderly patients knew very little about their disease, especially before the operation (mean=2.03, SD=0.69, $R=1-5$). Educational level, presence of complications in the immediate postoperative period and reported angina were related to a poorer QoL. **Conclusion:** A high proportion of the patients experienced improvement while a substantial number had exacerbations related to self confidence and dependence to others. An important step to improve this situation might be through the institution of a structured multi-disciplinary rehabilitation program with focus on emotional support, information giving and education to elderly CABG patients and their significant others. © 2008 European Society of Cardiology. Published by Elsevier B.V. All rights reserved.

Keywords: Coronary artery bypass graft; Quality of life; Elderly

1. Introduction

Escalating medical costs, limitation of resources and the necessity to provide cost-effective medical care have increased the need for assessment of the outcomes of any intervention or method of treatment. Coronary artery bypass grafting (CABG) has become the primary option for the

treatment of angina pectoris [1] and accounts for almost one third of the operations performed on patients over 65 [2].

It is common knowledge that coronary artery bypass for elderly is characterised by increased comparative mortality and morbidity due to typical arteriopathy and concomitant diseases [3,4]. Older patients also develop more operative and postoperative complications with longer periods of hospitalisation than younger patients [3,5,6].

Despite this negative impact in the immediate post-operative period, research findings suggest that even patients aged 70 and over experience an improvement in symptoms and fewer cardiac events in long-term after CABG compared

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to patients who underwent drug therapy [7]. However, evaluation of these objective indicators is not sufficient. Important questions must be answered about the consequences of coronary artery bypass surgery on the quality of life of elderly patients.

Almost 2300 years ago, the Greek philosopher Aristotle referred to QoL as “*eudaimonia*” (bliss), and emphasized the subjective nature of the concept by saying that it varied in accordance with cultural and personal beliefs and was very difficult to measure because of the ever-changing nature of our needs [8]. Many years later, the World Health Organisation (WHO) [9] defined quality of life as individuals’ perceptions of their position in life, in the context of the cultures and values in the societies in which they live and in relation to their goals, expectations, standards and concerns. Quality of life can also be defined as the subjective experience of a person for his/her life [10,11].

Health care scientists are more interested in the assessment of areas related directly or indirectly with disease and its treatment and for this reason the term health-related quality of life (HRQL) is better to be used in medical and nursing research [12,13].

The literature concerning the impact of CABG on elderly’ HRQL is limited and inconsistent. Some studies have confirmed the long-term positive HRQL [14,15], but others show less benefit or even a negative relationship between age and quality of life after CABG. [16–18].

The aim of this study is to explore the quality of life of elderly patients (≥ 65 years) before, 4 months and 12 months after CABG surgery.

2. Method

The present study employed a pre–post test design with completion of questionnaires at the following periods: before CABG, and at 4 and 12 months post CABG. The data was obtained from one cardiac surgery department at a large general hospital in Athens after obtaining the consent of both administration and the ethics committee involved. The study sample ($N=63$) included all patients over 65 that had undergone elective CABG surgery at two cardiac surgery departments in the course of the twelve month period from January–Dec 2003.

Most developed countries have accepted arbitrary the chronological age of 65 years as a definition of “elderly” because this point is usually linked to the retirement age or to governmental benefits (WHO). In the context of CABG surgery, “elderly” patients are very often defined as those over 70 years of age [19]. For the purpose of this study the first and more general definition was adopted because it corresponds to the Greek National Health Statistics reports and the social situation in Greece.

The study did not include any emergency cases because of requirements to record data pre-operatively. Inclusion requirements covered all cases presenting a one, two or three vessel disease treated with CABG without concurrent

procedures (e.g. valve replacement), ability to communicate and absence of any serious postoperative complications. The introduction and restoration of anaesthesia were the same for all of the patients. All of the patients were operated on by the same surgeon (s) and in the same way.

After being admitted for surgery, all patients that complied with the above mentioned criteria were asked to participate in the study. In the course of pre-data collection interviews patients were given information about the research team, objectives of the study, the confidential nature of their data and the voluntary nature of the project. All patients were informed of their rights to refuse to participate or withdraw their participation from research at any time without this affecting their treatment or care.

All the patients after their consent were asked to complete a questionnaire preoperatively. No patient refused to participate in the study. Demographic data was extracted from medical records. All patients were contacted by the researchers before their discharge from the hospital in order to ensure a high response rate in the following interviews which were made by phone.

