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Evaluation of Quality Of Life after Cardiac Surgery in High-Risk Patients

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ABSTRACT

Background: Conventionally, there is controversy over subjecting high-risk patients to cardiac operations, due to major postoperative complications. Higher survival rates and less morbidity as well as better quality of life can be good predictors of the outcome of surgery. This study evaluates the quality of life before and 12 months after cardiac operations on high-risk patients.

Methods: In this study, the European System for Cardiac Operative Risk Evaluation (EuroSCORE) II was used to separate high-risk patients from others. The quality of life was assessed using the Medical Outcomes Study 36-item Short Form Health Survey (SF-36) before surgery and one year afterward. Based on SF-36, the score for each of the eight different dimensions of the quality of life was quantified; and, their differences between pre-surgery and post-follow up period were analyzed.

Results: 126 high-risk patients were included in this study. The mean age of the patients was 64.29 ± 12.35 years. The median of EuroSCORE II score in these cases was 6.83 (6.04-25.98). The results reveal that the majority of the quality of life dimensions, except mental health, improved significantly after the follow-up period.

Conclusion: Cardiac surgery on high-risk patients can noticeably promote the different aspects of their quality of life; although, such improvements should be considered against surgical complications.

INTRODUCTION

The quality of life (QOL) plays a major role in the attitude of patients as well as physicians in regard to cardiac operations. QOL generally depends on the patient's perception of his/her multiple dimensions of health. In addition to measuring the physical aspects of the patient's health, QOL includes both psychological and social behaviors [Guyatt 1993].

Conventionally, cardiac surgery primarily seeks to relieve symptoms and increase survival rates. These improvements, however, do not necessarily translate into a better QOL. In several studies, risk factors associated with short- and long-term mortality and morbidity following cardiac surgery have been well assessed. Studies have reported higher mortality rates among high-risk patients as well as more complications after surgery [Nashef 1999; Riera 2011]. So, the question still remains as to whether or not to perform an operation on high-risk patients.

Recent surveys have accorded greater emphasis on QOL as a significant indicator of a patient's health post cardiac surgery. Nevertheless, most of such studies examined only preoperative risk models or QOL individually [Colak 2008; Peric 2005; Rumsfeld 2001]; therefore, there is a need to quantify QOL of both pre- and post-surgery in each specific risk group. This study aims to evaluate changes in QOL at 12-month follow-up of high-risk patients after cardiac surgery, using the European System for Cardiac Operative Risk Evaluation (EuroSCORE) II.

METHODS

Study Population

The data of this study were obtained from Tehran Heart Center (THC), Tehran, Iran. Preoperative data were collected from patients who underwent a cardiac operation from February 2012 to February 2013. As the QOL of patients was investigated one year post-surgery, the last questionnaire was conducted in February 2014. According to EuroSCORE II, patients with a score equal to or higher than 6 are considered high-risk for cardiac surgery. In this regard, a total of 126 high-risk patients who underwent a cardiac operation in THC during that period were included in our study. Other high-risk patients could not answer the questionnaire due to their urgent health conditions, and some declined to answer.

QOL was assessed using the Medical Outcomes Study 36-item Short Form Health Survey (SF-36) two days before surgery and one year afterward. In total, 120 (95.23%) patients completed both pre- and postoperative surveys; 3 (2.38%) patients died during the postoperative time period (EuroSCORE: 6.19, 6.41 and 9.05); 3 (2.38%) patients accomplished only the preoperative survey.

Informed written consent was obtained from all the patients participating in the study in accordance with the Helsinki Declaration. The Medical Ethics Committee of Tehran University of Medical Sciences (TUMS) also approved the project.

