Endoscopic Vein Harvesting in CABG Surgery

an Initial Iranian Experience

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Abstract

Background:

The minimally invasive endoscopic dissection of vessel conduits is steadily gaining acceptance as a preferable alternative to the standard open-incision technique. . As experience and refinements in instrumentation progress, the endoscopic approach will undoubtedly become the procedure of choice for harvesting vessel conduits. This article provides a practical primer, based on our serial experience with endoscopic vein dissections, for those considering the minimally invasive endoscopic approach inharvesting vessels for CABG.

Methods: Video-assisted endoscopic technique for vein harvest was introduced in our medical center in" august 2007". The procedure was evaluated and compared with the standard open vein harvest procedure with regard to primary short - term outcomes:1) leg wound complications (identified as dehiscence, drainage for greater than 2 weeks postoperatively, cellulitis, hematoma, and seroma/lymphocele and neurologic complications). 2) Short-term event free survival(focused on any cardiac events ,30 days after CABG) between **August 2007 and May2008 .**

We prospectively randomized 150 patients scheduled for elective CABG to vein harvesting via EVH and OVH. We used ClearGlide vessel harvesting system, Datascope corp, to harvest the greater saphenous vein .The groups were similar with regard to age, risks for wound complications (diabetes,sex,obesity,peripheral vascular disease), bypass time, the length of vein harvested (EVH:40±15cm vs.OVH:45±15cm) p=0.65,and total number of grafts(168 vs 175)p =0.4

Results:

We randomized 150 patients schaduled for elective CABG to vein harvesting via EVH(n=75) or OVH(n=75).

Average operation time was177 min in OVH group.In EVH group operation time increased approximately 45 min ±20 for the first 50 cases,but later,it didn't realy influence the time.. In EVH group 5 patients were converted to OVH due to anatomical or device issues.The prevalence of leg complications was 4% vs 18.6% for EVH and OVH groups respectively (p=0.007) ,and for local infection 0% vs 12% p <0.0001.

Short term event-free survival(1mo follow up) is 94.7% vs 93.4% p=0.85.

Conclusion:

Consistent with earlier findings ,wound complications and outpatient office visits to manage each complication ,was significantly reduced following EVH compared with OVH.The use of small access incisions and well-designed endoscopic instrumentation to harvest the saphenous vein would be expected to provide cosmetically superior outcomes compared with a single long ,open incision .This study also suggested that coduit quality ,may not differ as a result of the EVH technique.

Key words:

CABG, EVH :endoscopic vessel harvesting,OVH: open vessel harvesting

Introduction:

For the greater part of four decades, the saphenous vein has been used as

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the preferred conduit after the internal mammary artery, for coronary artery revascularization. The vein has been traditionally harvested by an "open" technique, which involves exposing the vein through a longitudinal incision extending from the ankle to the groin, often involving both lower extremities.The frequently encountered wound-related morbidity ranging from 1.5% to 24%, associated with the open technique, has consistently been recognized as a major obstacle in the patient's path towards recovery.[1,2] These morbidities vary from superficial infections such as cellulites to the more extensive complications of purulent discharge, eschar formation, or complete dehiscence. Despite meticulous surgical attention, the incidence of wound complications as well as the increased pain is still a cause of great concern for both the patient and physician.

By the mid-1990s, laparoscopic systems, which were initially developed for general surgical procedures, began to be applied to the harvesting of saphenous veins with encouraging results.In 1997, Allen and Shaar first described endoscopic saphenousvein harvesting (ESVH) in 30 patients.[3] The instrumentation consisted of a 5-mm endoscope with a 30-degree angled lens, endoscopic vessel dissector, modified vein stripper, and standard endoscopic equipment including a television monitor, light source, fiberoptic camera, and CO2 insufflator.

The endoscopic approach afforded operative field magnification and side-branch visualization, permitting the complete operative dissection through small access incisions. It was anticipated that the endoscopic protocol for vein harvesting would yield considerable advantages, of which limiting the length of the incision was the primary goal. Endoscopic vein harvesting (EVH) was developed to improve patient satisfaction and minimize the complications and corresponding costs associated with traditional OVH.[4,5,6,7]

Preliminary observations of patients who had undergone endoscopic vein harvesting (EVH) suggested that these patients were generally able to ambulate earlier without the same level of discomfort characteristically experienced by those patients that had undergone the "open" vein harvest technique. Earlier ambulation translated into a shortened length of postoperative hospital stay and the number of outpatient office visits began to reduce significantly.

Along with the introduction of ESVH came concerns about its potential for vein trauma and resulting intimal disruption, ischemic stricture, and reduced graft patency. In response, histologic, light, and electron microscopy examinations were performed comparing vein segments obtained endoscopically to vein segments obtained by open saphenectomy. The results demonstrated no significant disruption of the vein intima with enscopic harvest compared to open saphenous vein harvesting.[8,9] These conclusions played a key role to the ongoing development and adoption of ESVH since determination of vein intimal trauma would likely have resulted in abandonment of the technique.

