

# Endoscopic Saphenous Vein Harvesting and Surgical Site Infections after Coronary Artery Bypass Surgery (CABG)

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## ABSTRACT

**Introduction:** Coronary artery bypass grafting (CABG) surgery remains the most common procedure in adult cardiac surgery for coronary artery disease.

**Objectives:** The main objective of the study is to find the infection in open vs endoscopic saphenous vein harvest for patients undergoing CABG surgery.

**Material and method:** This comparative analysis was conducted at Rawalpindi Institute of Cardiology, Armed Forces Institute of Cardiology, Rawalpindi and Shifa International Hospital, Islamabad from October 2019 to 2021. The data was collected with the permission of the ethical committee of hospital. The data was collected with the permission of the ethical committee of the hospital. Patients undergoing CABG or combined valve/CABG with EVH and OVH were differentiated from each other in the MHCCSR as of the start of the study period. The OVH was performed by either a continuous, longitudinal incision or through multiple smaller incisions.

**Results:** The data were collected from 122 patients, from these 22 patients were not extubated and none of them survived. The most common indication for surgery was myocardial revascularization (30.6%), followed by valve replacement (22.7%) and thoracic aortic aneurysm repair.

Practical implication: EVH is now considered not to be the best method in CABG surgery.

**Conclusion:** It is concluded that, patients undergoing CABG surgery with EVH presented with worse systolic function and more recent myocardial infarction.

**Keywords:** CABG, Procedure, EVH, Systolic, Myocardial infarction, Endoscopic

## INTRODUCTION

Coronary artery bypass grafting (CABG) surgery remains the most common procedure in adult cardiac surgery for coronary artery disease. Among arterial and venous conduits for CABG surgery, saphenous vein grafts (SVG) are the most commonly used conduit due to its superficial access site and decreased risk for bleeding compared to arterial conduits<sup>1</sup>. Traditionally, the SVG is harvested under direct vision (open harvest) with linear incisions along the course of the vein for clear vein visualization, mobilization and branch ligation. However, this approach carries an increased risk of wound complications including infection, hematomas, seromas and longer hospital length of stay<sup>2</sup>.

The technique of endoscopic SVG harvesting was introduced in 1996 as a minimally invasive alternative to traditional open SVG harvesting. Multiple small randomized trials subsequently reported advantages of endoscopic SVG harvest as compared to open SVG harvest<sup>3</sup>. In their 2017 consensus statement, the International Society for Minimally Invasive Cardiothoracic Surgery, reaffirmed that endoscopic saphenous vein harvesting is safe and associated with neither decreased graft patency nor an increase in adverse events<sup>4</sup>. Furthermore, the consensus statement endorsed use of either endoscopic or open SVG harvest technique based on major adverse cardiac events and angiographic patency at 6 months (class IIa, level A). On the basis of these demonstrated advantages, endoscopic SVG harvest has now become the predominant mode of graft harvesting at many surgical centres<sup>5</sup>.

The great saphenous vein (GSV) remains one of the most commonly used conduits due to its ease of harvesting, availability, and versatility. Traditional harvesting of the GSV involves the open-vein technique, which requires an extended leg incision. This technique is associated with a significant morbidity rate, and wound complications occur in 2–24 % of cases<sup>6</sup>.

Minimally invasive techniques such as endoscopic vein harvesting (EVH) have therefore been developed to reduce post-coronary artery bypass grafting (CABG) leg wound complications. Currently, EVH is the method of choice in many centres as it allows lower post-surgical complication rates compared to the open method. Although long-term graft patency following EVH has

been questioned, cohort studies have reported that the technique is safe and effective<sup>7</sup>.

Despite improvements in medical care and the increased emphasis on quality improvement programs to reduce postoperative infections, nearly 5% of patients experience major infection after cardiac surgery<sup>8</sup>. In recently published findings from a prospective, multi-institutional cohort study of infections associated with cardiac surgery, researchers observed substantial increases in morbidity, mortality, and costs associated with these events. However, secondary surgical-site infections (SSIs) in patients who undergo coronary artery bypass grafting (CABG) with saphenous vein graft (SVG) harvesting were one infection of interest not analyzed in this initial report<sup>9–11</sup>.

**Objectives:** The main objective of the study is to find the infection in open vs endoscopic saphenous vein harvest for patients undergoing CABG surgery.

## MATERIAL AND METHOD

This comparative analysis was conducted at Rawalpindi Institute of Cardiology, Armed Forces Institute of Cardiology, Rawalpindi and Shifa International Hospital, Islamabad from October 2019 to 2021. The data was collected with the permission of the ethical committee of the hospital.

### Inclusion criteria

- Both male and female patients
- Age > 18 years
- Patients who have undergone CABG surgery

### Exclusion criteria

- Patients with previous CABG surgery
- Those who do not want to participate in the study

**Data collection:** The data was collected with the permission of the ethical committee of the hospital. Data was collected from 122 patients undergoing CABG or combined valve/CABG with EVH and OVH were differentiated from each other in the MHCCSR as of the start of the study period. The OVH was performed by either a continuous, longitudinal incision, or through multiple smaller incisions. Several baseline demographic and clinical variables were considered: age, sex, body mass index greater than 35, hypertension, diabetes mellitus, dyslipidemia, smoking history, cerebrovascular disease, peripheral vascular disease, renal

insufficiency, chronic obstructive pulmonary disease, ejection fraction less than 50% and recent myocardial infarction. The short-term outcomes of interest included leg, in-hospital mortality, and a composite outcome consisting of in-hospital mortality, perioperative myocardial infarction, reoperation before discharge from hospital, permanent or disabling stroke, deep sternal wound infection, and sepsis.

