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Endoscopic versus bridging technique of saphenous vein graft harvesting – one-year results

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ABSTRACT

Aim: Prospective study comparing objective and subjective parameters of patients undergoing myocardial revascularization surgery. Venous grafts were harvested by both the endoscopic and the bridging method.

Methodology: In the period from January 2009 to March 2010, we performed 45 combined harvests of v. saphena magna by using the endoscopic and bridging method. Patients went through an ambulatory control of wound complications after one week and after one month. Another inspection was carried out by telephone after three months when the patients completed a short questionnaire. After one year, details of major adverse cardiac and cerebrovascular events (MACCE) were collected. The agreement of patients was obtained prior to their participation in this study.

Results: The average age of patients was 66.3 years (55–84), the average BMI was 28.9 (24.1–36.6) and in the observed group men predominated (77.8%). Diabetes presented in 24.4%, varicose veins of lower extremities in 20% and peripheral arterial occlusive disease in 11.1% of patients. The average length of harvested vein, the velocity of harvest and the number of sutured defects per vein were quite similar.

Early complications occurred in a total of 5 patients (11.1%). After completion of the endoscopic harvest in 1 patient (2.2%) and after the bridging harvest in 4 patients (8.9%).

In the questionnaire completed three months after the surgery patients mentioned less pain, better cosmetic results and greater overall satisfaction in the endoscopic harvest (75.6% of patients). If the patients had had the choice, in most cases (88.9%) they would have preferred the endoscopic harvest to the bridging technique harvest. For the vast majority of respondents (93.3%) a scar on the chest and a scar on the lower extremities after harvesting of vein grafts are equal from a cosmetic point of view.

Major adverse cardiac and cerebrovascular events (MACCE) were reported over one year in 8.9% of patients.

Conclusions: Comparing the two minimally invasive techniques (endoscopic and bridging) in the selected group of patients we have demonstrated a lower incidence of wound complications and greater patient satisfaction with endoscopic harvesting method. Both of these minimally invasive methods are safe for the patients, which was demonstrated by low occurrence of MACCE.

Klíčová slova:
Endoskopický odběr
Jednoleté výsledky
Metoda kožních můstků
Ranné komplikace

SOUHRN

Cíl: Prospektivní studie s cílem porovnat objektivní a subjektivní parametry u pacientů podstupující revaskularizační operaci myokardu, kterým byl odebrán žilní štěp současně endoskopickou metodou a metodou kožních můstků.

Metoda: V období od ledna 2009 do března 2010 jsme provedli 45 kombinovaných odběrů v. saphena magna endoskopickou metodou a metodou kožních můstků. Zhodnocení ranných komplikací proběhlo za

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týden a měsíc po operaci. Další kontrola proběhla telefonicky za tři měsíce po operaci, kdy pacienti zodpověděli krátký dotazník. Rok po operaci byl vyhodnocen výskyt závažných kardio- a cerebrovaskulárních příhod (major adverse cardiac and cerebrovascular events – MACCE). Před zařazením do sledování byl nutný souhlas pacienta.

Výsledky: Průměrný věk pacientů byl 66,3 roku (55–84), průměrné BMI bylo 28,9 (24,1–36,6) a ve sledovaném souboru převažovali muži (77,8 %). Diabetes mellitus byl přítomen u 24,4 % pacientů, varixy dolních končetin u 20 % pacientů a ischemická choroba dolních končetin u 11,1 % pacientů. Délka odebraného žilního štěpu, rychlost odběru i počet defektů na štěpu se mezi oběma typy odběru významně nelišily.

Ranné komplikace se vyskytly u pěti pacientů (11,1 %). Na končetině se po endoskopickém odběru komplikace vyskytly u jednoho pacienta (2,2 %) a na končetině po odběru pomocí metody kožních můstků u čtyř pacientů (8,9 %).

V dotazníku zodpovězeném za tři měsíce po operaci udávali pacienti menší bolestivost, lepší kosmetický výsledek a větší celkovou spokojenost s endoskopickým odběrem (75,6 % pacientů). Pokud by pacienti měli na výběr, většina (88,9 %) by upřednostnila endoskopický odběr před odběrem pomocí metody kožních můstků. Pro většinu pacientů je jizva po sternotomii a jizvy po odběru žilních štěpů z kosmetického pohledu stejně důležitá (93,3 %).

Ve sledovaném souboru se v průběhu jednoho roku vyskytly závažné kardio- a cerebrovaskulární příhody (MACCE) u 8,9 % pacientů.