In order to limit this risk for phone bias, the same researcher took the first face to face and the phone interview. The decision to use the phone interview postoperatively was based on the low educational level of the patients, the overprotection of the significant others and the residency of the patients, since almost half of them had come from other cities of rural areas.

The HRQL questionnaires can be roughly classified as generic and disease or population specific [20]. Generic measures are broadly applicable and therefore can be used for comparison with the general population and/or with patients with different diseases or characteristics (e.g Short Form-36 (SF-36) [21,22], Nottingham Health Profile (NHP) [23–25]). Disease or population specific measures include questions on specific health problems and for this probably more sensitive to small, but possibly important changes in the quality of life [26,27] for the patient (e.g the Diabetes Health Profile [28] or the EORTC QLQ-for patients with cancer [29]). This advantage has made them very popular with health care professionals. In an extensive literature review of quality of life research ($N=3921$ reports), Garratt et al found that disease specific questionnaires were used in the majority of the studies (46%) and generic ones were only used in 22% [20].

A basic criterion for the selection of the appropriate instrument is the aim of the study [26]. The aim of this study is the detection of small changes over time for a specific population. For this reason researchers preferred the MacNew heart disease health-related quality of life questionnaire [30,31], a disease specific questionnaire which has proved valid, reliable, responsive, simple to administer and is well-accepted by and applicable to patients with cardiac angina pectoris, heart failure, myocardial infarction [32–38] and recently to patients after CABG [39,40].

The MacNew heart disease questionnaire contains 27 questions focused on three important health-related quality

of life domains, the Emotional, Physical, and Social [32,41]. Comparisons with other instruments give fairly good grounds for distinguishing between patients after myocardial infarction in accordance with their HRQL, and measuring any eventual changes in HRQL over certain periods of time. This questionnaire favoured well when compared with other disease specific HRQL measurements [42].

Patients were presented with a scale to express symptom frequencies, emotions or events in the course of the two weeks immediately preceding completion of the questionnaire. The scale used was a Likert type scale (never=7, very often=6, often=5, sometimes=4, few times=3, rarely=2, always=1).

The questionnaire was translated into Greek by two bilingual translators (one a health professional and the other is not) and then translated back into English by two different translators to check conceptual meanings were equal in both cultures. The developers of the questionnaire reviewed and closely discussed all differences in the instrument of measurement, and adjusted the questionnaire for the Greek population. Three questions were added at the end of the questionnaire in order to evaluate the presence of cognitive problems related to orientation, concentration – frequency of mistakes, and short term memory function.

Table 1
Patients' background characteristics

Age (yrs)	Mean = 72.9 ± 3.7
Sex <i>N</i> (%)	Men = 48 (76) Women = 15 (24)
Residency <i>N</i> (%)	Athens = 35 (56) Other cities = 7 (11) Rural areas = 21 (33)
Family <i>N</i> (%)	Married = 49 (78) Unmarried = 2 (3) Divorced = 2 (3) Widow-er = 10 (16)
Educational level <i>N</i> (%) (years of schooling)	≤ 9 = 47 (74) 12 = 8 (13) ≥ 12 = 8 (13)
Pensioners <i>N</i> (%)	Yes = 54 (86) No = 5 (8) Missing = 4 (6)
History of heart attack <i>N</i> (%)	Yes = 32 (51) No = 31 (49)
Family history of heart disease	Yes = 34 (54) No = 29 (46)
Other risk factors <i>N</i> (%)	No exercise = 42 (67) Smoking = 40 (64) Hypertension = 39 (62) Hyperlipidaemia = 34 (54) Diabetes = 22 (35) Obesity = 20 (32)
Diagnosis (# of vessels) <i>N</i> (%)	One = 6 (10) Two = 23 (36) Three = 34 (54)
Ejection fraction before the operation <i>N</i> (%)	≤ 40 = 24 (38) > 40 = 39 (62)
Co-morbidity <i>N</i> (%)	Yes = 19 (30) No = 44 (70)
PCTA <i>N</i> (%)	5 (8)
Length of hospitalization	Mean = 14.6 ± 4.9

Table 2

Frequency of patients' complications after the operation and before discharge (*N* = 63)

Complications	<i>N</i> (%)
Without complications	21 (33)
Atrial fibrillation	25 (40)
Re-exploration for bleeding	3 (5)
Low cardiac output syndrome	4 (6)
Acute respiratory failure	2 (3)
Sternal wound infection	1 (2%)
Neurological dysfunction	7 (11)

