International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

A Comparative Study of Pain and Paresthesia in Open Vein Harvesting vs Endoscopic Vein Harvesting for Coronary Artery Bypass Grafting Surgery

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Received: 01-05-2026
Accepted: 24-05-2026
Available online: 11-06-2026

ABSTRACT

Background: CABG is a frequently performed surgical procedure in which the long saphenous vein is one of the most commonly used conduits. Traditionally, open vein harvesting (OVH) was performed, but recently endoscopic vein harvesting (EVH) has become popular. This study aimed to compare both the methods in terms of pain and paresthesia.
Methods: A prospective comparative study comprising of a total of 60 patients (EVH=30, OVH=30) undergoing CABG was performed between December 2022 and December 2023 in our institution. The patients in each group were assessed for pain and asked to grade the severity along with the incidence of paresthesia.
Results: EVH resulted in less pain with an average pain scale rating of 2.17 ± 1.28 when compared to the OVH group in which it was 3.67 ± 1.86. The incidence of paresthesia was also less in the EVH group (70%) in comparison to the OVH group (73.3%).
Conclusion: The study demonstrates that EVH had less pain and paresthesia compared to OVH, which supports prior research comparing both methods.

Keywords*: Endoscopic vein harvesting, open vein harvesting, coronary artery bypass grafting, great saphenous vein.*

INTRODUCTION

Coronary artery disease is one of the most common diseases, which is a major cause of morbidity and mortality [1]. Presently, there is no common consensus regarding the type of graft used for coronary artery bypass grafting (CABG) and the ideal harvesting technique. The great saphenous vein (GSV) is one of the most commonly used conduits due to its ease of harvest and availability [2].

Open harvesting of the GSV is the traditional method, which requires a long leg incision. The open vein harvesting (OVH) technique is associated with more wound complications, which occur in 2–24 % of cases [3,4].

Endoscopic vein harvesting (EVH) is a newer technique, which has become popular. It utilizes smaller incisions, and the GSV is harvested with the help of an endoscope and specialized instruments. This technique has become widespread due to the reduction in pain and risk of infection associated with the procedure [5]. Currently, an ample number of studies have demonstrated decreased leg wound complications, better cosmetic results, and increased patient satisfaction [6,7,8]. The aim of our study is to evaluate the patients with both techniques and demonstrate any difference in pain and paresthesia between the techniques.

METHODS

Study Design and Setting

This was a prospective single center comparative study conducted at the Vydehi Institute of Medical Sciences and Research Center in Bangalore, India between December 2022 and December 2023. The study was performed in accordance with the Declaration of Helsinki and approved by the Institutional Ethics Committee. All patients provided informed consent for surgical intervention and follow-up data collection.

Study Population

A total of 60 patients undergoing CABG with long saphenous vein harvesting were included in the study. They were divided into two parallel groups as EVH (n=30) and OVH (n=30) after obtaining informed consent. The parallel groups of patients were assessed for pain and paresthesia.

Inclusion criteria

Patients who underwent open chest CABG with at least one saphenous vein graft

Exclusion criteria

Patients who had prior neuropathy, varicose veins, peripheral vascular disease, pre-existing paresthesia, and emergency cases

Surgical Techniques

Endoscopic Vein Harvesting (EVH) Technique

For all the patients in the EVH group, vein harvesting was performed using an FDA approved endoscopic vessel harvesting system. The vein was harvested from the thigh by a 2-3 cm incision on the medial aspect above the knee and from the leg by a 2-3 cm incision above the medial malleolus on the medial border of the tibia. After identification of the long saphenous vein (LSV), the balloon tip trocar was introduced into the incision, and CO2 insufflation was started. Dissection was commenced by using the conical dissecting tip of the harvesting system under endoscopic visualization, and the long saphenous vein and its tributaries were isolated. Any tributaries of the vein were divided with electrocautery or with scissors. A 2-3 cm incision is made near the upper medial aspect of thigh, and the proximal end of the LSV was ligated and divided. The LSV was removed, and all the branches were ligated with 3-0 silk or clipped. If any repairs were required, they were done using 8-0 polypropylene sutures. The clots were evacuated from the surgical wound, and the incisions were closed in layers using vicryl 2-0 for the deep layer and vicryl 3-0 by subcuticular method for the skin. This was followed by application of pressure bandages for at least 24 hours, which were later replaced by graduated compression stockings.

Open Vein Harvesting (OVH) Technique

The LSV was harvested from the leg by making a longitudinal incision starting above the medial malleolus near the medial border of tibia, and likewise in the thigh by making a longitudinal incision on medial aspect above the knee. The vein was dissected using Metzenbaum scissors with the incision being continued along the course of the vein. Tributaries of the vein were ligated with 3-0 silk sutures or clipped using titanium clips. The incisions were closed in layers using vicryl 2-0 for the deep layer and vicryl 3-0 by subcuticular method for the skin. Pressure bandages were applied for at least 24 hours after which they were replaced with graduated compression stockings.

