PREOPERATIVE CHARACTERISTICS OF PATIENTS WITH IMPROVED QUALITY OF LIFE ONE YEAR AFTER CORONARY ARTERY BYPASS SURGERY

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ABSTRACT: *A study was conducted to determine the outcome of Coronary artery bypass graft (CABG) surgery in terms of patients' improved quality of life one year after the intervention. Quality of life was assessed in terms of return to work, absence of angina and increased activity. The analysis of the variables identified on admission between two groups (those who had an improved quality of life and those who did not have an improved quality of life) are presented. Patients with improved quality of life were married (p=0.02), men (p=0.01), with an income >R50,000 p/a (p=0.03), reported a normal sex-life prior to hospital admission (p=0.04), were taller (p=0.01), spent more hours at school participating in sporting activities (p=0.04) and had carried on with sport for more years prior to the surgery (p=0.01). There were no significant differences in weight or body mass index between the two groups.*

KEY WORDS: QUALITY OF LIFE, CORONARY ARTERY BYPASS SURGERY, ADMISSION CHARACTERISTICS, SPORTING ACTIVITIES, HEIGHT, WEIGHT

INTRODUCTION

The purpose of this study was to evaluate the outcome of an intervention (coronary artery bypass surgery) in patients with chronic disease (coronary heart disease) in terms of the patient's quality of life. When dealing with chronic disease the ultimate goal in most cases is not to "cure" the patient but to achieve optimal function by decreasing the symptoms experienced by the patient and/or by limiting the disease process. In this way the life and the quality of life of the patient is preserved.

The major objective of medical care is to preserve life and to assure its optimal quality. Medical and surgical interventions have become so advanced that the mortality rates of certain elective procedures are very low (Jenkins et al, 1996). As survival rates increase adverse consequences following interventions have become evident. In the final outcome the quality of life of the patient may be affected. For this reason it becomes important to assess patients' judgement of their medical treatment and the resultant outcome. Quality of life measures are important to determine the impact of chronic diseases on patients' lives (Guyatt et al, 1993).

One of the major problems with quality of life research is that there is no universal definition of quality of life. Failure to define quality of life has been identified as a major weakness in many studies (Kinney et al, 1996). Gill and Feinstein (1994) reported that quality of life was defined in only 15% of the literature reviewed by them. Without defining quality of life there is no blueprint for the measurements taken to support the definition. Knapp and McClure (1978) regard quality of life as a multidimensional concept that can be viewed as a transaction between individuals and their social and physical environment. Personality traits such as "expectancy of success", adaptability and competence are some of the individual differences observed in patients' attempts to master their environment.

Quality of life is a dynamic construct and one should bear in mind that attitudes are not constant and are continually modified by phenomena such as adaptation, coping and self-control. Individuals also change the standards by which they assess quality of life during a prolonged disease process and this aspect must be considered when dealing with quality of life measurements (Allison et al, 1997).

When analysing the literature two important factors affecting individuals' quality of life can be identified. These two factors are **the health of the patient and the ability to achieve and maintain maximal functional independence and autonomy** (King et al, 1992; Williams, 1994). Quality of life has been described by LaMendola and Pelligrini (1979) as a complex concept used by patients to subjectively assess the desirability of a particular way of life. The quality of that way of life is the satisfaction it provides the individual (Ferrans and Powers, 1992).

According to Flanagan (1982) health and subjective well being are of central importance in the assessment of quality of life. Health includes the objective evaluations of disease and the patient's perception of symptoms. Subjective well being includes measures such as the patient's assessment of life in terms of happiness, life satisfaction and positive effects. Health has been reported as the

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most important aspect of happiness (Campbell, 1970). Palmore and Luikart (1972) stated that **self-rated health was the predominant variable to influence life satisfaction.** However, it is important to note that the relationship between satisfaction with health and well being is only moderate. It seems that the influence of health on well being does not merely reflect how people feel physically, but to some extent what their health allows them to do in terms of functional capacity.

