

Evaluation of Quality of Life, Cognition and Endurance in Cardiac Procedures Patients

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Received: April 29, 2020; **Published:** June 11, 2020

Abstract

Background: Coronary heart disease (CHI) is the single largest cause of death in developed countries and is one of the leading causes of disease burden in developing countries as well.

Purpose of the Study: The objective of this study was to determine the quality of the patient after CABG and PCI and to determine which procedure has better outcomes.

Material and Method: A comparative cross-sectional study was carried out at Shifa International Hospital Islamabad for six months. In this study 50, post-operative CABG and 50 post-operative PCI patients who had procedures from 1 to 3 months were included through the non-probability convenience sampling technique. Data about socio-demographics were collected through self-structure questionnaires, cognition level was checked through the Mini-Mental Examination scale, Physical activities were assessed through the New York Heart Classification system and quality of life was assessed through RAND-36.

Result: The results of the study show that the health-related quality of life of participants of PCI was better than CABG patients. In RAND 36 four domains showed similar quality of life i.e. Role Limitation due to physical health ($p = 0.22$), Role Limitation due to an emotional problem ($p = 0.35$), emotional wellbeing ($p = 0.83$), social functioning ($p = 0.55$), whereas in the General Health, Physical Functioning, Bodily Pain and energy/fatigue subscales PCI group showed better quality of life ($p < 0.05$).

Conclusion: This study concluded that the quality of life in cardiac patients after PCI was better than CABG patients.

Keywords: Quality of Life; CABG; PCI

Introduction

Coronary heart disease (CHD) is the single largest cause of death in developed countries and is one of the leading causes of disease burden in developing countries as well. In 2001, there were 7.3 million deaths and 58 million disability-adjusted life years (DALYs) lost due to CHD worldwide [1]. By 2005, the total number of cardiovascular disease (CVD) deaths (mainly coronary heart disease, stroke, and rheumatic heart disease) had increased globally to 17.5 million from 14.4 million in 1990. Of these, 7.5 million were attributed to coronary heart disease and 5.7 million to stroke [2].

An emerging body of evidence suggests that rapid dietary changes associated with nutritional transition along with a decrease in levels of physical activity in many rapidly urbanizing societies also may play a particularly important role in the rise of CVD observed in developing countries [3]. Surgery for coronary artery disease is known as coronary artery bypass grafting (CABG). Current reasons for performing CABG are the presence of 3-vessel disease (all the 3 major arteries to the heart are blocked), left main coronary artery disease (the main artery itself is critically narrowed), and 3-vessel disease in diabetes [4]. There are many complications associated with CABG, for example,

a transient neurocognitive impairment associated with cardiopulmonary bypass, Nonunion of the sternum, Myocardial infarction due to embolism, hypoperfusion, or graft failure, Late graft stenosis, Acute renal failure, Stroke, Vasoplegic syndrome, Pneumothorax, Hemothorax, Pericardial tamponade, and Lower extremity edema.

Percutaneous Coronary Intervention (PCI), commonly known as coronary angioplasty or simply angioplasty, is a non-surgical procedure used to treat the stenotic (narrowed) coronary arteries of the heart found in coronary heart disease [5]. PCI has proven to be as effective and less costly than CABG in patients with medically refractory myocardial ischemia. Major complications of PCI included thrombosis, restenosis and arterial dissection [6].

Quality of life itself is a subjective assessment of health which is defined by the WHO as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity [7]. From a patient's perspective not merely, the disease but rather the impact of disease and the treatment a daily life important [8]. In this context, "health status" characterizes the range of manifestation of diseases in a given patient, including symptoms and functional limitations. The discrepancy between actual and desired function is described as a health-related quality of life (HRQoL) [9]. With respect to HRQoL, it is known that an uncontrolled CVD risk factor is associated with impairments in well-being and HRQoL. On the other hand, there is only weak evidence about the positive impact of controlled risk factors on HRQoL in usual care. European primary care revealed that lower education is negatively associated with HRQoL in patients at risk for CVD and patients with CHD. However, systematic consideration of the impact of educational level on HRQoL and risk factor control in usual primary care is still missing [10].

