

Quality of Life following Minimally Invasive Direct Coronary Artery Bypass Grafting (MIDCABG) versus Conventional Open-Heart Coronary Artery Bypass Grafting (CABG): A 3-year Data from a Single Centre

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ABSTRACT

Introduction: In Malaysia, MIDCABG started in 3 centers developing the technique. As the technique is gaining traction in the country, this study aims to compare the quality of life following MIDCABG compared with conventional CABG in one of the centers actively developing this technique. **Methods:** A retrospective cohort study was performed involving 30 post CABG patients which consists of 15 MIDCABG and 15 conventional CABG from January 2015 to May 2018. 15 from 21 post-MIDCABG patients were included and selected, based on EuroSCORE II less than 5. Modified Post-Operative Quality of Recovery Scale was used to assess and compare the quality of life following respective approaches. Data were analyzed using SPSS version software and comparison using mean rank with $p < 0.05$ as statistically significant. **Results:** The mean rank for pain score within 5 days, weeks of analgesics requirement and emotional status post operation for MIDCABG is higher. Both procedures have same mean rank for ability to walk without assistance postoperatively. Mean rank for daily activities 1 month after operation, ability to walk without assistance and ability to have good sleep is lower in MIDCABG. The mean rank for weeks to regained normal appetite and overall satisfaction of surgery for MIDCABG is higher. no significant different in the entire measured postoperative outcome between both operations as $P > 0.05$. **Conclusion:** There is no significant difference in quality of recovery following MIDCABG compared to conventional CABG. Modified PostOPQRS system can be a useful assessment tool to evaluate the impact of an intervention in relation of quality of life.

KEYWORDS: MIDCABG; PostOPQRS; CABG

INTRODUCTION

In recent years, there has been significant improvements in cardiac surgery surgical techniques including minimizing the incision size, specialized surgical instruments and the advancement of robotic technology. The approach to surgery is by the simplest possible access such as minimally invasive direct coronary artery bypass grafting (MIDCABG) in order to minimize morbidities associated with the surgery.

Quality of life (QOL) has been defined as “a broad multidimensional concept that usually includes subjective evaluations of both positive and negative aspects of life” [2] which incorporated many realms. Health is one of the important domains of overall

quality of life. The concept of health-related quality of life (HRQOL) has includes those aspects of overall quality of life that can be clearly shown to affect health either physical or mental. Many researches have been carried out to compare quality of life following MIDCABG and conventional CABG. However, the absolute conclusion whether or not one has better outcome than the other is still debatable.

In Malaysia, cardiac surgery began with the conventional CABG, with currently more than 25 centers performing the same procedure. MIDCABG however has only started to take root with only 3 centers developing the technique. As the technique is gaining traction in the country, this study aims to compare the



quality of life following MIDCABG compared with conventional CABG at UiTMMS (UiTM Medical Specialist Centre). as one center actively developing this technique. We present the 3 years data at our centre.

MATERIALS AND METHODS

Study Design

This retrospective cohort study was conducted at UiTMMS (UiTM Medical Specialist Centre). All patients who underwent CABG from January 2015 to May 2018 via minimally invasive approach (MIDCABG) and an equal amount of conventional CABG were included in the study.

Inclusion criteria for this study include multi-vessel coronary artery disease for isolated CABG, ability to perform either of revascularisation methods and elective surgery.

Pregnancy, previous CABG, severe comorbidity with high procedural risk for either of the studied strategies, severe peripheral artery disease, other serious diseases limiting life expectancy (e.g., malignancy), participation in other clinical trials, need for emergency revascularisation, complicated coronary anatomy and unstable haemodynamic status were excluded from the study.

Sample Size

This study involves 30 post CABG patients which consists of 15 MIDCABG and 15 conventional CABG from year 2015 to 2018 in UiTMMS. Our population represents 21 patients who underwent MIDCABG and 174 patients who underwent conventional CABG from the respective years. Out of 21 MIDCABG patients, 15 respondents were included in this study, as there were 2 mortalities, 3 were unreachable and 1 was unable to cooperate at the time of study. Hence, 15 patients who underwent conventional CABG were randomly selected from the population to be compared with MIDCABG patients. Out of 15 patients for both procedures, 14 males and 1 female were enrolled in this study.