SF-36

Recent studies have considered the role of QOL in the clinical management of patients with cardiac disorders

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Table 1. Preoperative Clinical Characteristics of the Study Population

Variable	n (%)
Age, mean ± SD, years	64.29 ± 12.352
Sex F/M, n (%)	46 (36.5) / 80 (63.5)
EuroSCORE II Domains	
Patient-related factors	
Renal impairment, n (%)	
Normal (CC >85 mL/min)	8 (6.3)
Moderate (CC >50 & <85 mL/min)	88 (69.8)
Severe (CC < 50)	22 (17.4)
Dialysis (regardless of CC)	8 (6.3)
Extracardiac arteriopathy, n (%)	10 (7.9)
Poor mobility, n (%)	14 (11.1)
Previous cardiac surgery, n (%)	14 (11.1)
Chronic lung disease, n (%)	0 (0)
Active endocarditis, n (%)	0 (0)
Critical preoperative state, n (%)	0 (0)
Diabetes on insulin, n (%)	84 (66.6)
Cardiac-related factors	
NYHA classification, n (%)	
I	0 (0)
II	94 (74.6)
III	30 (23.8)
IV	2 (1.5)
CCS class 4 angina, n (%)	0 (0)
LV function, n (%)	
Good (LVEF >50%)	2 (1.5)
Moderate (LVEF 31%-50%)	66 (52.3)
Poor (LVEF 21%-30%)	52 (41.2)
Very poor (LVEF ≤ 20%)	6 (4.7)
Recent MI, n (%)	36 (28.5)
Pulmonary hypertension, n (%)	
Moderate (PA systolic 31-55 mmHg)	62 (49.2)
Severe (PA systolic ≥55 mmHg)	48 (38.0)
Operation-related factors	
Urgency, n (%)	
Elective	126 (100)
Urgent	0 (0)
Emergent	0 (0)
Salvage	0 (0)
Weight of the intervention, n (%)	
Isolated CABG	24 (19.0)
Single not CABG	2 (1.58)
2 procedures	72 (57.1)
3 procedures	28 (22.2)
Surgery on thoracic aorta, n (%)	18 (14.2)
EuroSCORE II, n (%)	
Percentile 25	6.43
Median	6.83
Percentile 75	7.64

CABG indicates coronary artery bypass graft surgery; CC, creatinine clearance; CCS, Canadian Cardiovascular Society; EuroSCORE, European System for Cardiac Operative Risk Evaluation; LV, left ventricle; LVEF, left ventricular ejection fraction; MI, myocardial infarction; NYHA, New York Heart Association; PA, pulmonary artery.

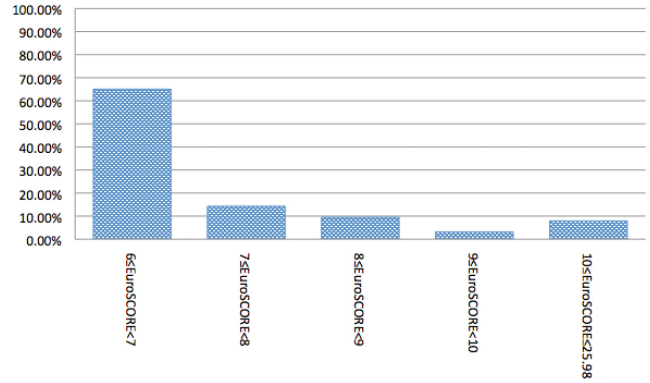
[Rumsfeld 2001; Rumsfeld 1999]. One of the most standardized generic questionnaires, the SF-36, measures QOL across eight emotional and physical dimensions: physical functioning (PF); role limitations due to physical health (RP); role limitations due to emotional problems (RE); energy/fatigue (vitality-VT); emotional well-being (mental health-MH); social functioning (SF); bodily pain (BP); and general health perception (GH). The SF-36 has been validated in terms of reliability in multiple languages in different literature [Aaronson 1998; Bjorner 1998]. In our study, a valid Farsi version of the SF-36 was utilized [Montazeri 2005]. All of the pre- and postoperative surveys were completed by one trained interviewer. RAND instructions were employed to score the SF-36. In this regard, better health status in each domain was defined by its higher values transformed on a 0 to100 scale.