Mean scores were presented for the purposes of comparing results with other studies. Data was not usually normally distributed (as was the case with the Kolmogorov–Smirnov statistic and Lilliefors Significance Correction) and non-parametric tests were used. For comparison between two groups, the Mann–Whitney *U* test was used, and comparison between three or more groups used the Kruskal–Wallis *H* test. To prevent Type I errors for post hoc comparisons, accepted levels of significance were divided by the number of comparisons (Bonferroni correction). Wilcoxon Signed Rank test was used for comparison between two related samples and Friedman test for three related samples. Spearman rank-order (ρ) correlation coefficient was used to assess correlations between two numerical variables. Finally, Cronbach's alpha coefficient was used to measure reliability.

All the scores were transformed according to meaning. Higher scores meant better realized quality of life (minimum score = 1 and maximum = 7). Domain scores were assessed as the averages of the respective item responses. Global score was calculated as the average over all items.

The investigation conforms to the principles outlined in the Declaration of Helsinki.

3. Results

Of 63 patients, 35 (55.6%) patients came from Athens (metropolitan areas), 7 from other cities and 21 from rural areas (residency). Most of the patients were male (*N* = 48,

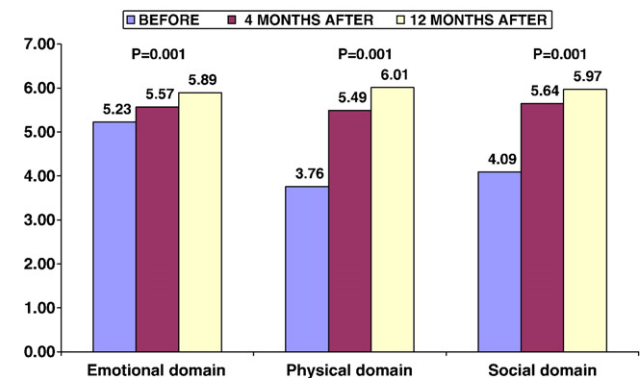


Fig. 1. Quality of life (QoL) before and after the operation (*R* = 1–7, mean values — *P* value Friedman test).

Table 3
Difference in QoL before and at 12 months after the operation (Wilcoxon Signed Rank Test)

The last 2 weeks I experienced or felt	N	% of patient with exacerbation	% of patients with improvement	% of patients with no change	P	Paired mean difference
1. Frustrated, impatient or angry	56	30.4	64.3	5.4	<0.001	2.38
2. Worthless or inadequate	56	51.8	14.3	33.9	0.129	-0.21
3. Confident	55	67.3	21.8	10.9	0.001	-0.87
4. Discouraged or down in the dumps	55	54.6	27.3	18.2	0.895	0.09
5. Relaxed and free of tension	56	42.9	48.2	8.9	0.011	0.98
6. Worn out or low in energy	56	41.1	44.6	14.3	0.011	1.11
7. Happy, satisfied or pleased with my personal life	55	34.6	49.1	16.4	0.090	0.42
8. Restless or experiencing difficulty in calming down	56	35.7	50.0	14.3	0.001	1.34
9. Shortness of breath	55	18.2	65.5	16.4	<0.001	1.95
10. Tearful or felt like crying	55	18.2	70.9	10.9	<0.001	2.60
11. More dependent	56	64.3	25.0	10.7	0.161	-0.20
12. Unable to do social activities	55	21.8	67.3	10.9	<0.001	3.18
13. That others have less confidence in me	56	64.3	7.1	28.6	<0.001	-0.64
14. Chest pain	56	25.0	58.9	16.1	<0.001	1.79
15. Unsure or lacking self-confidence	54	50.0	24.1	25.9	0.670	0.00
16. Bothered by aching or tired legs	56	41.1	42.9	16.1	0.099	0.50
17. Limited in doing sports and exercise	56	21.4	67.9	10.7	<0.001	2.64
18. Apprehensive or frightened	56	37.5	39.3	23.2	0.124	0.54
19. Dizzy or light-headed	56	26.8	30.4	42.9	0.246	0.34
20. Restricted or limited	56	10.7	69.6	19.6	<0.001	3.13
21. Unsure about exercise	56	25.0	69.6	5.4	<0.001	3.04
22. That my family is overprotective towards me	56	25.0	64.3	10.7	<0.001	1.77
23. A burden on others	56	80.4	5.4	14.3	<0.001	-1.07
24. Excluded from doing things with others	56	17.9	64.3	17.9	<0.001	3.11
25. Unable to socialise	56	10.7	64.3	25.0	<0.001	3.25
26. Physically restricted or limited	56	19.6	67.9	12.5	<0.001	2.73
27. Sexual intercourse	41	26.8	68.3	4.9	0.002	1.61

76.2%), married ($N=49$, 77.8%) and pensioners ($N=54$, 61.7%). Their ages ranged from 65 years to 78 years (mean=72.9, SD=3.72). At 4 months postoperatively, the contact was lost with 4 patients ($N=59$), whereas at 12 months with 3 more patients ($N=56$). Two of these patients had died at 12 months after the operation.