Data Collection

This study was approved by institutional ethical committee for human research. The medical records of patients who underwent MIDCABG (n=21) and conventional CABG from January 2015 until May 2018

(n=174) performed by Cardiovascular and Thoracic surgeons in UiTMMS were reviewed retrospectively. European System for Cardiac Operative Risk Evaluation (euroSCORE) II for all patients were calculated and only patients with euroSCORE II less than 5 included in this study (low-risk patients). Inclusion and exclusion criteria were kept in check before proceeding with data collection. A total of 30 patients (MIDCABG, n=15 and conventional CABG, n=15) were selected randomly. Patient selection was randomized; thus, selection bias may exist. Hence, euroSCORE II less than 5 pre-operatively was used to control selection bias. Demographic data of selected patients (n=30) were collected from medical notes, database registry and medical charts (secondary data). Modified PostopQRS questionnaire were used to assess quality of life. This questionnaire was adapted and modified based on two well-established and validated scoring system, PostopQRS as well as QoR-40 [5]. This modified questionnaire consists of 8 questions which assess patients from several aspects such as postoperative pain within 5 days, postoperative site pain (weeks of analgesics requirement), emotional status, ability to walk without assistance postoperatively, impact on daily activities, weeks required to regain good sleeps, weeks for normal appetite to return and overall level of satisfaction of the surgery. Modified PostopQRS was also established to adapt with the retrospective study design. 2 from 6 domains were omitted (physiological and cognitive) from PostopQRS scoring system as both are unsuitable for retrospective study. Moreover, PostopQRS requires both pre-operative and post-operative evaluation of similar domains and subsequently comparing the scores pre- and post-operatively which is not feasible to the study. (<https://www.postopqrs.com/faq>). 2 additional domains were adopted from QoR-40 i.e comfort (quality of sleep and appetite post-operatively) and physical independence (ability to return to routine daily activities measured in weeks) to extend aspects of assessment.

A domain (operative site pain measured by duration of analgesic used) added as an important factor in assessing quality of life post-operatively for cardiac surgery. The time window was adjusted for each domain. Patients were consented after explanation for the interview. A short interview (t=10-15 minutes) was

carried out for each selected patient via telephone calls or during their routine follow-up clinic visit at Cardiovascular and Thoracic Surgery Clinic UiTMMS. Data collected were entered into SPSS.

Data Analysis

Demographic, intra and post-operative variables were collected from clinical notes. Statistical analysis was carried out by using SPSS software for Windows (Version 23). Descriptive statistics will be used for first phase of analysis to characterize the demographic of the sample such as age, gender, race, and BMI.

Categorical data were expressed as frequency (%) and continuous data were expressed as mean + standard deviation. Dependent variables data were analysed by using Mann-Whitney U test (non-parametric) due to non-normal distribution of data for all variable tested possibly because of very small sample size. All four assumptions for Mann-Whitney test were checked before proceeding with the test. The assumptions are the dependent variable should be measured on an ordinal scale or a continuous scale, the independent variable should be two independent, categorical groups, observations should be independent (there should be no relationship between the two groups or within each group) and observations are not normally distributed but they should follow the same shape. Significant level was set at $\alpha = 0.05$. Differences were considered statistically significant if two-tailed $p < 0.05$. Comparisons between groups, minimally invasive CABG (MIDCABG) and conventional CABG was expressed by using mean rank and the significant difference was determined by using p-value for each variable tested.

RESULTS

No MIDCABG patients had to convert to a sternotomy thus, all patients were included in the study. Therefore, data analysis was based on 15 patients from each arm. Baseline characteristics were summarised as in Table 1. The mean age for MIDCABG and conventional CABG group are 56 and 60 respectively. Majority of them are male and Malays in both groups. MIDCABG patients mostly are overweight compared to conventional CABG who are mostly have normal BMI.

Table 2 demonstrate the final mean scores for the domains to measure the postoperative outcomes. Pain within 5 days of operation was measured using pain score, ranging from 1 for absent of pain to 5 for extremely pain. Pain also was measured by period of analgesic medication requirement by the patients in weeks.