Physical activity is defined as any bodily movement produced by contraction of skeletal muscles and resulting in energy expenditure above the base level and as such, part of lifestyle intervention. Coronary heart disease (CHD) is the leading cause of mortality among women in the United States [11]. Physical inactivity is among the risk factors for this disease. A 1990 meta-analysis concluded that physically active individuals had about half the CHD rates of those who were sedentary [12]. Cardiac patients after an acute event and or with chronic heart disease deserve special attention to restore their quality of life and to maintain or improve functional capacity. They require counseling to avoid recurrence through a combination of adherence to a medication plan and the adoption of a healthy lifestyle.

Few latest researchers have identified several important factors related to neurological dysfunction in cardiac surgery patients. Goto and colleagues, present a report on neurological problems before surgery and in this report, they stated that in around fifty percent of patients before surgery infarcts present in this same study the found association between the degree of infarcts present before the surgery and the extent of neurological dysfunction occurred after surgery [13]. Rosengart and colleagues in their study stated that in patients who are waiting for CABG procedure have poor cognition as compared to the control group. Similarly, in another study by Ernest and colleagues, 42 results showed that patients waiting to undergo CABG procedures had a low cognitive level and a control group consisting of healthy people [14].

A study was conducted to analyze and compare health status after a percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) using the Seattle Angina Questionnaire (SAQ). The SAQ was administered to 475 patients (252 PCI and 223 CABG) pre-procedure and then monthly for 6 months and again at 1 year. The difference in baseline characteristics were controlled by multivariable risk adjustment, and outcomes over time were compared using repeated measures analysis of variance. Result showed that In-hospital, 6- and 12-month clinical outcomes were not different; however, 25% of PCI patients required at least one reintervention during the study period, compared with only 1% of CABG patients ($p < 0.001$). Although physical function decreases for CABG patients at 1 month ($p < 0.001$) but it improved and was better than PCI group by 12 months ($p = 0.008$). Relief of angina was greater for CABG than PCI when analyzed over time ($p < 0.001$), principally due to the adverse effects of restenosis in the PCI group. Multivariable analysis confirmed that CABG independently conferred greater angina relief compared with PCI ($p < 0.001$). At 12 months post-procedure, quality of life had

improved to a greater extent for CABG than PCI ($p < 0.004$). Over 12 months of follow-up, health status was improved to a greater extent for CABG patients than for PCI patients, primarily due to the adverse influence of restenosis after PCI [15].

The study was conducted to determine that there is some difference between women and men in terms of psychosocial and physical functions after the procedure of CABG. In the study, 454 patients were recruited among which 345 were men and the rest was female. The participants filled a questionnaire sent to them at their homes. This questionnaire had a scale of six items for daily activities, social activity scale of three items, vitality scale of four-item and mental health of five items. The results of this study showed that during the time CABG female was sicker, but they recovered sooner than men. Later after six months of surgery men and women were similar both physically and psychosocially [16].

To determine the effect of CABG in left ventricular dysfunction patients a study was carried out. The purpose of this study was analyzing the quality of life of patients as well. The study result showed that CABG procedure had a positive effect on patients. It decreased the frequency and severity of angina and congestive heart failure. It increased the ejection fraction of the heart as well. Due to these changes in patients, they were able to work efficiently and with the least pain in daily living activities [17].

Patients were enrolled in a veteran's affairs multicenter randomized trial comparing PCI versus CABG for patients with medically refractory ischemia and one or more risk factors for an adverse outcome; 389 of 423 patients (92%) alive six months after randomization completed a short form-36 (SF-36) health status survey. The primary outcome was the physical component summary (PCS) and Mental component summary (MCS) scores from the SF-36. Multivariable analyses were used to evaluate whether PCI or CABG surgery was associated with better PCS and MCS scores after adjusting for over 20 baseline variables. There were no significant differences in either PCS scores (38.7 vs. 37.3 for PCI and CABG, respectively; $p = 0.23$) or MCS scores (45.5 vs. 46.1, $p = 0.58$) between the treatment arms. In multivariable models, there remained no difference in HRQL for post-PCI versus post-CABG patients (for PCS, absolute difference = 0.56 +/- 1.12, $p = 0.27$). We had 97% power to detect a four-point difference in scores, where four to seven points is a clinically important difference, high-risk patients with medically refractory ischemia randomized to PCI versus CABG surgery have equivalent six-month HRQL. Therefore, HRQL concerns should not drive decision-making regarding the selection of a revascularization procedure for these patients [18].

