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Extended Length Great Saphenous Vein for Coronary Artery bypass Grafting: An Endoscopic Harvesting Approach Over Conventional Techniques.

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Abstract

Introduction: The endoscopically harvested vein from thigh usually falls short by half to one length in patients requiring multiple conduits. Increased risk of complications precludes routine endoscopic vein harvest from the leg and an extra incision for open technique is often required thereby nullifying the sole purpose of the former. We employed the endoscope to harvest this extra length of vein from the upper half of the leg with little or no extra risk.

Methods: From January 2018 to January 2020 we endoscopically harvested the vein in thigh as well as the leg using the same entry point incision over the medial epicondyle in 51 cases. The only exclusion criterion for the study was a superficial location and subcutaneous visibility of the vein in the leg. We made 3 incisions in each patient of average size 2. 5 cm.

Results: Five patients required conversion to the open technique. The average harvest time was 59 minutes. Average length of the conduit was 48 cms. Complications included 1 minor wound infection, 1 case of superficial wound dehiscence, 1 haematoma requiring aspiration and minor erythema at the incision site in 2 patients. Most common complication observed was ecchymosis in 6 patients (5 thigh; 3 leg). None of the patient developed lymphoedema and none required re-hospitalization for vein harvest related wound complications.

Conclusion: "Extended endoscopic vein harvest" and avoidance of the open incision was possible in most patients with no additional risk and that the procedure could be routinely employed in patients requiring multiple conduits.

Keywords:Endoscope, Saphenous vein, Hematoma.

Introduction

As per 2016 Geneva summit of World Health Organization, India books nearly one-fifth deaths worldwide caused by cardiovascular diseases (CVD) especially in younger population. The causes a hike of Global Burden of Disease study state age-standardized CVD death rate of 272 per 100000 population in India. This rate is far larger than the death rate in western population which is merely 235.[1]

Amongst all the non-communicable diseases cardiovascular disease (CVD), causing maximum deaths numbering more than 18 million. Which leads CVD to be the leading cause of deaths amongst the country [2]. These numbers are typically attributed to young and increased number of smokers in India.[3]

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Amongst these CVD majority of the patients are having coronary artery disease which requires coronary artery bypass grafting (CABG) surgery. Over the past endoscopic vein harvesting (EVH) has been supposed to be the gold standard for harvesting greater saphenous vein (GSV). This GSV is preferred because of its Anatomical and Physiological benefits to the patient where in a single surgery numerous grafts are essential [4].Also Great saphenous vein (GSV) is a good drain for aorta-coronary bypass grafting. Conventional method of vein harvesting requires an extended incision and the associated complications often prove troublesome in the recuperative phase of CABG in at least some cases[5].

Considering the conventional open techniques for GSV harvesting it requires longer skin incision which may lead to increased chance of wound complication leading to hike in admission days and ill satisfied patients[6]. Hence to avoid such complications endoscopic vein harvesting can be a milestone.[7, 8]

The current practice of applying minimally invasive techniques to cardiac surgery has brought in vogue the use of an endoscope to harvest the saphenous vein[9, 10]. Endoscopic vein harvest is usually done from the thigh but this conduit usually falls short by a length or two in patients requiring more than three individual vein grafts. This extra length requires an open incision in the leg thereby nullifying the sole purpose of the endoscopic technique. We anticipated that the endoscope could be negotiated through the same entry wound at knee level to harvest an additional length from the leg with little or no extra risk.

Method

From January 2018 to January 2020 we harvested the vein endoscopically in thigh as well as the leg using the same entry point incision over the medial epicondyle in 51 cases. The great saphenous vein was used as a sole conduit or in combination with the internal mammary artery. The group included 35 male and 16 female patients of average age 51 years. Superficial location and subcutaneous visibility of the saphenous vein in the leg were used as exclusion criteria in patients considered for endoscopic vein harvest in the leg.

We used the VASOVIEW 6 endoscopic system marketed by GUIDANT **(**Guidant Corporation Santa Clara, CA, 95054, USA**)**. It has a stream lined dissector tip, bisector cautery device, closed system insufflation, telescope, and video camera, colour monitor, xenon light source and a fiber optic cable.

