



# Comparison of Life Quality in Patients Undergoing Open Vein Harvesting and Endoscopic Vein Harvesting Techniques: A Prospective Cohort Study

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Received 2020 February 25; Revised 2020 June 13; Accepted 2020 June 14.

## Abstract

**Background:** As the traditional indicators of the operative outcomes, including morbidity and mortality, cannot give sufficient information on a patient's physical, mental, emotional, and functional well-being alone, we aimed to compare life quality in the patients under open vein harvesting (OVH) and endoscopic vein harvesting (EVH) techniques after four years of follow-up.

**Methods:** This prospective cohort study followed all the patients who were scheduled for off-pump CABG in the Mashhad-based Imam Reza Hospital, in October 2013, for 4 years. Accordingly, data related to their quality of life were collected, and their life quality was then compared using the WHOQOL-BREF scale. Chi-squared, *t*-test, Fisher exact test, and relative risk were also used.

**Results:** This study was conducted on a total of 103 patients under the two techniques of OVH (*n* = 53) and EVH (*n* = 50). The difference between the EVH (4.7%) and OVH (16.3%) groups at the demographic characteristics was the Transient Ischemic Attack (*P* = 0.023). After a 4-years follow-up period, no significant differences were observed between the patients undergoing the two techniques of OVH and EVH in all the domains of life quality.

**Conclusions:** According to the obtained results, there was no difference in the quality of life between the patients undergoing OVH and EVH techniques over a four-year period. In this regard, further investigations are recommended on the quality of life in patients under the two techniques of OVH and EVH with long-term follow-up periods.

**Keywords:** Endoscopic Vein Harvesting, Coronary Artery Bypass Grafting, Open Vein Harvesting, Quality of Life

## 1. Background

A frequent choice in coronary artery bypass grafting (CABG) operations is to harvest the greater saphenous vein, which is primarily performed through two procedures as minimally-invasive endoscopic vein harvesting (EVH) and open vein harvesting (OVH) (1).

Typically, OVH comprises of either one long incision or 'bridged' incisions across the vein (2). Accordingly, this technique is characterized by discomfort and risks of complications such as edema, hematoma, postoperative pain, wound dehiscence and infection, delayed healing, cellulitis, and loss of mobility, which lead to greater costs due to the prolonged hospital stay or readmissions (2-4).

As a procedure developed to eliminate the necessity for

long incisions accompanied by open harvesting, EVH decreases the related complications compared to OVH and also contributes to higher patient satisfaction and the improved life quality of the patients. Moreover, it stands as the preferred technique for conduit harvest in numerous cardiothoracic centers (2, 3, 5). However, several concerns still remain regarding the impact of endoscopic harvesting on the mid- and long-term outcomes (2, 3, 6, 7).

On the other hand, such traditional indicators of the operative outcome as morbidity and mortality cannot give sufficient information about a patient's physical, emotional, mental, and functional well-being alone (8). Given the increasing number of patients with heart disease and CABG procedures as well as the currently predominant holistic approach for the patient's health, it seems crucial

to consider the evaluation of the effects of OVH and EVH on the life quality of the patients.

## 2. Objectives

This study was conducted to compare life quality between the patients under the two techniques of OVH and EVH after a 4-year follow-up period in Imam Reza Hospital affiliated with Mashhad University of Medical Sciences.

## 3. Methods

After obtaining the approval of the Ethics Committee of Birjand University of Medical Sciences (IR.BUMS.REC.1397.1), this study was conducted on the patients with off-pump CABG in the Cardiac Surgery Ward of Imam Reza Hospital. After four years, the patients were contacted to obtain the data related to their quality of life, which was then compared using WHOQOL-BREF scale.

The inclusion criteria were the patients aged more than 18 years old undergoing the elective off-pump CABG for the first time. In addition, the exclusion criteria included any patient who failed in providing the written informed consent who were candidates for heart-valve surgery, those who had simultaneous EVH and OVH, those who had ulcers in the leg or elsewhere, those with active bacterial infections, and those who died during surgery.

Moreover, the WHOQOL-BREF scale was used for data collection, which was developed by the World Health Organization. It consists of 26 items assessing the overall perceived QOL. Accordingly, the first two items evaluated the overall perception of QOL and health, respectively. In addition, other items were labeled under social, psychological, physical, and environmental domains. In this regard, each one of the items was scored on a 5-point Likert scale, and the responses were scaled in a positive direction. In order to compute the raw score, the mean score of the items per domain was employed. By applying a transformation formula, the raw scores were then converted into a scale ranged from 0 to 100 (9). A study by Nejat et al. confirmed the validity and reliability of the scale in various groups of subjects in Iran (10). Notably, the higher scores obtained on the scale suggest higher QOL (11).

After four years, among the 173 patients under the study (OVH = 86 cases and EVH = 87 cases), the data belonged to 70 participants were not accessible as their address or telephone number was changed. In total, 103 patients (OVH 53 cases and EVH 50 cases) were studied in this research.