Emotion after 1 month of operation of all the 30 patients was assess by score ranging from 1 to 5 as 1 for not sad at all and 5 for extremely sad. Ability to walk without assistant was assessed by months. Daily activity of all the patients after one month of operation was assess either their routine is not impacted at all scored as 1 to 5 as completely impacted. Patient's ability to have a good sleep and to regained appetite after operation was evaluated by weeks. Overall satisfaction of the patients to the surgery was evaluated using a score ranging from 1 to 5 as 1 for not satisfied at all to 5 for extremely satisfied.

Postoperative outcomes between MIDCABG patients and conventional CABG patients were compared using Mann-Whitney U test and are summarized as in Table 3. Although there are differences in mean rank between both operations in the measured postoperative outcomes, there are no significant different in the entire measured postoperative outcome between both operations as P value is more than $\alpha (0.05)$.

Table 1 Baseline characteristics by type of CABG approaches

VARIABLE	MIDCABG (N=15)	Conventional CABG (N=15)
Age (years old)	56.0 (\pm 8.0)	60.0 (\pm 6.4)
Gender		
Male	14.0 (93.3%)	14.0 (93.3%)
Female	1.0 (6.7%)	1.0 (6.7%)
Race		
Malay	13 (86.7%)	9 (60.0%)
Indian	0 (0%)	3 (20.0%)
Chinese	2 (13.3%)	3 (20.0%)
BMI		
Underweight	0 (0%)	0 (0%)
Normal	5 (33.0%)	9 (60.0%)
Overweight	10 (66.7%)	3 (20.0%)
Obesity	0 (0%)	3 (20.0%)

Table 2 Mean for postoperative outcome domains with standard deviation

Postoperative outcome	Operation	Mean	Standard Deviation (+/-)
Pain within 5 days	MIDCABG (n=15)	2.80	1.57
	Conventional CABG (n=15)	2.87	1.25
Requirement of analgesic	MIDCABG (n=15)	2.53	1.55
	Conventional CABG (n=15)	2.47	1.30
Emotion after 1 month	MIDCABG (n=15)	1.07	0.26
	Conventional CABG (n=15)	1.13	0.35
Ability to stand without assistant	MIDCABG (n=15)	1.53	0.74
	Conventional CABG (n=15)	1.53	0.74
Daily activities 1 month after operation	MIDCABG (n=15)	2.20	1.01
	Conventional CABG (n=15)	1.73	0.70
Ability to have a good sleep	MIDCABG (n=15)	2.20	1.42
	Conventional CABG (n=15)	1.33	0.90
Days to regain normal appetite	MIDCABG (n=15)	1.93	1.39
	Conventional CABG (n=15)	2.33	1.50
Satisfaction of surgery	MIDCABG (n=15)	4.40	0.74
	Conventional CABG (n=15)	4.53	0.64

Table 3 Mann-Whitney U Test: Postoperative outcomes between MIDCABG patients and conventional CABG patients were compared using Mann-Whitney U test

Postoperative outcome	Operation	Mean rank	P value
Pain within 5 days	MIDCABG (n=15)	15.73	0.902
	Conventional CABG (n=15)	15.27	
Requirement of analgesic	MIDCABG (n=15)	15.67	0.935
	Conventional CABG (n=15)	15.33	

Postoperative outcome	Operation	Mean rank	P value
Emotion after 1 month	MIDCABG (n=15)	16.00	0.775
	Conventional CABG (n=15)	15.00	
Ability to stand without assistant	MIDCABG (n=15)	15.50	1.000
	Conventional CABG (n=15)	15.50	
Daily activities 1 month after operation	MIDCABG (n=15)	13.60	0.250
	Conventional CABG (n=15)	17.40	
Ability to have a good sleep	MIDCABG (n=15)	12.93	0.116
	Conventional CABG (n=15)	18.07	
Days to regain normal appetite	MIDCABG (n=15)	16.57	0.512
	Conventional CABG (n=15)	14.43	
Satisfaction of surgery	MIDCABG (n=15)	16.17	0.683
	Conventional CABG (n=15)	14.83	