Note has to be taken of the suggestions by Wiklund et al (1987) that subjective measures of health are more strongly related to happiness (satisfaction) and that objective measures have only a limited relationship to subjective assessments. It is therefore essential to include both kinds of indicators when measuring health.

The domains commonly thought to comprise health-related quality of life are: Physical health, functional ability, emotional health (depression, perceived stress), sexual functioning, work productivity and social performance and life satisfaction (Ory, 1994). The domains recognised by the Coronary Artery Surgery Survey Principal Investigators and their Associates (1983) were: functional status; improvement of cardiac related symptoms; return to gainful employment and recreational activity. The domains used by the CASS Principal Investigators are incomplete as there is no recognition of the patient's evaluation of health and personal life satisfaction outcomes.

METHODS

A study was conducted to determine patients' quality of life one year after bypass surgery. Improved quality of life was determined as suggested by the CASS researchers (1983). In addition information was sought on the patient's subjective evaluation of the outcome, the spouse's/care-giver's evaluation of the patient's quality of life and other aspects as suggested by Ory et al (1994). Information was also obtained on the sociodemographic and medical profiles of the participating patients.

Fifty-eight patients and 50 spouses/ caregivers were interviewed by telephone one year after the bypass surgery. This study was passed by the Ethics committee for Research on Human Subjects of the University of the Witwatersrand (number 36/9/92).

RESULTS

Of the 58 patients interviewed one year after the surgery, 17 were identified with an improved quality of life and 39 patients did not have an improved quality of life. In two cases the data were inadequate to analyse for improved quality of life. The variables were then analysed to determine the whether any statistically significant differences existed between the two groups.

In Table 1 the variables **on admission into the trial** that were significantly different between the two groups, are presented. The table is split into two sections with the categorical data in the first section and the continuous data in the second section. For the categorical data the degrees of freedom (df), the Chi-square value (χ^2) and the p-value are given in the table. For the continuous data the mean values are given and then the F-value (variance ratio) and the p-value. A p-value of 0.05 or less is regarded as significant. **(See Table 1)**

Patients who had an improved quality of life 12 months after CABG surgery were statistically different from the group whose quality of life had not improved in that they were on admission, married males with an income greater than R50 000 ($8 000) and had reported a normal sex-life prior to hospital admission. **(See Table 1 - Continued)**

Table 1: On Admission into the Trial

	Chi-square		
Group 1 (Improved quality of life) (Categorical data)	**df**	**χ^2-value**	**p-value**
Male	1	5.31	0.01
Married	1	5.44	0.02
Income > R50 000 p/a	1	4.74	0.03
Normal sex-life	1	5.10	0.04

Group 1 Improved quality of life (n=17), Group 2 No improved quality of life (n=39)

Table 1: On Admission into the Trial (Continued)

		ANOVA		
Group 1 (Improved quality of life) (Continuous data)		**Mean**	**F-value**	**p-value**
Taller (cms)	Grp 1	176.53	6.68	0.01
	Grp 2	168.36		
Weigh more (kg)	Grp 1	86.71	3.57	0.06 (NS)
	Grp 2	78.77		
More hours of sport at school per week (hrs)	Grp 1	10.68	4.64	0.04
	Grp 2	7.06		
Years sporting activities stopped prior to CABG	Grp 1	15.67	10.14	<0.01
	Grp 2	27.70		

Grp 1 (Group 1; improved quality of life, n = 17);
Grp 2 (Group 2; no improved quality of life, n = 39)
NS: not statistically significant

Patients with improved quality of life were taller than patients whose quality of life had not improved. These patients had also participated more in sporting activities at school and carried on with sport for a longer period prior to surgery than the group who did not have improved quality of life. The differences in weight and body mass index between the two groups were not significant. (**See Table 2)**