Data were analyzed using SPSS 16 software (IBM Corporation, Chicago, IL). Also, the normal distribution of the

quantitative variables was verified using the Kolmogorov-Smirnov test. Moreover, *t*-test was used to compare the continuous variables. Categorical variables were analysed using chi-squared or Fisher exact test. The relative risk (RR) was computed with a 95% confidence interval (CI) to compare death between the OVH and EVH groups. P-values less than 0.05 were considered statistically significant.

## 4. Results

At the study onset, the patients under the OVH and EVH procedures were matched for age, gender, body mass index, smoking, and accompanying diseases (such as asthma, COPD, and diabetes). Notably, the only difference between the EVH (4.7%) and OVH (16.3%) groups in terms of the demographic characteristics was the Transient Ischemic Attack ( $P = 0.023$ ), as shown in Table 1.

No significant difference was found between the EVH and OVH groups in their post-op ICU stay in terms of the variables such as the ankle circumference of the harvesting leg, serum albumin level, positive Troponin, serum creatinine level, pain score, Intra-aortic Balloon Pump (IABP) use, cardiac arrhythmia, and death.

Regarding the hospitalization in the cardiac surgery ward, there was no significant difference in post-op ward stay (in terms of serum albumin level, positive Troponin, serum creatinine level, and cardiac arrhythmia) between these two groups except pain scores and hospital stay fee. Also, the mean pain score in post-surgery hospital stay in the cardiac surgery ward was significantly different between these two groups (0.003) ( $1.2 \pm 1.1$  in the EVH group and  $1.6 \pm 1.3$  in the OVH group). Furthermore, a significant difference was observed between these two groups in terms of hospital fees (OVH vs. EVH:  $5.8 \pm 4.7$  vs.  $7.3 \pm 2.0$ ;  $P = 0.008$ ). After a six-week follow-up period, the only difference between these two groups was the pain score (OVH vs. EVH:  $1.3 \pm 0.8$  vs.  $0.9 \pm 1.08$ ;  $P = 0.02$ ).

In addition, there was no significant difference between the OVH and EVH groups in terms of the risk-adjusted death during the 4-year follow-up (RR, 0.326; 95% CI 0.063 to 1.700). In this study, there were 8 (7.8%) deaths overall.

Comparison of the mean scores of quality of life in different areas in the patients of the EVH and OVH methods showed that, in the physical dimension, mental area, environmental area, and general area, in terms of gender in the OVH method, there was no significant difference in the scores of the two genders. However, in the EVH method, the difference between men and women was significant, and men had a higher score. In this study, it was found that the quality of life among men was higher than the quality of life among women after surgery.

**Table 1.** Demographic Characteristics and Medical Characteristics of the OVH and EVH Groups at Study Entrance <sup>a</sup>

| Variable                         | OVH (N = 86) | EVH (N = 87) | P-Value            |
|----------------------------------|--------------|--------------|--------------------|
| <b>Age, Mean ± SD</b>            | 59.9 ± 10.49 | 59.3 ± 8.20  | 0.665 <sup>b</sup> |
| <b>Gender</b>                    |              |              | 0.666 <sup>c</sup> |
| Male                             | 53 (62.4)    | 57 (65.5)    |                    |
| Female                           | 32 (37.6)    | 30 (34.5)    |                    |
| <b>Body mass index</b>           |              |              | 0.969 <sup>c</sup> |
| Lowweight                        | 1 (1.2)      | 2 (2.4)      |                    |
| Normal                           | 37 (43.5)    | 34 (40.5)    |                    |
| Overweight                       | 34 (40.0)    | 35 (41.7)    |                    |
| Obese                            | 13 (15.3)    | 13 (15.4)    |                    |
| <b>Smoking</b>                   |              |              | 0.706 <sup>c</sup> |
| Yes                              | 29 (33.7)    | 27 (31.0)    |                    |
| No                               | 57 (66.3)    | 60 (69.0)    |                    |
| <b>COPD</b>                      |              |              | 1.000 <sup>d</sup> |
| Yes                              | 1 (1.2)      | 1 (1.1)      |                    |
| No                               | 85 (98.8)    | 86 (89.9)    |                    |
| <b>Asthma</b>                    |              |              | 1.000 <sup>d</sup> |
| Yes                              | 2 (2.3)      | 3 (3.4)      |                    |
| No                               | 84 (97.7)    | 84 (96.6)    |                    |
| <b>Diabetes</b>                  |              |              | 0.437 <sup>c</sup> |
| Yes                              | 32 (37.2)    | 37 (43.0)    |                    |
| No                               | 54 (62.8)    | 49 (57.0)    |                    |
| <b>Dialysis</b>                  |              |              | 1.000 <sup>d</sup> |
| Yes                              | 2 (2.3)      | 2 (2.3)      |                    |
| No                               | 84 (97.7)    | 84 (97.7)    |                    |
| <b>Transient ischemic attack</b> |              |              | 0.023 <sup>d</sup> |
| Yes                              | 14 (16.3)    | 4 (4.7)      |                    |
| No                               | 72 (83.7)    | 82 (95.3)    |                    |

<sup>a</sup>Values are expressed as No. (%) unless otherwise indicated.

