

Should We Use Video-Assisted Endoscopic Vein Harvesting as a Standard Technique?

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ABSTRACT

Background: To investigate the feasibility and results of endoscopic vein harvesting (EVH) using the Vasoview Uniport® system (Guidant Corporation, Menlo Park, CA). Can this technique be used as a standard technique for vein harvesting in coronary artery bypass surgery (CABG) or is it too time consuming? Do smaller incisions result in less morbidity and discomfort?

Methods: From October 1998 to May 1999, 158 patients who underwent CABG with venous grafts, in addition to arterial grafts, formed the study population for EVH. In group A (n=131) the vein was harvested with the Vasoview Uniport System. In group B (n=27) the vein was harvested by a conventional open technique with interrupted incisions because of unavailability of the equipment. Recordings were made on vein length, harvest time, length of incision, and complications.

Results: In none of the patients in group A was a conversion to the open technique necessary. In 72/131, pure EVH was used. In 59/131 an additional incision below the knee was used for harvesting extra vein length.

Mean harvested vein graft length (cm) was 35.9 (range 18-56) in group A and 30.6 (range 16-51) in group B, and mm of vein harvested/min was 77 and 71 in group A and B. Mean time for harvesting and closing (min) was 56.1 (range 14-120) SD 20.4 and 78.3 (range 37-129) SD 26 for a mean length of incision (cm) of six (range 2-19) and 27 (range 12-54). Wound complications at postoperative day three at discharge, and after six weeks were seen in 30 (23%), 27 (20%) and four (4%) patients of group A, and in five (18%), five (18%) and four (23%) of group B.

Conclusions: Despite a learning curve in using endoscopic techniques, the total procedural time for EHV is acceptable and even shorter than open harvesting. Most of the time is gained in closure of the wound. Hematoma for-

mation is the most common perioperative complication, but diminishes with experience. The absence of postoperative edema after EVH is striking. Despite the higher costs for disposable material, we have adopted EVH as a standard technique since patient and surgeon satisfaction have improved substantially.

INTRODUCTION

Despite a growing application of arterial grafts, the autologous saphenous vein is still widely used in coronary revascularisation. Vein harvesting often is an underappreciated component of coronary artery bypass grafting (CABG), although associated with its own complications, and postoperative morbidity due to a long continuous incision through the skin. The incidence of wound healing impairment ranges from 18 to 44% [Utlely 1989, Wipke-Tevis 1996, Wong 1997]. In an attempt to reduce this morbidity, products are developed to perform this procedure via minimal access techniques. We evaluated endoscopic vein harvesting (EVH) with the Vasoview Uniport® system (Guidant, Menlo Park, CA). Can this technique be used as a standard technique in CABG or is it too time consuming? Do smaller incisions result in less morbidity and discomfort?

MATERIALS AND METHODS

From October 1998 to May 1999, 158 patients who underwent CABG with venous grafts, in addition to arterial grafts, formed the population for a prospective non-randomised study on the use of EVH. In group A (N=131) the vein was harvested with the Vasoview Uniport System. In group B (N=27) the vein was harvested in a conventional open technique with interrupted incisions, because of unavailability of the system or experienced surgeon for EVH. Recordings were made on dissected vein length, harvest time, length of incision, and complications. Demographics and preoperative correlates for impaired wound healing are comparable for both groups and are summarised in Table 1 (⊙). Patients were assessed for postoperative morbidity at the third postoperative day, at discharge and six weeks postdischarge.

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Table 1. Demographics and preoperative correlates for impaired wound healing

	Group A N=131	Group B N=27
Mean age, years (range)	65.7 (46–86)	66.2 (40–79)
M/F	100/31	23/4
BMI > 30, number (percentage)	21 (16%)	4 (15%)
Peripheral vascular disease	7 (5.3%)	2 (7%)
Diabetes	18 (13.7%)	4 (14%)

The technical details of EVH with the first generation Vasoview saphenous vein harvest system have been described elsewhere [Crouch 1998]. The saphenous vein is identified by a small incision above the knee. A unique conal tip blunt dissector which is coupled with a 0° scope and two or three chip camera is introduced via a 12 mm blunt tip trocar with a balloon for securely sealing of the incision for CO₂ insufflation. Via gentle dissection with the blunt tip, an operative tunnel is created around the saphenous vein and all venous side branches are dissected from the knee to the groin. The conal tip is then removed from the dissection cannula and replaced by bipolar scissors. With the aid of a vein cradle, incorporated in the dissection cannula, the saphenous vein is retracted to achieve a desired exposure of the side branches for ligation. A small incision in the groin is made for ligation of the saphenous vein. The vein can be exteriorised via the incision at the knee. Additional small incisions can be made at difficult or big side branches. This approach saves operative time and avoids vein injury. The procedure can be repeated below the knee with the Vasoview Uniport System, or an additional incision below the knee is made to harvest more vein. Side branches are ligated by clips after the vein is removed from the leg.