DISCUSSION

All the patients who were judged to have an improved quality of life were males (p=0.01). This result correlates well with the results reported by Steine et al (1996) indicating male sex to be a significant predictor of enhanced well being after coronary artery bypass surgery. No females in this study were identified with an improved quality of life. This may be due to the fact that there were so few females in the sample (14%). However, it has been frequently reported in the literature that men do significantly better after CABG surgery than females (Stanton et al, 1984; Allen, 1996). Penckofer and Holm (1990) found that females experienced less relief of angina and dyspnoea, more psychosocial impairment, and in addition had a poorer long-term bypass graft patency rate. In a qualitative study by Hawthorne (1993) it was stated that women felt that the surgical intervention was quite successful in relieving symptoms and that they were satisfied with the results of surgery. Clancy et al (1984) stated that no matter how successful CABG surgery may be from the medical perspective, patients' futures are based on how they feel about themselves and what they feel they are able to do. If patients do not perceive that their condition has improved the surgery cannot be called successful. It can thus also be argued that if patients are satisfied with the outcome and that they feel their condition has improved then the surgery can be called successful. **All the females in this study either remained symptomatic post-operatively or reported decreased levels of activity.**

The in-hospital mortality experienced by females has been reported to be 1.6 times greater than males (Jaglal et al, 1995). Not one of the female patients in this study died post-operatively, although there was an overall post-operative mortality rate of 6.8% for the entire sample.

A significant number of males in the group with improved quality of life (p=0.02) were married. Psychosocial support is a major component of successful outcome (Jenkins et al, 1983; Williams and Littman, 1996). In several studies patients with reduced social support have been found to have increased morbidity and mortality rates following cardiac events (Ruberman et al, 1984; Case et al, 1992).

It is a common finding that individuals with heart disease experience fear and anxiety regarding sexual performance, and many report sexual dysfunction or abstinence from sexual activity (Seidl et al, 1991). An interesting finding in the current study was that patients, with an improved quality of life, as assessed at one year post-operatively, had a significantly "normal" sex-life on admission compared to those who did not have an improved quality of life (p=0.04). The question asked on admission was whether the patient regarded his sex-life as "normal". At six months and twelve months patients were asked if their sex-life had improved, was the same, or worse. At six months and twelve months patients with an improved quality of life reported their sexual performance to be better than before the operation. This was significantly different from the group who did not have an improved quality of life (p=0.01).

Jenkins et al (1983) stated that the goal of the rehabilitation process was to focus on satisfaction rather than "sheer amount of activity". They reported that 50% of the patients in their study compared to 40% of the patients in this study, reported that their sex-life was the same as before the operation. Only 13% percent reported an improvement in their sex lives. Contrary to the findings in this study, Kornfeld et al (1982) found that sexual adjustment improved the least. In the current study sexual frequency was not evaluated but it remains important that there was a significant difference between the sex-life of the group with an improved quality of life and those whose quality of life did not improve. The reason may simply be that all the patients with an improved quality of life were all married. Studies by Papadopoulos et al (1986) and Miller et al (1990) indicated a positive effect of the marital relationship on sexual functioning.

They found that the return to sexual activity was positively influenced by a strong emotional relationship between husband and wife.

One must also bear in mind that the criteria for improved quality of life in this study included improved physical activity, and this may also be a reason for the difference in sexual performance between the groups. Jenkins et al (1983) found a close association between improved physical activity and improved sexual performance and Kavanaugh and Shepard (1977) found that with exercise programmes, sexual activity was the same or improved.

Patients with an improved quality of life had a significantly higher annual income than the group who did not have an improved quality of life (p=0.030). Health and risk of premature death are determined by socio-economic factors

Table 2:

Body Mass Index $\frac{\text{Wt in Kg}}{\text{Height m}^2}$

BMI	< 24	24-30	> 30	Total
Improved quality of life	3	10	4	17
No improved quality of life	7	22	10	39
Total	10	32	14	56

< 24 = normal, 24-30 = overweight, > 30 = obese

Chi-square value = 0.034, df = 2; p = 0.983
No significant differences in BMI were found.

acting throughout life (Smith et al, 1997). A lower socio-economic status has an adverse impact on the prognosis of patients with coronary heart disease (Gundle et al, 1980; Kinchla and Weiss, 1985; Williams and Littmann, 1996). According to Smith et al (1997) it has recently been demonstrated that it is important to consider the cumulative effect of socio-environmental exposures over a life time and that the risk of cardiovascular death at an early stage is particularly sensitive to socio-economic influences acting in early life.