Závěr: Při porovnání dvou miniinvazivních metod odběru žilního štěpu (endoskopická a metoda kožních můstků) byl ve sledovaném souboru vyhodnocen nižší výskyt ranných komplikací a větší celková spokojenost pacientů s endoskopickou metodou. Obě tyto metody se dají považovat za bezpečné pro pacienta, což potvrdil nízký výskyt závažných kardio- a cerebrovaskulárních příhod (MACCE) v období jednoho roku po operaci.

Introduction

Venous grafts are still used in cardiac surgery in more than 95% of coronary surgery [1] and harvesting presents a potential risk of postoperative complications. By the use of minimally invasive techniques, these risks are significantly reduced [2–5] compared to conventional methods. In this paper we compared two of these methods – the endoscopic and bridging techniques.

Patients file and methods

In our department we use two standard techniques of saphenous vein harvesting; the endoscopic and the bridging technique which uses several short skin incisions. For last 8 years we have been routinely using the bridging technique as the method of choice for venous graft harvesting. But since 2009, we have also been using the endoscopic method, and, while doing so, when more than one venous graft was needed, we performed harvests combining both the endoscopic and the bridging techniques to reduce the length of the procedure.

In the period from 1/2009 to 3/2010, 45 harvests of v. saphena magna were performed in our department using the combined methods. During one surgery two venous grafts were harvested – one by the endoscopic method and the second by the method of short skin incisions (bridging technique). Endoscopic harvests were carried out by one resident using ClearGlide instrumentation (Sorin Group) on the right lower extremity. The harvest was initiated with a longitudinal incision 3 cm long above the right knee. V. saphena magna was prepared and hung on a rubber tourniquet. Then we continued with the dissection, which was performed firstly with an optical dissector (tunnelling) and then with an optical retractor and bipolar electrocoagulation to interrupt the outgoing branches. After completion of the preparation and release of the vein from the surrounding tissue 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 with endoscopic scissors. In this type of ligation it is possible to harvest venous graft from one cut.

The second method of harvesting (the bridging technique) was performed by the second resident on the left lower extremity. For preparing the venous graft we used a cold light retractor (Mini Harvest System, Tyco Healthcare Group) which was inserted in the subcutaneous tunnel for direct visual inspection of the vein. The result was 3–4 skin incisions 4 cm in length between 6 cm long skin bridges in the left leg.

Monitoring of patients was possible only after their agreement to participation in this study. Monitoring of wound complications was carried out one week and one month after the operation. Haematoma in the wound with a need for evacuation, lymphatic secretion, wound infection and wound dehiscence were classified as wound complications.

Another check was carried out by the telephone three months after the surgery when patients were asked the following questions:

1. In which leg did the patient felt more pain after surgery?
2. Which leg has better cosmetics results?
3. Which procedure is the patient more satisfied with?
4. If the patient had a choice which method would he/she choose for him/herself?
5. Which scar is more important for the patient from the cosmetic point of view? The scar on the chest after sternotomy or on the leg after harvesting of the vein graft?

The last control was performed one year after surgery, when the main cardiac and cerebrovascular events (MACCE) were evaluated. This information was gathe-

Table 1 – Patients' characteristics.

	n	%
No.	45	
Male	35	77.8
Body mass index	28.9	
Diabetes mellitus	11	24.4
Varicose vein	9	20
Ischemic disease of lower extremities	5	11.1

Table 2 – Operative characteristics.

	Bridging method	Endoscopic method
Avg. length of vein (cm)	26	25.5
Velocity of harvest (cm/min)	1.59	1.32
No. of sutured defects per vein	0.2	0.26

Table 3 – Postoperative complications.

	Bridging method	Endoscopic method
Revision for bleeding	0	0
Haematoma	1	0
Infection	2	0
Lymphatic secretion	1	1
Total no.	4	1
%	8.9	2.2

red from the general practitioners or from the patients themselves.

Results

In our trial, men predominated (77.8%) and, average age was 66.3 ± 7 years. Average body mass index was 28.9 ± 4. Among the risk factors, 24.4% of patients had diabetes, 20% of patients had varicose veins and 11.1 % of patients had ischemic leg disease (Table 1). During the harvest, there were observed the average length of harvested vein, the velocity of harvest and the number of sutured defects per vein. All of these factors were quite similar (Table 2).

Early complications occurred in a total of 5 patients (11.1%). After the endoscopic harvest, lymphatic secretion from the wound occurred in one patient (2.2%). This early complication was treated conservatively by systematic bandaging of the leg and stopped completely after 2 weeks.