RESULTS

In none of the patients in group A, conversion to the open technique was needed. In 72/131 pure EVH was

Table 2. Operative data

	Group A N=131	Group B N=27
Mean harvested vein graft length, cm (range)	35.9 (18–56)	30.6 (16–51)
Mean prelevation time, min (range)	46.3 (9–105)	42.8 (20–80)
Mm of vein harvested/min	77	71
Mean time for harvesting and closing (min)	56.1 (range 14–120)	78.3 (range 37–129)
Mm of vein harvested + closing/min	64	39
Mean length of incision (cm)	6 (range 2–19)	27 (range 12–54)

Table 3. Postoperative wound problems

	Group A N=131	Group B N=27
Wound problems at discharge	27 (20%)	5 (18%)
Hematoma	14	2
Bruising	11	0
Erythema	2	0
Necrotic wound	0	1
Serous fluid drainage	0	1
Edema	0	1
Wound problems after 6 weeks	4/95 (4%)	4/17 (23.5%)
Lymphangitis	1	0
Hematoma	1	0
Induration	1	0
Dehiscence	1	0
Edema	0	3
Paresthesia	0	1

used. In 59/131 an additional incision below the knee was used for harvesting some extra length of vein.

Operative data are summarised in Table 2 (⊙). For EVH there is a preference for using the right leg due to the set up of scrub nurse and tables, except in case of poor vein quality on that side. Mean number of venous grafts and mean number of total grafts was 2.6 (range 1–5) and 4.2 (range 2–7) in group A and 1.8 (range 0–4) and 3.5 (range 2–6) in group B. Perioperative problems in group A were: torn-off side branch (n=2) and bleeding (n=4).

Wound complications at postoperative day three at discharge, and after six weeks were seen in 30 (23%), 27 (20%) and four (4%) patients of group A, and in five (18%), five (18%) and four (23%) of group B, and are summarised in Table 3 (⊙). Number of patients lost to follow up were 36 in group A (27%) and 10 in group B (37%). Postoperative length of stay was 12 (range 5–48) "6.6 and 10.6 (range 7–19) "3.6 days for group A and B.

DISCUSSION

Success of a new technique depends on its safety and effectiveness, and it must not significantly alter or delay an operation. In a study on endothelial integrity, Cable pointed out that endothelial release of vasoactive substances after EVH is similar to that after the traditional, extended incision technique and microscopy confirmed similar histology [Cable 1998]. An additional safety aspect is the unique feature of CO₂ insufflation with the Vasoview Uniport System, which creates a plane of dissection around the saphenous vein in addition to the blunt dissection. With a maximum CO₂ insufflation pressure of 13 mmHg, no gas absorption into the the blood is noticed. Especially in obese patients, there is no decreased visibility from intruding fat in comparison to other EVH systems. The ideal patients were identified as moderately obese with good fatty tissue consistency and easy separation of

fatty planes. Dissection of superficial veins in thin legs is somewhat more problematic, due to the dense fibrous tissue surrounding the vein. We never encountered damage to the vein leading to waste. We must, however admit that in EVH quality judgement of the vein can only be done after dissection in contrast to the open technique. We have never had to convert to the open technique in contrast to the study of Allen and Hayward with conversion rates of 5.6 and 22% [Allen 1998, Hayward 1999].

To prove effectiveness and absence of alteration of surgery, we related the vein length harvested to harvest time. Mean prelevation time was 46.3 minutes for EVH (group A), and 42.8 minutes for group B, or 77 mm/min and 71 mm/min. 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. We estimate the learning curve to be approximately 15 to 20 procedures in order to augment the harvested vein length from 65 mm/min for the first 20 cases to 1cm/min afterwards.

Hayward noted a significant amount of leg infection in the open technique as well as in the EVH [Hayward 1999]. We encountered no leg infections. We noted a significant amount of hematoma and ecchymosis at discharge: 25/131 (19%) in group A versus 2/27 (7%) in group B. In later patient groups the incidence of hematoma is lowered by experience, wound closure after heparine reversal, wound drainage by closed suction drain in case of bleeding, and applying an elastic bandage. The most striking advantage of EVH in our patient population is a decrease in postoperative lower extremity edema and nerve injury at the ankle. It is obvious that patients prefer an EVH due to the cosmetic aspect of a substantially smaller incision. The same conclusions are made in a study by Pagni on clinical experience with video-assisted saphenectomy and in a prospective randomised trial by Allen [Allen 1998, Pagni 1998].

Although we see an accelerated ambulation of patients after EVH, this technique has no influence on postoperative length of stay.

We did not focus on the cost-effectiveness of this technique.

In conclusion, this study demonstrates the feasibility, safety, and effectiveness of EVH with the Vasoview Uniport system, leading to higher patient satisfaction due to smaller incisions. Only the higher costs for disposable material will preclude its use as a standard procedure in most cardiac centres.

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