Socio-economic factors in childhood will also affect growth and poor growth in childhood is associated with higher mortality rates from cardiovascular disease in adulthood (Allebeck and Bergh, 1992). The current study established a significant difference in height between the group with improved quality of life and those who did not have improved quality of life ($p=0.01$). The patients with improved quality of life were taller (mean height: 177 cms) than the patients whose quality of life had not improved (mean height: 168 cms).

Those patients with improved quality of life also tended to weigh more although this was not significant ($p=0.06$). There were no statistically significant differences in body mass index between the two groups (see Table 2).

Several studies have observed an increased risk for coronary disease in shorter men (Herbert et al, 1993; Walker et al, 1989; The Steering Committee of the Physicians Health Study Research Group, 1989). The reasons for this may be the coronary artery lumen diameter (Herbert et al, 1993). Men have larger diameters of the mid-left anterior descending artery than have women and small mid-LAD (left anterior descending) arteries are associated with a substantially increased risk of in-hospital mortality ($p<0.001$) with CABG surgery (O'Connor et al, 1996). The study by O'Connor et al (1996) was a well controlled, prospective study on 1325 patients undergoing CABG surgery and provided information on coronary artery size. These observations may also explain the higher perioperative mortality in women and smaller people (Rich-Edwards et al, 1995). Kannam (1994), however, reported that in a study of 5209 individuals, the shortest individuals had a significantly higher death rate from cardiac disease. He suggested the difference in death rates was due to an inverse association between height and age. This was disputed 1992 by Allebeck and Bergh concluded that there was an inverse relationship between body height and mortality and that the association could be explained almost entirely by social and behavioural characteristics (Allebeck and Bergh, 1992).

The controversy surrounding the inverse relationship between height and mortality from cardiovascular disease has not been resolved. From the results of this study it can be concluded that should taller people have CABG surgery, they are more likely than shorter people, to have an improved quality of life one year post-operatively.

Patients who had an improved quality of life one year after CABG surgery spent significantly more hours involved in sport at school ($p=0.04$) and also carried on with their sporting activities for a longer period of time. They had stopped for significantly fewer years before their CABG surgery ($p=0.003$), than those who did not have an improved quality of life. It could be argued that younger patients would have stopped sporting activities fewer years before surgery, but as age was not a significant factor influencing improved quality of life, it could not have influenced the results. This observation probably ties in well with the fact that these patients were also taller and tended to weigh more. It has been documented that physical fitness seems to have a protective effect against the development of coronary artery disease (Ekelund et al, 1988; Chandrashekar and Anand, 1991; Labbate et al, 1995; NIH Consensus Conference, 1996).

Many factors are associated with adopting and maintaining a physically active lifestyle. These factors are: socio-economic status, cultural influences, age and health status (NIH Consensus Conference, 1996). Men are more active than women, girls become less active than boys as they grow older, and as children grow through adolescence they become even less active. Eighty five percent (85%) of the patients in the current study participated in some form of sport at school. This rate dropped to 68% after school and patients stopped participation in sport, on average 24.5 years after having left school. The figures quoted for the American population are that 70% of children at the age of 12 years are physically active, 50% of high school students and at the age of 21 only 42% of men and 30% of women are physically active (NIH Consensus Conference, 1996). As American adults age, their physical activity continues to decline. The South African sample in this study seemed to be more physically active but the sample was small and limited mainly to white males. What remains interesting, is that patients who participated in sport at school for approximately 10-11 hours per week, had a significantly improved quality of life compared to patients who spent fewer hours involved in sport at school.

CONCLUSION

This study revealed the following patient profiles for patients with an improved quality of life one year after CABG: Married males with an income >R50 000, having a normal sex-life before the operation, spent a mean of 11 hours per week at sport during their school years, had stopped with sporting activities an average of 16 years before the operation, were tall (mean height: 177 cms), reported their sexual performance as better than before the operation and had no other symptoms.