DISCUSSION

Postoperative quality of life is an important measurement to compare the consequences and overall effectiveness of surgical procedures. This retrospective cohort study evaluated postoperative quality of life following MIDCABG and conventional CABG. Comparing quality of life using a modified, previously validated, simple questionnaires of PostOPQRS and QOR-40, with adjustment made to the time window for feasibility of the study, shows that MIDCABG patients have similar scores with conventional CABG patients. These results are important during pre-operative discussion related to benefits and differences between MIDCABG and conventional CABG. The results also

can be used as pilot data for a larger trial examining differences in the MIDCABG and conventional CABG procedures in future [8].

It is important to have a patient reported instrument to measure the quality of life after surgical procedures in primary care setting. The Modified PostOPQRS system used in this study can be a useful assessment tool as a guide to healthcare professional and policy maker. This may initiate a transformation in healthcare services to ensure patient satisfaction. However, further validation study is needed which includes confirmatory factor analysis. Future research may also include utilisation of this modified questionnaire to evaluate the impact of an intervention

on the perceived quality of care as received by the patients [1].

In this study, the aim is to compare the quality of life in patients following minimally invasive CABG (MIDCABG) and conventional open-heart CABG in UITMMS. Based on the results, both procedures tend to yield similar outcomes in terms of postoperative pain, length of analgesics requirement, emotional status, ability to walk without assistance post-operatively, length of time needed to return to daily activities, to return to normal sleeping pattern and to return to normal appetite and level of satisfaction.

The result from this study contradicts with previously published literature which showed that the quality of life of MIDCABG patients are better compared to conventional CABG [4, 8]. Although this study proved that no surgical procedure is better than the other, having similar outcomes and not inferior than conventional CABG in this study is favourable as it allows us to further compare them in other aspects to decide which procedure is most beneficial such as cost-effectiveness, length of hospital stay, invasiveness of the procedure and medical related complications.

Numerous articles reported the cost-effectiveness of the MIDCABG operation [6] possibly originates from lower operative times, absence of cardiopulmonary bypass, minimal blood product transfusion, lower complication rate and shorter hospital stay [3]. The procedure also has shorter Intensive Care Unit with lesser postoperative analgesic requirements [2]. MIDCABG also has low rate of wound infection and newly-onset atrial fibrillation, thus shorten hospital stay and median time to return to full physical activity [7].

Since it was the data from a single centre, starting new approach of surgery, the outcome is expected to be the same from other report, yet the differences or dissimilarities would be meaningful as references in future.

STUDY LIMITATIONS

This is a single centre study, involving only patients who underwent CABG from a single centre with small sample size. Hence, the outcomes measured may be underpowered [8]. Therefore, caution needs to be taken

to generalize the findings. Apart from absence of propensity scoring, further limitation is set by the recall bias. Since the patients consist of those who had undergone surgery since 3 years before, they might not be able to recall the postoperative events accurately. Therefore, the time window was adjusted in questionnaires to reduce the bias. Subjective scales were chosen because it is easy to use for the respective subjects in this study. The bias is unavoidable and need to be interpret accordingly.

CONCLUSION

There is no difference in quality-of-life following MIDCABG and conventional CABG in terms of postoperative pain, length of analgesics requirement, emotional status, ability to walk without assistance post-operatively, length of time needed to return to daily activities, return to normal sleeping pattern and return to normal appetite and level of satisfaction.

Modified PostOPQRS system used in this study can be a useful assessment tool to evaluate the impact of an intervention in relation of quality of life.

Conflict of Interest

Authors declare none.

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Authors' Contribution

1. Adli Azam Mohammad Razi M.D, MS Surgery (Corresponding Author): Study design and concept, Data acquisition, analysis and interpretation, Manuscript drafting and revision, Final approval of the version to be published
2. Muhammad 'Abid Amir MBBCh, BAO, MS Surgery (co-author): Data acquisition,

Manuscript drafting and revision, Final approval of the version to be published

3. Mohd Zamrin Dimon M.D, MMed Surgery (co-author): Data acquisition, Manuscript drafting and revision, Final approval of the version to be published

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