EuroSCORE II

Among various risk models developed to predict mortality and morbidity after heart surgery, eg Parsonnet; Cleveland Clinic; French; Euro; Pons; and Ontario Province Risk (OPR) scores, the EuroSCORE yields the highest predictive value [Geissler 2000; Pitkanen 2000]. The EuroSCORE has been widely validated for use across a range of health care professions [Nashef 2002; Roques 2003; Nashef 2000]. We applied the recently introduced EuroSCORE II risk model because it has a more accurate calibration than the original model for the assessment of cardiac surgery risk factors; it has also been validated in some recent literature [Nashef 2012; Chalmers 2013; Di Dedda 2013].

Statistical Analysis

In this study, data is presented as mean ± standard deviation (SD) for continuous variables and as frequencies with percentages for the categorical variables. The contents of the SF-36 questionnaire were compared before and after surgery



Scattering diagram of EuroSCORE II in high-risk patients.

using the paired t or Wilcoxon signed rank test. A P value ≤ .05 was considered statistically significant. The analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 20.

RESULTS

This study recruited 126 patients at a mean age of 64.29 ± 12.35 years. 46 (36.5%) patients were female and the rest (63.5%) were male. The median of the EuroSCORE II in our study population was 6.83 (6.04-25.98). The distribution pattern of the EuroSCORE II of 126 patients is demonstrated in the Figure.

EuroSCORE II calculated the risk of undergoing a cardiac operation for a patient by assessing three major domains: patient-related factors, cardiac-related factors, and operation-related factors containing ten, five, and three dimensions respectively. A summary of the patients' characteristics and EuroSCORE II domains is presented in Table 1.

Patients from the Emergency Department (ED) were not included in this study, therefore nor were factors regarding patients' conditions in the ED and the impact of this ward on patients' attitudes. Consequently, our study population was only selected from patients in the cardiac surgery wards, which means that all surgical procedures were categorized in the elective part of the EuroSCORE II.

Subsequently, the score of each of the eight different dimensions of QOL in addition to its summary form were calculated, and differences were analyzed after 12 months of follow-up. The results of the comparison between the pre- and postoperative SF-36 scores are illustrated in Table 2.

The QOL scores of 6 patients who were lost to follow-up were excluded. Our patients experienced significant improvement in seven out of the eight dimensions of the SF-36, namely PF ($P < .01$), RP ($P < .01$), RE ($P < .01$), VT ($P = .014$), SF (P = .037), BP ($P < .01$), and GH ($P < .01$). Additionally, a summary form of the SF-36, comprising both physical component score (PCS) and mental component score (MCS), was analyzed. These components also improved considerably one year after the operation ($P < .01$ for both).

Table 2. Comparison between Pre- and Postoperative SF-36 Scores in High-Risk Patients*

Parameters of QOL	Pre	Post	*P*
Health dimensions			
PF	45.6 ± 26.2	69.0 ± 43.5	*P* < .001
RP	21.4 ± 33.2	57.8 ± 43.0	*P* < .001
RE	29.2 ± 38.3	69.0 ± 43.5	*P* < .001
VT	56.8 ± 17.6	64.1 ± 16.0	*P* = .014
MH	61.8 ± 18.1	66.2 ± 18.36	*P* = .160
SF	63.8 ± 22.4	73.6 ± 25.9	*P* = .037
BP	57.4 ± 29.0	85.3 ± 19.9	*P* < .001
GH	54.12 ± 15.0	67.2 ± 18.2	*P* < .001
Summary			
PCS	44.17 ± 19.8	72.39 ± 19.0	*P* < .001
MCS	50.14 ± 16.2	62.8 ± 18.8	*P* < .001

*Data are presented as the mean ± SD where indicated. BP indicates bodily pain; GH, general health perception; MCS, mental component score; MH, mental health (emotional well-being); PCS, physical component score; PF, physical functioning; Post, postoperative (12 months after surgery); Pre, preoperative score; RE, role limitations due to emotional problems; RP, role limitations due to physical health; SF, social functioning; VT, vitality (energy/fatigue).