The majority of the sample had less than 9 years of schooling ($N=47$, 77.6%), indicating a low educational level. The average length of hospitalisation was relatively high (mean=14.6 days, SD=4.86) mainly due to the long preoperative period (mean=6.0, SD=4.30). Of the patients in the sample, 34 (54%) had a three vessel disease, 23 (36.5%) a two vessel disease and 6 a one vessel disease, and their

average percentage of ejection fraction was 46 ± 10 . Almost one in two patients had had a heart attack (myocardial infarction) ($N=32$, 50.8%) and family history of coronary artery disease (CAD) ($N=34$, 54%). Table 1 depicts patients' background characteristics.

After the operation and before discharge 42 (66.6%) patients presented complications. The most common complication was atrial fibrillation ($N=25$, 39.7%) (Table 2). After discharge 8 patients reported mild problems related to leg incision healing or swelling, chest incision discomfort and medications.

Quality of life was significantly improved 4 months after the operation (mean difference=1.23, $P<0.001$) and

Table 4
Frequency of patients who reported cognitive problems before and after the operation

	Before $N=63$		4 months after $N=59$		12 months after $N=56$	
	N	%	N	%	N	%
Perception — not understanding some things	—	0%	25	42.4	27	48.2
Loss of concentration for long periods, making more mistakes than usual	1	1.6%	31	52.5	26	46.4
Short term memory problems	3	4.8%	28	47.5	26	46.4

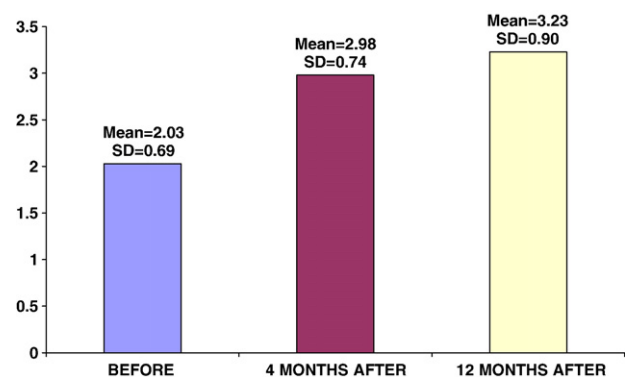


Fig. 2. Reported level of patients' knowledge about their disease ($R=1-5$).

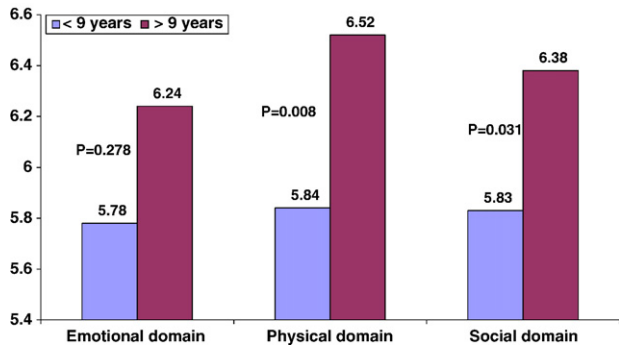


Fig. 3. Educational level and QoL 12 months post surgery ($R=1-7$, mean values — P value Mann Whitney U test).

continued to a lesser degree one year afterwards (mean difference=0.40 $P<0.001$). Physical condition exhibited the greatest improvement, with the smallest improvement in psychological state (Fig. 1).

Overall, one year after the operation, 45 (80.4%) patients experienced improvement and only 11 (19.6%) deterioration in their reported quality of life. Despite this postoperative improvement in all domains, one year after the operation a high percentage of patients (>60%) continued to report exacerbation in their QoL for specific areas (Table 3). A significant negative difference was observed in four questions which related to patient self-confidence and dependence on others: Q3 “How often you felt confident” (% exacerbation=67.3%), Q13 “How often you felt that others have less confidence in you” (% exacerbation=64.3%), and Q23 “How often you felt a burden to others” (% exacerbation=80.4%), and Q11 “How often you felt more dependent on others” (% exacerbation=64.3%) (Table 3).