The great saphenous vein was exposed by means of a 2 cm transverse incision along the medial surface of the knee. The vein was dissected free and surrounded by a vessel loop. Subcutaneous tunnels were created distally and proximally. Branches that were easily identified were clipped and ligated. The endoscopic dissecting device Vasoview was then placed in the proximal space (towards groin). A tunnel was created by blunt dissection along the length of the saphenous vein in the thigh. After 3-5 cm of blunt dissection, an insufflation port (Uniport), which has a balloon at its entry port, was inserted in the tunnel and simultaneous insufflation was performed by using Carbon dioxide to a pressure of 15-20 mm of Hg. The vein was circumferentially dissected and its tributaries were identified. A working scope was then placed through the Uniport. Further dissection of adherent tissue was performed by using a C-ring dissector and bipolar loop scissors (dissector cautery device). Bipolar scissors were used to cauterize and divide the vein tributaries at an energy level of 35 W. Once all tributaries were divided, a 2.5 cm incision was made at the groin and the dissected vein isolated. The proximal portion of the vein was then removed. The same

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procedure was repeated for the distal vein (towards ankle) for a length not exceeding the mid leg level .The resulting three incisions were closed by metal clips. Drains were not used. The leg was then wrapped in an elastic bandage for 48 hours. Pain assessment and wound examination was performed daily and 2 weeks after discharge.

Results

In this hospital based observational study extended saphenous vein harvest was possible in 45 of 51 patients selected for the study. The average time needed for endoscopic harvesting of the GSV was 59 min (40-68 minutes). The average length of the harvested vein was 48 cm (39- to 55 cm). The harvested segment was long enough to provide 3 individual conduits and all patients had 3 incisions of average size 2.5 cm. In 3 patients extreme obesity obscured endoscopic visualization, and in the other 2 patients excessive branching pattern around the knee joint precluded endoscopic vein harvest.

Wound healing was satisfactory in 45 patients. 1 patient had minor wound infection at the entry point and another had superficial gaping at the groin incision site, which responded to regular dressings and oral antibiotics.

One patient developed a hematoma distal to entry point, which resolved on aspiration. The most common problem encountered was mild to moderate ecchymosis in 6 cases. After discharge, no patient required further surgical treatment or repeat hospitalization for leg wound complication.

Discussion

Three to 30% of patients undergoing coronary revascularization experience wound complications related to the conventional vein harvest technique [11]. Despite a relatively non-serious nature of these complications morbidity, discomfort and the additional financial burden demands attention. The use of endoscopic vein harvest method reduces the invasiveness of the conventional open method and its consequent morbidity similar observations were made by Cisowski M [9].

As per observations of Davis Z the limited length of the conduit so harvested from the thigh however is a limitation in patients requiring multiple grafts similar findings were marked while performing surgery for the patients under consideration[10]. This often-encountered problem prompted us to employ the endoscope to gain this additional length from the leg and it was possible to harvest an adequate length so as to suffice for 3 individual conduits using 3 incisions of 2.5 cm each. This is one of the first reported study of its kind, which addresses the issue of conduit length in endoscopic vein harvest though the fact that the vein can be harvested from the leg endoscopically finds mention in the available literature.

We have observed that a “learning curve” is required to become familiar with the use of the endoscope in the leg. The harvest times decreased from 68 minutes in the initial cases to 40-45 minutes in the later cases for a surgeon who was well versed in the endoscopic technique and its deployment in the thigh before the initiation of this study a few similar observations were made by Desai P.[12]

Unlike other reports, which describe use of a single incision for endoscopic vein harvest, we prefer 3 separate small incisions – as it facilitates direct visualization and identification and secure ligation of the vein stumps. However this technique is not suitable for all patients. In

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our trial 5 patients had to be converted to open saphenectomy either because of obesity or excessive branching pattern of the saphenous vein.[13]

The incidence of wound infection was much less as compared to the open technique. (2.9% vs. 3.30%). Lymphedema as a complication of the endoscopic technique[2] has been reported but we did not observe it in our patients.

The most common minor complication, ecchymosis resolved in less than 2 weeks in all patients. Post-operative hematoma as a complication has been reported in the literature as a frequent complication but we observed it in only one patient and we attribute it to routine use of compression bandages in the post-operative period. Contrary to other groups we do not use suction drains in the limb after endoscopic vein harvest.[14]

Conclusion

Extended endoscopic harvesting of GSV offers significant advantages over the conventional open method and with experience a surgeon can safely perform endoscopic harvesting in reasonable time using only 2-3 small incisions. We have found the results using this technique to be superior to the open or the combined (open + endoscope) techniques. By avoiding wound complications minimally invasive techniques for vein harvest may reduce postoperative morbidity, hospital stay and cost.

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