A study was conducted to examine the relationship between preoperative sleep complaints and post-operative emotional and physical recovery in CABG surgery patients, independently of demographic, clinical and mood factors. Two hundred thirty CABG patients (aged 67.81 ± 9.07 years) completed a measure of self-reported sleep complaints before surgery and health-related quality of life (HRQoL), physical symptoms and pain 2 months after surgery. Greater sleep complaints prior to surgery were associated with greater physical symptoms, poorer physical HRQoL and greater sensory pain after surgery ($p < 0.05$), but not with effective pain or mental HRQoL. The preoperative mood was not able to explain these associations. Sleep complaints may be implicated in physical recovery from CABG surgery, but further work is needed to understand the role of causal pathways [19].

A longitudinal, one-group observational study was conducted to examine the changes in Health-Related Quality of Life form before PCI to the first 3 months after PCI on Hong Kong Chinese. Data was collected from the cardiac patients who were admitted into a regional public hospital at Hong Kong Island for PCI between August 2003 and February 2004. Seventy-eight out of eight-five eligible patients agreed to participate in this study, but thirteen patients dropped out from the study while data collection, the Medical Outcomes Study 36-Item Short Form 36 (SF-36) and Seattle Angina Questionnaire (SAQ) was used to collect the data about quality of life before PCI, 1 and 3 months after PCI. Sixty-five patients completed the study. All domains in SF-36 and SAQ improved at 1 month but the improvements did not continue in all domains at 3 months. The HRQoL measured by SF-36 improved significantly over time ($p < 0.05$) for six out of the eight

domains. Scores of all domains of SF-36 improved at 3 months when compared with baseline. Moreover, all five domains of SAQ changed significantly over time ($p < 0.05$); however, the score of angina stability in the third month was lower than that baseline [20].

A study was carried out to assess the health-related quality of life as a nonrandomized prospective study, 432 patients of coronary artery disease were assessed at baseline, 1 and 3 months after treatment assignment [medication, percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG)]. HRQL was assessed using the MacNew Heart Disease Health-related Quality of Life Questionnaire (MacNew) and the short-Form 36 (SF-36). Depressive and anxiety symptoms were assessed using the Hospital Anxiety and Depression Scale. Routine clinical data including disease severity were collected. The short and intermediate-term results revealed HRQL differences between PCI and CABG in the month immediately after intervention despite the almost identical reduction in angina severity over the first month in both groups. PCI was associated with a relatively rapid increase in HRQL in the first month, with little further change by 3 months. In contrast, after CABG there was an initial deterioration in HRQL, which then improved significantly. The change in depression and anxiety score uniquely accounted for most of the change in the SF-36 (6%, 64%) and MacNewScales (4%, 69%), whereas treatment accounted for less than 1% in any HRQL scale score changes [21].

Methodology

It is a comparative cross-sectional study. In this study total, 100 individuals were included in which there were 50 in each group. Group A was of patients undergone CABG surgery and group B had patients undergone PCI. In this comparative study non-probability, convenient sampling was done. This technique was used because it was less time consuming, more convenient and less expensive.

The study was conducted at Shifa International Hospital, Islamabad.

Inclusion criteria included all male and female patients between the ages of 40 to 60 years, Patients with PCI (Percutaneous Coronary Intervention), Patients with CABG (Coronary Artery Bypass Grafting) and at least 1-month history of cardiac procedure. Exclusion criteria included Patients with co-morbidities, Patients having Cardiac Procedures duration more than 3-Months, Patients having age more than 60 and Un co-operative patients. Data about socio-demographics were collected through self-structure questionnaire and RAND 36 was used to assess Health related Quality of life, cognition level was accessed through Mini-Mental State Examination and physical activity and endurance were accessed through New York Heart Association Classification. To measure the endurance of the study participants after cardiac procedure verbal consent was taken from patients and then accessed. The cardiac monitor was started, and leads were attached to the patient's chest and arms area and vitals were taken and then patients were made to run static bicycles for 10 - 15 minutes.