Many patients reported a cognitive decline after the operation. It is characteristic that nearly one in two patients reported cognitive problems during the immediate postoperative period which were still present one year later (Table 4).

Women ($N=15$) had poorer QoL before, at 4 and 12 months postoperatively compared with men (4.00 vs 4.47 $P=0.239$, 5.32 vs 5.65 $P=0.032$, and 5.71 vs 6.05 $P=0.003$ respectively, Mann Whitney Test).

Elderly patients knew very little about their disease, especially before the operation (mean=2.03, $SD=0.69$, $R=1-5$). Although this situation improved after the operation (Fig. 2), it is noticeable that 12 months after the operation almost one in three patients ($N=16$, 28.6%) continued to report limited knowledge.

Patients with a higher educational level (>9 years, $N=11$) knew more about their disease (3.71 vs 3.07 $P=0.000$, $R=1-5$) and reported a better QoL 12 months after the operation in all domains except the psychosocial one ($P=0.278$) (Fig. 3).

Another finding of this study is the fact that QoL before was not found to be related to QoL after surgery. The presence of postoperative in-hospital complications was not related to QoL after the operation. On the contrary, the presence of reported problems in the course of the immediate

postoperative period ($N=8$) was related to QoL for the same period (4.90 vs 5.67 $P=0.022$).

Before the operation 37 patients (62.7%) reported angina during their everyday activities, 12 months after the operation this number fell to 18 (32.1%). Reported angina was related to a poorer QoL (3.99 vs 4.84 $P=0.011$ before; 4.98 vs 5.91 $P<0.001$ at 4 months, and 4.96 vs 6.10 $P<0.001$ at 12 months, Mann-Whitney U test).

Finally, reliability (coefficient alpha) of the questionnaire domains was satisfactory ranging from 0.75 to 0.89.

4. Discussion

The results of this research indicated that 12 months after surgery a high percentage of patients presented significant improvements in QoL (80.4%). The fact that 19.6% of the patients did not improve corresponds to the results of most research, which has found that 15–37% of patients, regardless of age, presents exacerbation of post-surgery QoL after CABG surgery [43,44]. However, older patients present many problems in the immediate postoperative period. According to Khatri and her colleagues, the elderly only experienced greater worry and depression in the immediate postoperative period (6 weeks post surgery) [45]. The findings of this study illustrate that despite great overall improvement, patients still experience severe emotional problems 12 months postoperatively. More specifically, questions about self-esteem, self-confidence, and dependence on others in particular indicated that over 50% of the sample presented significant exacerbation (Table 3).

All surgical procedures affect the psychological conditions of patients to some degree. This is even more evident in life threatening surgical operations such as CABG, which require long – even longer for the elderly – periods of recovery [46]. In fact, much research has indicated that patients experience a range of emotional problems in the immediate postoperative period [15,16,47].

There are many reasons for these emotional problems experienced by patients. The operation itself is a font of several adverse factors such as worse physical condition and significant pain experienced from wounds in the immediate pre-operative period, psychological fear, non participation in everyday and social activities, temporary sexual disability and follow up examinations which have been researched in depth and could affect patients postoperatively [48].

However, external factors are not the only factors that play an important role in the postoperative psychological condition of the patient. Internal factors such as personality and coping style are also significant [47,49,50].

Apart from emotional disturbances, patients exhibit problems with attention, memory and concentration in the course of the immediate postoperative period (3–4 months after surgery), which were probably linked to their emotional state [51–53].

As indicated by our study, postoperative self-reported cognitive function, as represented in the three additional questions (orientation, difficulty in understanding – lack of concentration – forgetting or making mistakes more often

than usual) was seriously exacerbated. It was characteristic that around half of the patients in the sample reported cognitive problems at both 4 and 12 months after surgery.

Cognitive decline frequently occurs following CABG surgery [54], and the incidence rates from 4 to 47% [55]. Subjective cognitive complaints and especially those related to memory are more common and such symptoms are frequently closely associated with psychological factors than objective cognitive dysfunction [56]. Many researchers have concluded that reported cognitive problems and psychological factors are linked in a dynamic manner [45,57]. The increased number of the patients who reported cognitive problems after the operation maybe associated with the fore mentioned emotional problems experienced by the patients and more specifically with the low self-esteem, the lack of self-confidence, and the dependence on others.