DISCUSSION

Making an appropriate decision about subjecting high-risk patients to cardiac surgery is momentous; hence, survival rates and future morbidities as well as changes in QOL have an impact on making a more informed decision. Longer waiting periods before cardiac surgery are associated with decreased physical and emotional functioning, both before and after surgery [Sampalis 2001]. In high-risk patients, postoperative complications such as cardiac arrhythmia, longer intensive care unit (ICU) length of stay, and longer ventilation time are greater than those in low-risk patients [Yilmaz 2007]. Therefore, some cardiac surgeons are wary about surgical options for high-risk patients.

As patient perspective and cultural context have a great impact on QOL, we used the mother tongue, a Farsi version of the SF-36 questionnaire, to evaluate QOL in all cases.

In this study, most of the 126 high-risk patients had a EuroSCORE II between 6 and 10 (Figure). Taking this into account, as well as the mean score in dimensions of QOL (Table 2), it is evident that the majority of our patients were not critically ill with poor prognosis. Even though continuous medical management without surgery was an agreeable option for these high-risk patients, cardiac surgery was selected as their treatment. It is corroborated that nearly all dimensions of QOL significantly improved in high-risk patients following cardiac surgery (Table 2).

In a recent study, it was concluded that not only did domains of EuroSCORE such as lower left ventricle ejection

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fraction, severe pulmonary hypertension, and diabetes mellitus have an association with mid-term mortality after cardiac surgery, but also factors consisting of preoperative anemia, postoperative stroke, and hospital stay [Riera 2011]. The EuroSCORE does not encompass certain intraoperative events like cardiopulmonary bypass time or prolonged cross-clamp time, which affect short-term mortality and morbidity. Nonetheless, it can predict specific postoperative complications such as renal failure, respiratory failure, and sepsis, as well as long-term survival rates after cardiac surgery [Geissler 2000; Pitkanen 2000; Gurler 2003; Toumpoulis 2005]. Moreover, it has been shown that EuroSCORE may also correlate with the costs of cardiac surgeries [Pinna Pintor 2003]. So it has been demonstrated to be an appropriate scoring system to categorize patients based on their risks for cardiac surgery.

Previous studies have provided evidence that most of the dimensions of QOL improve after cardiac operation; however, the extent of such improvement may vary among patients at low, medium, or high-risk for cardiac surgery. Colak et al concluded that RE improved significantly among patients at low or medium risk for cardiac surgery one year post operation, while high-risk patients had many improved dimensions of QOL, including BP, VT, SF, RE, and MH [Colak 2008]. Loponen and his colleagues also reported that QOL improved after coronary artery bypass graft surgery and that the EuroSCORE could predict both survival rates and improvement in QOL at long-term follow-up after this surgical procedure [Loponen 2008]. Peric et al found that the aspect of QOL that improved most in high-risk patients was energy according to the Nottingham Health Profile Questionnaire (NHP) [Peric 2005]. In continuation of such analysis, our results showed a statistically noticeable improvement in seven out of the eight domains of QOL—PF, RP, RE, VT, SF, BP, and GH—in high-risk patients 12 months after surgery (Table 2). RE changed the most among other factors. Moreover, Table 2 illustrates that in the summary form of the SF-36, both PCS and MCS developed remarkably one year after surgery.

In comparison to a previous study among patients at THC who underwent a cardiac operation regardless of their risk [Najafi 2008], our study group scored lower in all eight dimensions of QOL. This may substantiate the fact that increasing the risk of a patient who is nominated for cardiac surgery deteriorates all dimensions of his/her QOL.

As a major limitation of this study, most of our cases were not critically ill patients, and they underwent an elective cardiac operation. Conducting this study at a single center is another limitation of this investigation. Therefore, multicenter research with a longer follow-up period of time could strengthen the results of this study.

Conclusion

This study evaluates changes in QOL at 12-month follow-up of high-risk patients who underwent a cardiac operation. It is concluded that although some cardiac surgeons may hesitate to perform surgery on high-risk patients due to a higher rate of post-operative complications and mortality, QOL of this group of patients improved significantly in almost every dimension after surgery.

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