**Statistical analysis:** The data was collected and analyzed using SPSS version 20. Patients who underwent CABG or combined valve/ CABG surgery with EVH were compared with patients undergoing OVH using t-tests.

## RESULTS

The data was collected from 122 patients, from these 22 patients were not extubated and none of them survived. The most common indication for surgery was myocardial revascularization (30.6%), followed by valve replacement (22.7%) and thoracic aortic aneurysm repair.

Table 01: Clinical outcomes of patients submitted to cardiac surgery

Variables	Total
Postoperative complications	
Pneumonia/VAP (N = 72)	62.6
Kidney dysfunction (N = 50)	42.4
AMI (N = 4)	3.5
Endotracheal reintubation in $\leq$ 48 hours (N = 28)	29.4
Use of NIV in the postoperative period (N = 94)	74.5
Absent ( $\text{PaO}_2/\text{FiO}_2 > 300$ ) (N = 11)	11.5
Mild ( $\text{PaO}_2/\text{FiO}_2: 200 - 300$ ) (N = 28)	29.2
Length of hospital stay (days) N = 119	$22.7 \pm 19.1$
Clamp time	$66.71 \pm 1.98$ min

Patients undergoing CABG or combined valve/CABG with EVH had similar rates of in-hospital mortality. The rate of postoperative leg wound infections was significantly lower in the EVH group.

Table 02: Risk-Adjusted Effect of Endoscopic Saphenous Vein Harvest on Outcomes

Variable	Hazard Ratio	P-value
Mortality	0.93	0.001
Cardiac catheterization	0.82	0.001
Angina	0.99	0.000
Heart Failure	0.86	0.001
Myocardial infarction	0.81	<0.001

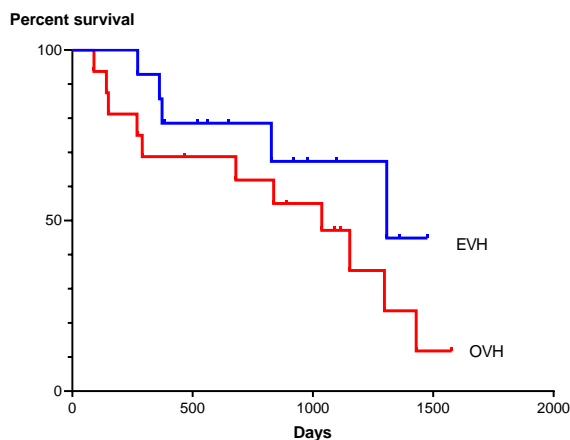


Fig: Adjusted curves demonstrating improved freedom from unstable angina in patients undergoing surgery with EVH

## DISCUSSION

Since its introduction in 1996 many expectations accompanied endoscopic vein harvesting (EVH) such as decreased leg wound morbidity, improved cosmetic results, and enhanced patient

satisfaction<sup>12</sup>. EVH gained so much success as to represent the standard of care in USA where is now applied in about 80% all of CABG procedures. Despite the evidence of a beneficial impact of EVH on wound complications including leg wound infections, on the other hand, the long-term durability of the conduits harvested by this technique, is still debated<sup>13</sup>.

In a secondary analysis from the PREVENT IV trial following on 3,000 CABG patients subjected to vein harvesting by EVH versus open technique, a significant rate of vein-graft failure and occlusion were observed. Furthermore, EVH had a higher rate of death, myocardial infarction, or need for further revascularization up to 3 years<sup>14-16</sup>.

Likewise, a sub-analysis of 1,471 patients, who underwent CABG with the use of SVG, comparing EVH and open techniques from the ROOBY trial, showed no significant differences between groups in terms of death or major perioperative complications including reoperation, new mechanical support, cardiac arrest, coma, stroke, or renal failure requiring dialysis<sup>17</sup>. Interestingly enough however, in the subgroup of 894 patients with 1-year angiographic follow-up, SVG patency for EVH versus open technique was 74.5% and 85.2%, respectively<sup>18</sup>.

In opposition to the two above mentioned trials indeed not designed for EVH evaluation, a subsequent observational study by Williams *et al.* of 235,394 Medicare patients undergoing isolated CABG between 2003 and 2008 at 934 surgical US centers, showed no difference between EVH versus open technique in survival and the composite of death, myocardial infarction, or revascularization through 3 years, although a reduced rate of wound infections was registered. The vein graft damage hypothesis suspected for reduced patency or patient survival was therefore not supported<sup>19-20</sup>.

## CONCLUSION

It is concluded that patients undergoing CABG surgery with EVH presented with worse systolic function and more recent myocardial infarction. Lastly, to decrease infectious complications after CABG, proper selection of procedures could make a difference.

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