In gender terms, it was found that female patients were in the minority both pre and postoperatively. Preoperatively, a fairly large difference was noted (0.47), which perhaps because of the small number of women in the sample ($N=15$) was not found to be statistically important. Postoperatively, at both 4 months and 12 months there was a significant difference to the detriment of female patients. This is in line with the fact that coronary heart disease is more severe in women, with higher mortality rates (almost double) and more post-surgical complications [58–60].

Concomitant diseases have been found to be associated, particularly in elderly patients, with worse results, such as prolonged hospitalisation, increased mortality and frequent complications etc [61,62] as well as worse QoL [63–65]. Our study found no correlation between simultaneous presentations of other chronic conditions (eg. Diabetes melitus, chronic renal insufficiency, chronic pulmonary obstruction) and QoL. This lack of correlation is probably because of the relatively small sample and the small number of patients with concomitant diseases ($N=27$).

However, angina pectoris and complications presented after discharge from the hospital were found to be correlated to QoL. For this reason, special measures must be taken for patients with relatively persistent angina pectoris or complications after discharge from hospital.

The limited knowledge of patients can be partially explained by the low educational level of the patients and the fact that each surgeon had the whole responsibility of informing and educating his/her patient.

Another finding from this study was that 12 months after surgery patients with more than 9 years of schooling ($N=11$, 17.46%) were more informed about their condition and reported improved QoL in all dimensions apart from psychological state (Fig. 3).

Low awareness should not only be correlated to educational level, as information is a basic right for all patients. Unfortunately, however, despite the fact that one of the common objectives of health systems is to keep patients informed and encourage participation in decision making procedures, this has not been daily practice in many cases,

significantly limiting patient autonomy [66] and their basic right to decide what interventions will be carried out on their bodies [67]. Despite the fact that nursing staff and other health professionals recognise the importance of informed patients and the promotion of patient participation in decision making procedures, hospitalised patients are in fact being encouraged to adopt a passive and dependent role [66,68,69].

The passive role of patients has been the subject of extensive study. Many years ago, in her classic work, Taylor [70,71] after a 10 year research arrived at the conclusion that patients can be separated into two categories, those who prefer to participate actively, and those who prefer the submissive–passive role, usually encouraged by hospitals. Taylor also found that patients in the second category can be classified into the following sub-categories: a) patients who have temporarily relinquished control of matters which concern them, b) patients who have been culturally cultivated to believe that submissiveness is an unavoidable aspect of hospitalisation, c) patients who believe they are in danger, such as minorities, and d) patients who opt for and are ready to undertake a passive–dependent role. Thus, it is important to carefully examine the so-called causes of patient submissiveness, and respective action must be taken.

One of the limitations of this study is the fact that the sample size was not large enough to allow the required power level for the investigation of differences between specific factors and QoL. Furthermore, this limitation did not allow to test for group differences and execute multi-variable statistical analysis. However the findings of this study give important information that can be the starting point of an extensive and systematic study of these patients.

Another limitation is the validation of the instrument for the Greek CABG patients. Content validity can be supported by the double, back and forth translation and the participation of a group of specialists and the developers of the instrument for the adjustment for the specific population. Although, construct validity has not been established for the specific population, MacNew questionnaire has been recently validated in many E. U countries [72–75]. However, the fore mentioned sensitivity of the instrument in detecting changes in specific questions and the fact that the relationships revealed correspond to a great extent to that of other researchers can be considered as an indication of validity.

One of the major problems of the hospital is that there is no specific rehabilitation program for all patients. There are some specific written medical instructions but many of the rehabilitation services are not provided from the hospital or from associate services. Moreover many patients are from distant geographical areas and are covered from different health insurance organisations. Usually there is no link between these services and the hospital. All these factors contribute to inconsistencies in patients' rehabilitation. It is clear that the hospital has to develop a specific rehabilitation program based on the group — interdisciplinary approach.

In addition, emphasis must be given to a) the psychological state of the patients before and after the operation, b) the

information and education of the patients and their families or significant others with special attention to patients with an over-protective environment in order to transform the love and interest for the patient in a way to really help them to adjust to the new situation in the best possible manner, c) the education of the staff (by congresses, meetings, orientation programmes, on-going education programmes etc.) for patient rights, d) the systematic measurement of QoL as an outcome after CABG.

Finally, further research is needed to explore the relationship of the emotional condition and the overprotective behaviour, the QOL and the reported cognitive dysfunction.

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