Follow Up

The patients were followed up after 2 months of complete healing of the long saphenous vein harvest site by hospital visits and telephonic consultation. The patients were asked to grade pain according to Likert pain rating scale, which ranges from 0 (no pain) to 10 (severe pain) [9] and whether there was the presence or absence of paresthesia.

STATISTICS

The data was entered and analyzed using IBM SPSS Statistics version 27 (IBM Corp., Armonk, NY, USA). Prior to the analysis, the dataset was screened for completeness, outliers, and consistency. The data were analyzed using Fisher's Exact test. P-values <0.05 were statistically significant.

RESULTS

There was no significant difference in the preoperative demographic data between the EVH and OVH groups, which is summarized in Table 1. The average age of the patients in the OVH group was 56.7 ± 7.69 years and EVH group was 57.27 ± 10.13 years. In the OVH group, out of 30 patients, 27 were males and 3 were females (Figure 1). In the EVH group, out of 30 patients, 29 were males and 1 was a female (Figure 1). None of the EVH patients needed conversion to OVH. No re-exploration of wounds was required due to hemorrhage or hematoma formation. There was no incidence of lymphatic leak in any patient in either of the groups. None of the patients were lost during follow up.

Table 1: Basic Demographic Data

Group	EVH	OVH
Mean Age (years)	57.27	56.7
Male	96.7%	90%
Female	3.3%	10%

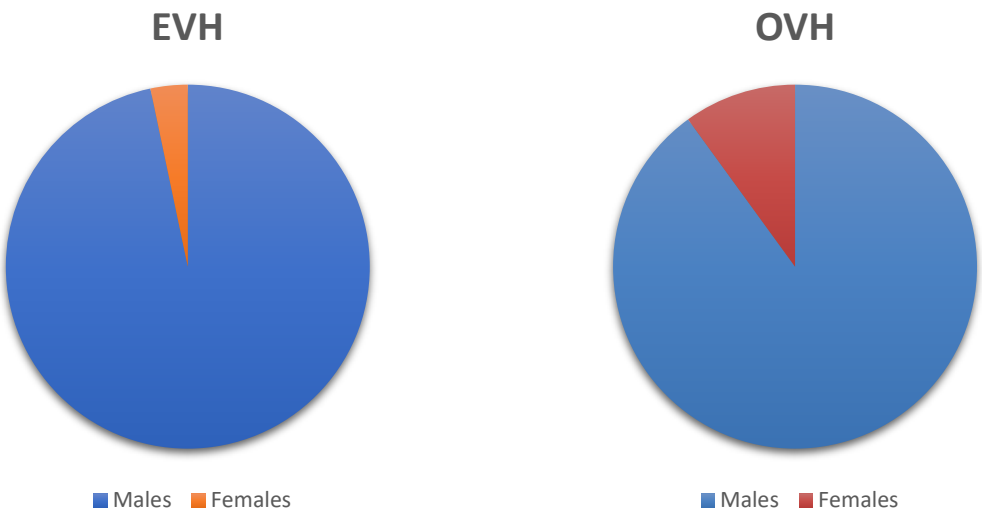

Figure 1: Male and Female Demographics in EVH and OVH Groups

Postoperative Pain

In our study, immediate postoperative pain was not factored as the patients were receiving analgesics as per their requirement and was not included in our study.

The patients were asked to grade pain according to Likert pain rating scale, which ranges from 0 (no pain) to 10 (severe pain) after 2 months by hospital visits and telephonic follow up. The difference in pain between the OVH and EVH groups after 2 months was found to be statistically significant, which is demonstrated by the p-value of 0.041 (p-value <0.05 is significant). The average pain scale rating out of 10 in the EVH group was 2.17 ± 1.28 and in the OVH group was 3.67 ± 1.86 (Figure 2).

Paresthesia

Any patients with tingling, burning, pricking sensation, itching, or numbness were considered to have paresthesia. Immediate post operative paresthesia was not factored as it would be less evident due to immediate post operative pain and also because transient paresthesia is common after surgery.

The EVH group (21 patients; 70%) had a reduced incidence of paresthesia compared to the OVH group (22 patients; 73.3%), which is shown in Figure 2. This was found to be statistically significant as the p-value was 0.019 (p-value <0.05 is significant).