<sup>b</sup>t-test

<sup>c</sup>Chi-squared

<sup>d</sup>Fisher's Exact test

Notably, after four years, the patients' quality of life was compared. The comparison of the quality of life and its domains in the patients under the two procedures of OVH and EVH are displayed in [Table 2](#). Moreover, there was no significant difference between these two groups in terms of quality of life and its domains.

## 5. Discussion

This study with a long-term follow-up was performed for comparing the life quality of the patients under the OVH and EVH techniques. Comparison of the mean scores

of quality of life in different areas in the patients of the EVH and OVH methods showed that, in the physical dimension, mental area, environmental area, and general area, in terms of gender in the OVH method, there was no significant difference in the scores of both genders. However, in the EVH method, the difference between men and women was significant, and men had a higher score. In this study, it was found that after surgery, the quality of life among men was higher than the quality of life among women. The results of several studies have shown that the quality of life among women is lower than that of men, especially in the psychological field. Moreover, it was shown that the preva-

**Table 2.** Comparison of Life Quality in Patients Under the Two Procedures of OVH and EVH After A 4-Year Follow-Up Period <sup>a</sup>

| Domains       | OVH (N = 53) | EVH (N = 50) | Independent Samples Test     |
|---------------|--------------|--------------|------------------------------|
| Physical      | 55.5 ± 11.28 | 50.8 ± 12.27 | t = 1.9, df = 93, P = 0.058  |
| Psychological | 51.0 ± 21.53 | 52.0 ± 22.04 | t = 0.2, df = 93, P = 0.820  |
| Social        | 51.0 ± 21.53 | 52.0 ± 22.04 | t = 0.2, df = 93, P = 0.820  |
| Environmental | 55.9 ± 10.34 | 56.1 ± 12.59 | t = 0.05, df = 93, P = 0.954 |
| Overall       | 61.4 ± 25.38 | 59.1 ± 19.42 | t = 0.5, df = 93, P = 0.617  |

<sup>a</sup>Values are expressed as mean ± SD.

lence of these disorders is higher in women compared to men, which some specific conditions for women such as genetics and sex hormones may be known as the reasons for this difference (12-14).

The majority of studies suggested the superior contribution of EVH over OVH to the patients' quality of life in short-term follow-up periods. For instance, Krishnamoorthy's study (2017) highlighted that, at 3-month and 12-month follow-ups, EVH was likely to improve the health-related quality of life of the patients undergoing on-pump CABG surgery (6). The result of Christopher Rao's study (2008) showed that EVH could significantly promote a patient's life quality compared to conventional vein harvesting after six weeks of the primary procedure (4). However, in our study, after a 4-year follow-up, no significant difference was observed between the patients under two techniques of OVH and EVH in all domains of quality of life.

In the current study, the duration of follow-up was four years. The follow-up periods are often selected as short-term in the studies that depict the advantage of endoscopic harvesting over the open procedure (4, 6). In this regard, our study was conducted on the patients undergoing the elective off-pump CABG. However, health centers might have difficulty using off-pump CABG. Also, revascularization that is less complete in the off-pump CABG can possibly be linked with the poorer long-term results. Notably, the completeness of revascularization depends on the number of performed grafts (15). In addition, the same number of grafts was performed in both groups in our study. In the current study, the data collection tool was different from other studies. In fact, a long-term follow-up and selection of the patients undergoing the elective off-pump CABG are among the strengths of the present study. We also suggest conducting further investigations with long-term follow-up periods on the quality of life in the patients under the two techniques of OVH and EVH.

### 5.1. Conclusion

The findings of this research show that there is no difference in the quality of life between the two groups (OVH

and EVH) over a four-year follow-up period. Investigating the short-, mid-, and long-term mortality is among the crucial parameters when determining the safety of a certain procedure. Moreover, our study shows no difference between the two groups in terms of mortality during the hospitalization as well as in the 6-week and 4-year follow-up periods.

### 5.2. Limitation

One limitation of the current study was the small number of patients, which makes it recommendable to conduct more studies with larger sample sizes and in multiple centers to obtain a more definite conclusion. Also, the long-time of four years to track the condition of the patients in some cases due to change of address and telephone, etc., has led to the loss of some patients.

### Acknowledgments

The authors express their gratitude to the study participants and Imam Reza Hospital personnel in the Intensive Care Unit, the open-heart surgery, and cardiac surgery wards for their assistance in performing this study.

### Footnotes

**Authors' Contribution:** Study concept and design: A.A.; Acquisition of data: A.A., R.P, and S.J.; Analysis and interpretation of data: Z.A., A.A., and F.S.; Drafting of the manuscript: Z.A., R.P, and S.J.; Statistical analysis: Z.A.; critical revision of the manuscript for important intellectual content: A.A., and F.S.

**Conflict of Interests:** The authors declare no conflict of interest in this study.

**Ethical Approval:** IR.BUMS.REC.1397.1.

**Funding/Support:** This research received no specific grant from funding agencies in the public, commercial, or non-profit sectors.

**Informed Consent:** Written informed consent was obtained from all the patients.

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