REFERENCES

Allebeck P, Bergh C 1992 Height, body mass and mortality: Do social factors explain the association? Public Health 106: 375-382

Allen J K 1996 Coronary risk factor modification in women after coronary artery bypass surgery. Nursing Research 45: 260-265

Allison P J, Locker D, Feine J S 1997 Quality of life: A dynamic construct. Social Science Medicine 45:221-230

Campbell A 1970 Subjective measures of well-being. American Psychologist 31: 117-124

Case R B, Moss A J, Case N, McDermott M, Eberly S 1992 Living alone after myocardial infarction: Impact on prognosis. Journal of

the American Medical Association 267(4): 515-519

CASS Principal Investigators and their Associates 1983a Coronary Artery Surgery Study (CASS): a randomized trial of coronary artery bypass surgery. Quality of life in patients randomly assigned to treatment groups. Circulation 68: 951-96

CASS Investigators and their Associates 1983b Coronary Artery Surgery Study (CASS): a randomised trial of coronary artery bypass surgery. Survival data. Circulation 68: 939-950

Chandrashekar Y, Anand I S 1991 Exercise as a coronary protective factor. American Heart Journal 122: 1723-1739

Clancy C, Wey J, Guinn G 1984 The effect of patients' perceptions on return to work after coronary artery bypass surgery. Heart Lung 13: 173-174

Ekelund L G, Haskell W L, Jonson J L 1988 Physical fitness as a predictor of cardiovascular mortality in asymptomatic North American men. New England Journal of Medicine 319: 1379-1384

Ferrans C E, Powers M 1992 Psychometric assessment of the quality of life index. Research in Nursing and Health 15: 29-38

Flanagan J C 1982 Measurement of quality of life: current state of the art. Archives of Physical and Medical Rehabilitation 63: 56-59

Gill T M, Feinstein A R 1994 A critical appraisal of the quality of quality-of-life measurements. Journal of the American Medical Association 272: 619-626

Gundle M J, Reeves B R, Tate S, Raft D, McLaurin L P 1980 Psychosocial outcome after coronary artery surgery. American Journal of Psychiatry 137: 1591-1594

Guyatt G H, Feeney D H, Patrick D L 1993 Measuring health-related quality of life. Annals of Internal Medicine 118: 622-629

Hawthorne M H 1993 Women recovering from coronary artery bypass surgery. Scholarly Inquiry for Nursing Practice: An International Journal 7: 223-243

Herbert P R, Rich-Edwards J W, Manson J E, Ridker P M, Cook N R, O'Connor G T, Buring J E, Hennekens C H 1993 Height and incidence of cardiovascular disease in male physicians. Circulation 88: 1437-1443

Jaglal S B, Tu J V, Naylor C D 1995 Higher in-hospital mortality in female patients following coronary artery bypass surgery: a population-based study. Provincial Adult Cardiac Network of Ontario. Clinical and Investigative Medicine 18: 99-107

Jenkins D C, Jono R T, Stanton B A 1996 predicting completeness of symptom relief after major heart surgery. Behavioural Medicine 22: 45-57

Jenkins D C, Stanton B-A, Savageau J A, Denlinger P, Klein M D 1983 Coronary artery bypass surgery: Physical, psychological, social and economic outcomes six months later. Journal of the American Medical Association 250: 782-788

Kannam J P, Levy D, Larson M, Wilson W F 1994 Short stature and risk for mortality and cardiovascular disease events. Circulation 90: 2241-2247

Kavanaugh T, Shepard R J 1977 Sexual activity after myocardial infarction. Canadian Medical Association Journal 116: 1250-1530

Kinchla J, Weiss T 1985 Psychologic and social outcomes following coronary artery bypass surgery. Journal of Cardiopulmonary Rehabilitation 5: 274-283

King K B, Porter L A, Norsen L H, Reis H T 1992 Patient Perceptions of Quality of Life after Coronary Artery Surgery: Was It Worth It?. Research in Nursing and Health 15: 327-334

Kinney M R, Burfitt S N, Stullenbarger E, Rees B, DeBolt M R 1996 Quality of life in cardiac patient research: A meta-analysis. Nursing Research 45: 173-180

Knapp F Jr, McClure L F 1978 Quasi-experimental evaluation of a quality of life intervention. Journal of Community Psychology 6: 280-290

Kornfeld D S, Heller S S, Frank K A, Wilson S N, Malm J R 1982 Psychological and behavioral responses after coronary bypass surgery. Circulation: 66 (suppl III): III-24 - III-28.