In addition to reduced morbidity and a better cosmetic results , EVH appears to result in lower treatment cost per patient and less resource utilization.[10]

Materials and Methods:

From August 2007 to May 2008,150 patients underwent CABG ,formed in a prospective randomized study on the use of EVH ,in our institute. In group A(n=75) the vein was harvested endoscopically with the ClearGlide Datascope system.In group B(n=75) the vein was harvested in aconventional open technique to compare short term results of both techniques on wound complications and cardiac events.Recordings were made on dissected vein length,harvesting time,complications,and cardiac events in 30 days post-operation.Demographic and preoperative correlations for impaired wound healing are comperative for both groups andare summarized in Table-1.Patients were assessed for postoperative morbidity through 30 days after surgery.

Table 1. *Demographics and preoperative correlates for impaired wound healing*

	Group A(n=75)	Group B(n=75)	p-value
Mean age, years (range)	62.1 (43–77)	62.9 (45–85)	0.31
M/F	59/16	57/18	0.41
BMI>30 number(%)	10 (13.3%)	9(12%)	0.54
Peripheral vascular disease	7(9.3%)	4 (5.3%)	1.0
Diabetes	15(20%)	14(18.6%)	0.36

M:male ,F:female , BMI:body mass index

Procedure:

We used Datascope ClearGlide endoscopic vessel harvesting system working with open CO2 circulation. The saphenous vein is identified by a small incision above or sometimes below knee(according to required pieces of veins).then aunique conus tip blunt dissector (optical vein dissector) which is coupled with a5-mm, 30 degree lense and a camera, is introduced to the top of the vein, and an operative tunnel is created around the saphenous vein .(Fig1,2)


Fig1

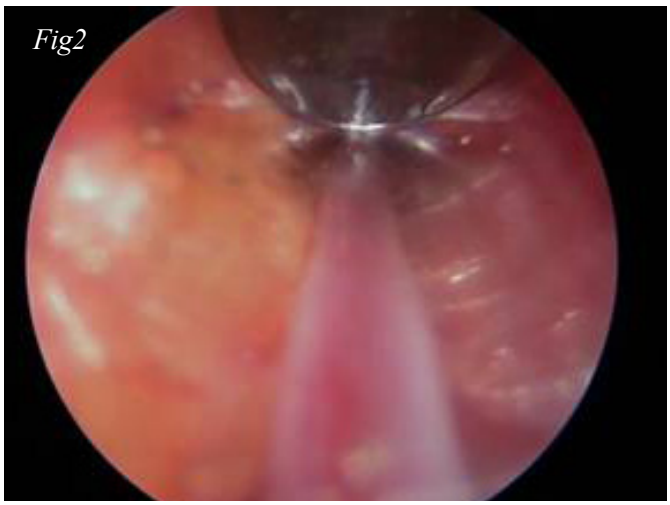
Fig2

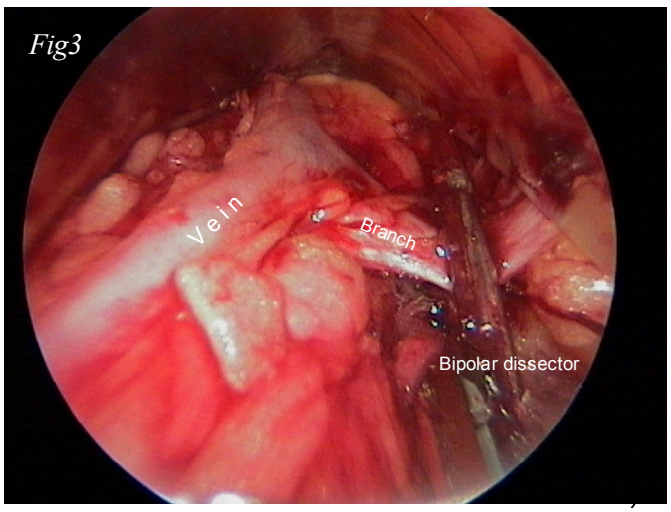

Fig3

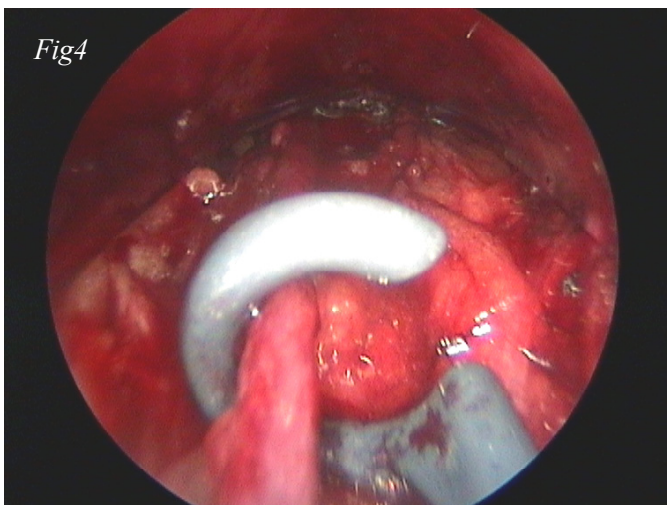
Fig4

All venous side branches are dissected from knee to groin and then distally toward the medial malleolus. By use of small ultra retractor and precision bipolar, all side branches are cauterized and the vein is dissected from surrounding tissues,(Fig3)

