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Midterm patency and risk factors for vein graft occlusion after endoscopic harvest

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ABSTRACT

Objectives: To evaluate midterm patency of saphenous vein grafts harvested endoscopically and identify risk factors for subsequent vein graft occlusion.
Methods: Fifty consecutive patients undergoing coronary artery bypass surgery with venous graft harvested by endoscopic method were included in the study. Patients underwent computed tomography angiography follow-up at mean 24 months. Multivariate logistic regression was used to analyze associations between preoperative variables (age, ejection fraction, body mass index, gender, hyperlipidemia, hypertension, diabetes mellitus, smoking, number of defects per graft and target vessel stenosis) and the incidence of saphenous vein graft occlusion.
Results: Occlusion of the saphenous vein graft occurred in 7 patients (14.3%) and occlusion of the left internal mammary artery graft in 1 patient (2.3%) during the 24 months after surgery. No significant stenosis (i.e. narrowing by >50%) was found in the remaining grafts. Multivariate logistic regression found no association between preoperative variables and saphenous vein graft occlusion.
Conclusions: Patency rates 2 years after endoscopic vein harvesting are comparable to those from open techniques. Our data indicated no association between preoperative variables and vein graft occlusion. These results support the use of endoscopic saphenectomy in a wide spectrum of patients undergoing coronary artery bypass surgery.

Introduction

The traditionally harvested saphenous vein still remains the most frequently used graft for coronary artery bypass grafting (CABG) [1]. Complications associated with the method, such as hematoma, dehiscence, skin necrosis or infection, increase the length of stay and hospital costs [2]. Aiming to decrease wound complications and obtain better cosmetic results, endoscopic vein harvest has become an alternative for patients undergoing

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surgical revascularization [1,3–9]. After initial distrust in the quality of grafts harvested endoscopically, several works were published that confirmed the same graft patency compared with grafts from traditional harvest, although most of these works evaluated short-term results [10]. The primary objective of this study was to evaluate midterm patency of saphenous vein grafts harvested using the endoscopic method. A secondary objective was to identify possible risk factors for vein graft occlusion.

Materials and methods

Study population

From September 2010 to December 2010, 50 patients undergoing primary cardiac surgery (74% of primary CABG and 26% of CABG + valve replacement/repair) at the Cardiac Surgery Department of the Hospital of České Budějovice were included in the study. All procedures were performed in a standard manner on extracorporeal circulation and during heart arrest. There were no off-pump procedures in the study population. The grafts used during these revascularization procedures were the left internal mammary artery (LIMA) for the left anterior descending artery (LAD) and vein grafts for remaining coronary arteries. The study was approved by the local ethics committee. The inclusion criteria were the following: elective cardiac surgery, agreement to participate in the study and written informed consent. Patients undergoing urgent cardiac surgery as well as patients who refused to participate in the study were excluded.

Surgical technique

Endoscopic harvests were carried out by two residents using ClearGlide instrumentation (Sorin Group). The harvest was initiated with a longitudinal incision 3 cm long above the right or left knee. V. saphena magna was prepared and hung on a rubber tourniquet. The dissection then continued and was performed first with an optical dissector (tunneling) and then with an optical retractor and bipolar electrocoagulator to interrupt the outgoing branches. The harvest utilized a no-touch technique and included the vein's surrounding tissue. The ClearGlide instrumentation is an open system which enables harvesting the vein without insufflation of CO_2 into the subcutaneous tunnel. After completing the preparation and release of the vein, the distal portion of the vein was cannulated and cut off. The proximal vein was ligated in the groin with an endoscopic loop and cut off using endoscopic scissors. In this type of ligation it is possible to harvest a venous graft with one cut. Finally, a drain was placed into the subcutaneous tunnel and the skin was closed in one layer. Vein grafts were routinely stored until use in saline.

CT angiography follow-up

The examination was carried out by multi-detector computed tomography (CT) angiography using a 64-slice Toshiba Aquilion CT apparatus. We followed the usual investigative protocol for the examination of heart enlargement, setting the scanning field to enable viewing all aortocoronary bypasses, including the length of the LIMA. CT angiography was performed with the administration of iodinated contrast media and while synchronizing the scan with recording ECG. A total of 100–120 ml of Iomeron 400 (Bracco Imaging, Germany) contrast was administered according to the patient's habitus (more contrast was administered to patients with a larger chest dimension) at 5 ml/s using bolus tracking. The start of scanning was for increased density in the descending aorta to 100 HU. The scanning range was from the sternoclavicular articulation to the base of the heart with gentle breathing. Subsequently, reconstruction was performed in different stages of the cardiac cycle using retrospective ECG gating. Primarily automatic reconstruction was used via the auto-phase program in systole and diastole. Reconstructions were performed in other targeted phases if the image in one of these phases was physically fuzzy. Patients were requested to fast for at least 3 hours before the testing. Most patients were being medicated with beta blocker for chronic conditions. The total examination time was about 20 min, out of which the Custom Scan required 10–20 s. Most of the time was spent preparing the patient and the examination protocol. Subsequent reconstruction can take up to 2 h. The total effective radiation dose for the examination was about 34 mSv.

Statistics

Continuous variables with normal distributions are expressed as means ± 1 standard deviation. Those with a non-normal distribution (age, left ventricular function, body mass index and vein length), as assessed by the Shapiro–Wilk test for normality, were tested using the nonparametric Mann–Whitney *U* test for 10 categorical variables (patient's characteristics, graft characteristics and target vessel properties), which were tested for their influence on vein graft patency by using a chi-square test or Fisher's exact test, as appropriate. Statistical analysis was performed using GraphPad Prism5 software. Multivariate logistic regression was used to analyze the association between preoperative variables (age, ejection

Table 1 – Patient characteristics.

Preoperative variables	*n*	%
No.	49	
Male	37	75.5
Mean age (years)	66.4 ± 6.1	
Mean BMI	29.4 ± 3.2	
Mean ejection fraction	58.6 ± 10.4	
Smoking	10	20.4
Hypertension	41	83.7
History of MI	24	48.9
History of TIA/stroke	2	4.1
Diabetes mellitus	18	36.7
Hyperlipidemia	35	71.4
Varicose veins	11	22.4
Ischemic disease of lower extremities	2	4.1
COPD	9	18.4

BMI, body mass index; COPD, chronic obstructive pulmonary disease; MI, myocardial infarction; TIA, transitory ischemic attack.