Labbate L A, Fava M, Oleshansky M, Zoltec J, Littman A, Harig P 1995 Physical fitness and perceived stress. Relationships with coronary artery disease risk factors. Psychosomatics 36: 555-560

Lamendola W F, Pelligrini R V 1979 Quality of life and coronary artery bypass surgery patients. Social Science and Medicine 13A: 457-461

Miller P, Wikoff R, McMahon M, Garrett M J, Ringel K 1990 Marital functioning after cardiac surgery. Heart Lung 19: 55-61

National Institutes of Health (NIH) Consensus Conference 1996 Physical Activity and Cardiovascular Health. Journal of the American Medical Association 276: 241-246

O'Connor N J, Morton J R, Birkmeyer J D, Olmstead E M, O'Connor G T for the Northern New England Cardiovascular Disease Study Group 1996 Effect of coronary diameter in patients undergoing coronary artery bypass surgery. Circulation 93(4): 652-655.

Ory M G, Cox D M, Gift H C, Abeles R P Aging and quality of life: celebrating new research discoveries p4. In: Abeles R P, Gift H C, Ory M G (eds) 1994 Ageing and Quality of Life. Springer Publishing Company, Broadway, New York Palmore E, Luikart C 1972 Health and social factors related to life satisfaction. Journal of Health and Social Behavior 13: 68-80

Papadopoulos C, Shelley S I, Piccolo M, Beaumont C, Barnett L 1986 Sexual activity after coronary bypass surgery. Chest 90: 681-685

Penckofer S M, Holm K 1990 Women undergoing coronary artery bypass surgery: Physiological and psychological perspectives. Cardiovascular Nursing 26: 13-18

Rich-Edwards J W, Manson J E, Stampfer M J, Colditz G A, Willet W C, Rosner B, Speizer F E, Hennekens C H 1995 Height and the risk of cardiovascular disease in women. American Journal of Epidemiology 142: 909-917

Ruberman W, Weinblatt E, Goldberg J D, Chaudhary B S 1984 Psychosocial influences on mortality after myocardial infarction. New England Journal of Medicine 311(9): 552-559

Seidl A, Bullough B, Haughey B, Scherer Y, Rhodes M, Brown G 1991 Understanding the effects of a myocardial infarction on sexual functioning: A basis for sexual counselling. Rehabilitation Nursing 16: 255-264

Smith S C 1997 The challenge of risk reduction therapy for cardiovascular disease. American Family Physician 55: 491-500

Stanton B A, Jenkins C D, Savageau J A, Thurer R L 1984 Functional benefits following coronary artery bypass graft surgery. The Annals of Thoracic Surgery 37: 286-290

Steine S, Laerum E, Eritsland J, Arnesen H 1996 Predictors of enhanced well-being after coronary artery bypass surgery. Journal of Internal Medicine 239: 69-73

The Steering Committee of the Physicians' Health Study Research Group 1989 Final report on findings from the aspirin component of the ongoing Physicians' Health Study. New England Journal of Medicine 321: 129-135

Walker M, Shaper A G, Phillips A N, Cook D G 1989 Short stature, lung function and risk of a heart attack. International Journal of Epidemiology 18: 602-606.

Wiklund I, Lindvall K, Swedberg K, Zupkis R V 1987 Self-assessment of quality of life in severe heart failure. Scandinavian Journal of Psychology 28: 220-225

Williams F T Rehabilitation in old age pp121-132. In: Abeles R P, Gift H C, Ory M G (eds) 1994 Ageing and Quality of Life. Springer Publishing Company, Broadway, New York

Williams R B, Littman A B 1996 Psychosocial factors. Role in cardiac risk and treatment strategies. Cardiology Clinics 14: 97-104