RAND-36 is used to measure Quality of life. It measures eight dimensions of health i.e. physical functioning, role limitation due to physical health, role limitation due to emotional problem, emotional well-being, social functioning, bodily pain, Energy/Fatigue and General Health. For each of the eight dimensions, 2 - 10 questions were included and scored on a scale from 0 - 100. Each dimension was scored independently. The dimensions are not added together but evaluated as eight separate measures of the ones HRQL. The higher the score the better the quality of life. MMSE is a widely used tool for detecting cognitive impairment assessing severity and monitoring cognitive changes over time. It takes 5 - 10 minutes to administer and should be administered by trained clinicians. It is used to assess 5 areas i.e. Orientation, Short-term memory (retention), Attention, Short-term memory (recall) and language. It is available in many languages. The New York Heart Association (NYHA) Functional Classification provides a simple way of classifying the extent of heart failure. It places patients in one of four categories based on how much they are limited during physical activity; the limitations/symptoms are regards to normal breathing and varying degrees in shortness of breath and/or angina pain in Class I there is no limitation of physical activity. Ordinary physical activity does not cause under fatigue, palpitation (feeling heartbeats), or dyspnea (shortness of breath). In class II (Mild) slight limitation physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, or dyspnea. In class III

(Moderate) Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, or dyspnea. In class IV (Severe) Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased.

The data was collected through questionnaires and then coded and entered in SPSS 25 and was analyzed through SPSS 21. Percentages of socio-demographic variables were accessed. The paired-sample t-test was used to access the difference in cardiac endurance before and after exercise in both groups and an independent-sample t-test was applied to access the quality of life between the two groups.

Results

Variables	Group A (CABG)	Group B (PCI)	P value
Age (Years), mean (SD)	58.02 ± 1.00	56.12 ± 8.35	0.30
Gender, male % (n)	74.0 (37)	68.0 (34)	0.51
MMSE, mean (± SD)	30.00 ± 0,00	30.00 ± 0,00

Table 1: Shows the mean 30.00 ± 0,00 SD of Age and MMSE and Gender percentage of participants.

Variables	Group A Mean ± SD	Group B Mean ± SD	P-value
Heart Rate	84.34 ± 5.98	88.14 ± 16.12	0.12
Respiratory Rate	23.46 ± 3.70	23.22 ± 4.11	0.76
Saturation	98.62 ± 3.50	97.66 ± 5.42	0.29
Systolic blood pressure	130 ± 4.25	133 ± 5.11	0.00
Diastolic blood pressure	90.76 ± 3.30	92.94 ± 6.02	0.02
Temperature	98.00 ± 0.00	98.00 ± 0.00	1.00
Pain VAS	9.80 ± 1.28	6.00 ± 0.42	0.00

Table 2: It shows the mean ± SD of vitals of group A and group B after static bicycling.

Health-related quality of life variables	Group A (CABG) Mean ± SD	Group B (PCI) Mean ± SD	P value
Physical functioning	68.60 ± 23.88	80.10 ± 24.62	0.02
Role Limitation due to physical health	50.00 ± 49.48	62.00 ± 49.03	0.22
Role Limitation due to emotional problem	60.66 ± 40.23	67.33 ± 32.21	0.35
Emotional well-being	55.76 ± 12.75	55.30 ± 6.06	0.83
Social Functioning	75.00 ± 21.57	71.50 ± 36.07	0.55
Pain	76.75 ± 26.58	91.00 ± 12.02	0.00
Energy/fatigue	54.30 ± 13.05	73.30 ± 9.01	0.00
General Health	57.00 ± 35.94	85.00 ± 12.85	0.00

Table 3: Shows that the health related quality of life of group A and group B participants.

Discussion

This study was carried out to compare the quality of life of cardiac patients after CABG and PCI procedure and to find out which procedure is better results and better quality of life of patients after the procedure. The study demonstrated several important findings. First, both PCI and CABG resulted in substantial and durable benefits in cardiovascular-specific health status and secondly PCI resulted in more rapid improvement in health status and quality of life compared with CABG. There were no significant differences in demographics, age and cognition level between patients to PCI and CABG surgery group. In this study health-related quality of life was accessed by RAND 36 questionnaire and it has eight subscales. It was scored on a scale from 0 - 100, zero being the lowest and poorest score and 100 the highest and best possible score with higher scores representing better health. Study results showed that in four domains both CABG and PCI groups showed similar quality of life i.e. Role Limitation due to physical health. Role Limitation due to an emotional problem, Emotional wellbeing, social functioning Whereas in the General Health, Physical Functioning, Bodily Pain and Energy/fatigue subscales PCI group showed better quality of life. Interestingly, these domains all reflected some level of physical functioning. Therefore, PCI definitely improved the overall quality of life of these patients to a greater extent for PCI than CABG. The results of current study are in accordance with a previous study carried out by Man SW, Sek YC and another study conducted by Stefan H, Stephan D, Gerhard R, Neil O, and Werner B which showed that Health-related Quality of life of PCI patients improved a lot within 3 months after surgery [22,23].