The vein is then completely freed by a vessel dissector (Fig4). Distal and proximal ends usually are ligated using an endoloop suture or through a counter incision made over the vein allowing ligation under direct visualization.There are occasions when difficulty is encountered navigating the instrument in a branched saphenous vein or in fatty or bloody fields, where , access through a second incision may be necessary.This approach saves operation time and avoids vein injury.Sometimes we need additional incisions to harvest a longer vein.Side branches are ligated by 3-0 tie sutures or clips after removing the vein from leg.

Statistical Analysis:

Data are reported as a percentage or as a mean ± SD. Univariate comparisons were computed using the $\chi 2$ test or Fisher exact test for categorical variables and t tests for continuous variables. Statistical analysis was performed using StatGraph statistical software. Variables were considered significant at P values less than 0.05.

Results:

In EVH group 5 patients were converted to OVH due to anatomical or device issues or additional vein grafts.

Average operation time was177 minutes in OVH group. In EVH group operation time increased approximately 45 min ±20 for the first 50 cases,but later,it didn't realy influence the time.. Operative data are summarised in Table (2). For EVH there is a preference for using the left leg due to the set

up of scrub nurse and tables, except in case of poor vein quality on that side.Our preferred incision is over tibial tuberosity when we need 3 pieces of vein and above knee ,when we need just 2 pieces. Mean number of venous grafts per patient was 2.6 (range 1–4) in goup A and 3(range 1–4) in group B.

Table 2. *Operative data*

	Group A (n=75)	Group B (n=75)	p-value
Mean harvested vein graft length, cm	40±15cm	45±15cm	0.27
Mean time for harvesting and closing (min)	71.2 (range 25–120)	48.9 (range 20–90)	0.02

Wound complications in the 30 days post operative period, identified as dehiscence, drainage for greater than 2 weeks postoperatively, cellulitis, hematoma, and seroma/ lymphocele and neurologic complications such as pain and paresthesia needed some forms of intervention .The results are summarized in Table 3.

Table 3. *Postoperative wound problems*

	Group A(n=75)	**Group B(n=75)**	**p-value**
Wound problems	3 (4%)	14 (18.6%)	0.007
Hematoma	3	3	
cellulitis	0	3	
major infection	0	2	
Necrotic wound	1	1	
Serous fluid drainage	0	2	
Edema	0	1	
Neurologic complications	0	2	
Readmission for wound complications	0	0	

Short term event- free survival in both group were compared . Postoperative cardiac events (MI, cardiac arrhythmia) were recorded up to 30 days post surgery. Table 4 includes the results.

Table .4 *postoperative cardiac results*

	Group A (n=75)	Group B(n=75)	p-value
Acute MI	0	0	
AF rhythm	4	4	
Multiple PVCs	0	1	
Short term event-free survival (1mofollow up)	94.7%	93.4%.	P=0.85

Discussion:

Success of a new technique depends on its safety and effectiveness, and it must not significantly alter or delay an operation.

To prove effectiveness and absence of alteration of surgery, we related the vein length harvested to harvest time. Mean harvesting time was 56.1 minutes for EVH (group A), and 48.9 minutes for group B. This enables the surgeon to perform sternotomy, internal thoracic artery take down and cannulation.Due to the smaller incision, most of the time gained is in closing the wound. consistent with other studies we estimate the learning curve to be approximately 15 to 20 procedures[11].

The ideal patients were identified as old male patients with good fatty tissue consistency. Dissection of superficial veins in thin legs is somewhat more problematic, due to the dense fibrous tissue surrounding the vein. Also harvesting the vein is more chalenging in obese women.

Our data demonstrate that endoscopic vein harvest results in

fewer cases of impaired wound healing (fig5) and reduced postoperative pain, and it does not prolong the operative time significantly nor compromises the vein quality. Furthermore, it is quicker to perform if two grafts are needed,. In later patient groups the incidence of hematoma is lowered by experience, , wound drainage by closed suction drain in case of bleeding, and applying an elastic bandage.the study suggests ,however that in EVH group,the complicated wounds are easier to handle and it reduces late interventions.[12]

This study also suggested that coduit quality ,may not diminish as a result of the EVH technique,also found in other studies.[11,12,14,15]

Also it demonstrates the feasibility,safety, and effectiveness of EVH with the ClearGlide vessel harvesting system , Datascope corp, Only the higher costs for disposable material equipments ,special training programs for harvesters may preclude its use as a standard procedure in some cardiac centres.[10,13]

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