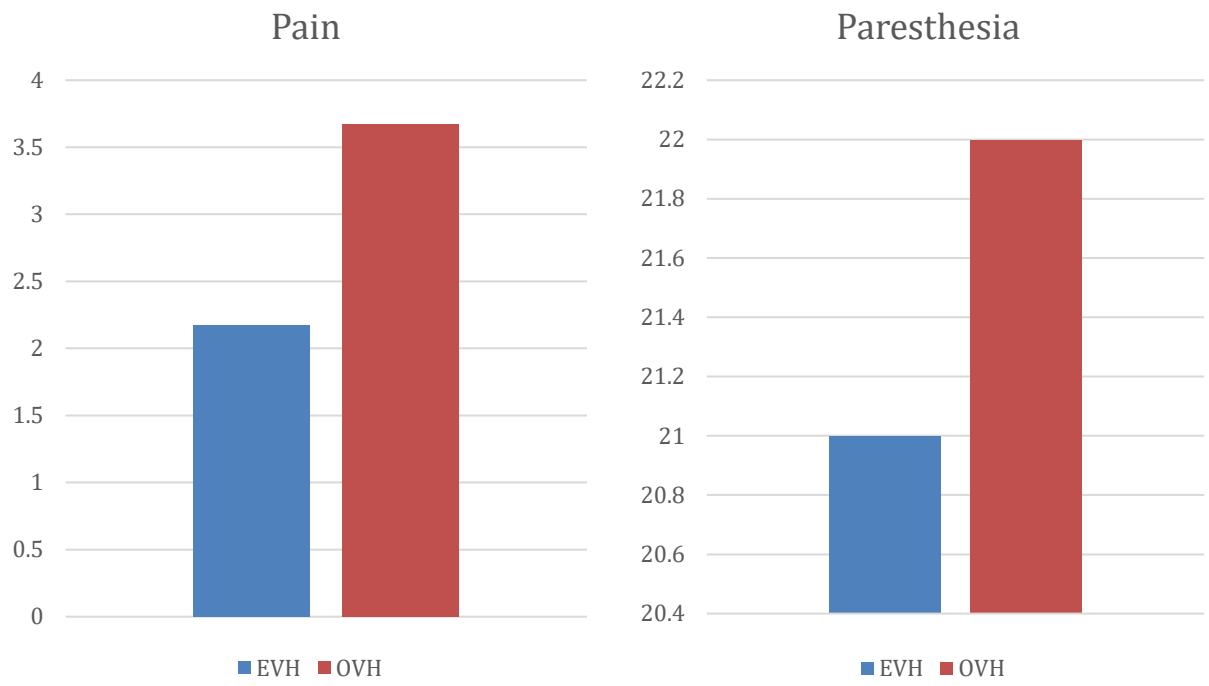

Figure 2: Pain and Paresthesia in EVH and OVH

DISCUSSION

Coronary artery bypass grafting is one of the most commonly performed procedures in cardiac surgery, and the LSV is one of the most frequently used conduits [2]. Traditional open vein harvesting is frequently associated with saphenous neuropathy and wound infections, which may result in prolonged hospital stay and poor cosmetic outcome [10]. Complications related to open vein harvesting are the primary reason for developing minimally invasive methods to harvest the GSV [11].

The use of the EVH techniques improves wound healing and the cosmetic outcome, which is mainly due to the length of the incisions. There is also an increased incidence of serous exudates in OVH when compared with EVH. Therefore, the overall patient satisfaction is higher with EVH [12].

Previous studies have demonstrated that pain was significantly lower in EVH when compared with OVH [13,14]. In our study, the mean pain score in the EVH group was lower than the OVH group (2.17 ± 1.28 vs. 3.67 ± 1.86), which is in concordance with preceding studies. The statistical relevance is demonstrated by the p-value of 0.041 (p-value <0.05). Reduction in pain not only improves patient satisfaction, but also results in improved mobilization postoperatively potentially reducing the ICU and hospital stay [12].

The risk of paresthesia in lower limbs was higher in OVH by 4.7 times than EVH group. The frequency of complications in OVH when compared with EVH was reportedly due to frequent early lymphatic drainage. According to the results of previous studies, lymphatic drainage was observed in approximately 10–12 % of patients [15,16]. In the present study, the occurrence of paresthesia was higher in the OVH group (73.3%) compared to the EVH group (70%), which is consistent with prior research. However, lymphorrhea was not observed in any patients in this study perhaps due to avoidance of dissection upto the groin. The findings demonstrated that the method of vein harvesting utilized has an impact on the post-surgical wound complications [17, 18, 19].

The limitation of this study is that it is of a small sample size, thereby lacking statistical power. A total of 60 patients were assessed (OVH = 30, EVH = 30), and it is a single center study with a follow up of short duration. Although, patients with prior neuropathy were excluded from the study, we did not consider other potential comorbid factors in our study, which may have affected the incidence of pain and paresthesia in the patients. The long-term patency of grafts, which is a very important end point of the procedure was also not evaluated. These are all limitations of our study that require additional assessment.

CONCLUSION

In conclusion, multiple published studies have compared EVH with OVH and have demonstrated that EVH had fewer wound complications, better quality of life, shorter hospital stay, and less postoperative pain leading to higher patient

satisfaction. Similarly, our study was able to replicate the advantages of EVH over OVH. However, due to the limited study design, it may require further evaluation in the future.

Declarations:
Funding: All authors have declared that no financial support was received from any organization for the submitted work.

Conflicts of Interest/competing interests: The authors declare that they have no conflict of interest or competing interests.

Ethical approval: Compliance with ethical standards is followed by the journal article.

Consent to participate: Obtained as per the institutional ethics committee guidance.

Consent for publication: Informed consent (general consent) was collected and signed before the submission of this document. According to local regulations, no further signed document was required for the submission of this work.

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