Strauss WE and his colleagues conducted a study that demonstrated improvements in Health-Related Quality of Life form pre- to post-procedure for both PCI and CABG surgery and the results of our current study are also in accordance with their results [24].

The results of our study demonstrated that patients of PCI had better general health, physical functioning, energy/ fatigue and pain as compared to CABG group patients as PCI is a less invasive procedure than CABG. A previous study conducted by Brunner D and associated also showed similar findings and stated that post CABG complication like soreness of incision in the chest and/or log and anxiety from the surgery itself affect the overall health of patients and their quality of life [25].

The CABG group patients had less physical functioning than PCI patients after the surgery in our study, a previous study conducted by A. Michael and colleagues to compare the recovery of health status after percutaneous coronary intervention and coronary artery bypass showed similar results. The better physical functioning in PCI patients as compared to CABG patients is due to the reason that PCI surgery involves fewer incisions and CABG is a more invasive procedure. There is shorter hospital stay after PCI as compared to CABG. The ADLs are least effected after PCI as compared to CABG because after CABG patients have to take care of movements as incisions may get damaged so PCI patients' physical functions are less effected than CABG and they can perform physical activities better [15].

In 2013 a study was conducted by Abdullah, Wang, and colleagues and concluded that the overall General Health of patients after PCI was better than CABG immediately after surgery and after 1 year CABG patients had a better quality of life. Our study results showed a similar finding that within the first three months after surgery PCI group patients have a better quality of life. In CABG, patients may have a breathing tube placed in their airway before the surgery. Most people awaken within a few hours after surgery and they feel disoriented during this time. After the CABG procedure tubes are placed inside the chest to drain fluids that accumulate around the heart after surgery and may be painful for patients. These tubes are usually removed after the surgery within one to three days. The incision in the chest is usually sore, with the most discomfort in the first 48 to 72 hours after surgery. Many people have a poor appetite for several weeks after surgery. Constipation is also common during this time, probably due to decreased activity and food intake and the use of pain medications. Patients who have graft taken from the leg something have swelling in this leg after surgery. All the factors mentioned above might be the possible reasons for CABG patients' poor general health within one to three months after the procedure as compared to PCI patients [26].

A study conducted by Ernest CS, Murphy BM stated that approximately 20 to 40 percent of people become depressed after CABG. Such patients show signs of depression such as sadness for most of the day, diminished pleasure or Interest all activities, insomnia or excessive

sleep, or feelings of worthlessness or guilt. Depression can interfere with recovery and increase the risk of heart problems in the future. In our study depression was not measured directly but emotional wellbeing was measured and showed less emotional well of cardiac patients after surgery [27].

Conclusion

The study was conducted to evaluate the health-related quality of life of cardiac patients after cardiac procedures such as CABG or PCI and to find which procedure is better and has better health outcomes. The results of the study concluded that both procedures are associated with good quality Evaluation of Quality of life, Cognition, and Endurance in Cardiac Procedures Patients. Page 42 of life but PCI is associated with a better quality of life than CABG in post-operative patients within the first three months after surgery. The cognition level of patients after CABG and PCI is the same. The cognition of patients is not much affected after cardiac surgery. The physical activity or endurance is better among PCI patients as compared to CABG patients post-operatively as PCI is a minimally invasive procedure.

Limitations

Following were the limitation in this study i.e. Lack of time, Lack of cooperation from patients and Permission issues form hospitals authority.

Recommendations

In this study health Related Quality of life was accessed between post-surgery CABG and PCI patients, their health related quality of life pre surgery was not accessed so it is recommended that in future such a research should be carried out which predict a change in score of health Related Quality of life between pre-surgery and post-surgery CABG and PCI patients. In this study health related quality of life was accessed once in CABG and PCI patients from one to three months post-surgery only. Infuture longitudinal assessment Would be ideal to evaluate change over time and such research should be carried out which evaluate the changes in quality of life for more longer duration of time post-surgery to access the long term quality of life of patients after these procedures. Finally, we only had a general measure of health Related Quality of life, and it would be ideal to evaluate both general and disease-specific health Related Quality of life.

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Volume 11 Issue 7 July 2020

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