Early complications in the legs after harvest by the bridging technique occurred in a total of 4 patients (8.9%). Lymphatic secretion occurred in one patient and in another haematoma in the wound which needed evacuation. Infections of the wound occurred in two patients necessitating delayed release from hospital for 21 and 30 days – respectively and intravenous antibiotic therapy (Table 3).

When we compared preoperative risk factors with postoperative wound complications, both patients with wound infection had long-term diabetes mellitus type one which was decompensated after the surgery. One patient with lymphatic secretion had presented peripheral arterial occlusive disease, which probably has no significance in this type of wound complication.

In completing the questionnaire 75.6% of the patients reported more painful sensations in the donor leg after the bridging technique, compared with 8.9% patients after endoscopic and the same painful feelings were described by 15.5% of the patients. A better cosmetic result and a better overall satisfaction was described after the endoscopic harvest, in both cases 75.6%.

A better cosmetic effect and overall satisfaction after the bridging technique was described by 4.4% patients. The remainder of the patients (20%) did not note any difference in the cosmetic effect of both methods. If the patients had had a choice, 88.9% patients would have chosen the endoscopic harvest technique rather than the bridging technique as the only harvesting method. One patient (2.2%) would choose the bridging technique and 8.9% of patients had no definite answer (Table 4). For most of the respondents (93.3%) the scar on the leg after harvesting of the vein was equally important from the cosmetic point of view as the scar on the chest after sternotomy.

Table 4 – Results of questionnaire part I.

Question	Endoscopic	Bridging	No diference
In which leg patient felt more pain after surgery?	8.9%	75.6%	15.5%
Which leg is bringing better cosmetics result?	75.6%	4.4%	20%
Which procedure is patient overall more satisfied with?	75.5%	4.4%	20%
If the patient had had a choice which method would he/she has chosen for himself/herself?	88.9%	2.2%	8.9%

Table 5 – Results of questionnaire part II.

Question	Chest	Leg	Equal
What scar is more important from a cosmetic point – scar on the chest after sternotomy or on the leg after harvesting a vein graft?	6.7%	0%	93.3%

Table 6 – Occurrence of MACCE in one-year period.

MACCE	No. (total 45 pts.)	%
Death	1	2.2
MI	1	2.2
Repeat revascularization	0	0
CVA	2	4.4
Total	4	8.9

CVA – cerebrovascular accident; MACCE – major adverse cardiac and cerebrovascular events; MI – myocardial infarction.

For 6.7% of the patients the scar on the chest was more important than the scar on the donor leg (Table 5).

Major adverse cardiac and cerebrovascular events (MACCE) occurred in 4 patients (8.9%) in the one-year period. There was one death but not from cardiac or cerebrovascular events. One patient had a stroke immediately after the surgery, and one patient 11 months after the surgery. One patient had a myocardial infarction 8 months after the surgery (Table 6).

Discussion

Introducing the minimally invasive harvesting techniques of vein grafts led to a decrease in wound complications compared to conventional techniques of harvesting. This is in conformity with the literature [2–5]. After the endoscopic harvest technique fewer pain sensations, better cosmetic results, and overall satisfaction were described by most patients compared to the classical harvest technique [6–9]. Early surgical complications were followed by a prolonged stay in hospital and consequent cost increases [4].

These studies compared the results of groups of patients who have undergone harvesting of vein conduit by minimally invasive (endoscopic and bridging from short skin incisions) and conventional techniques. In our department minimally invasive methods of harvesting are part of normal practice.

The initiation of the endoscopic method is usually accompanied by demanding, prolonged harvesting times especially when patients need more than one vein conduit. Therefore we decided to harvest one vein by one resident using the endoscopic method and the second vein conduit by another resident using the bridging technique. In this way we normalized our harvesting times as part of our learning curve in relation to the endoscopic technique. This approach can be used as a "bridge" to complete endoscopic harvest of several vein conduits.

In our specific group of patients we tried to compare the appearance of early complications and the subjective feelings and impressions of patients while undergoing harvest of vena saphena magna by two minimally invasive methods. The results indicate that the perception of pain and the perception of cosmetic improvement were relatively reduced. Other factors must also be considered as background for the possible origin of early complications. These risk factors could be: the contamination of wounds in the operating theatre or by routine dressings of the wounds in the ICU; contamination of the patients' skin by a virulent stem of bacteria; decompensated diabetes after the procedure; oedema of the lower legs, or poor hygiene and dressing of wounds in the domestic environment.

The final number of leg wound complications was lower after endoscopic harvest. Less pain, a better cosmetic result and a higher overall satisfaction was confirmed with the endoscopic method. This method would also have been preferred by the patients if they had had the choice.

MACCE within one year occurred in our group in 8.9% of patients; this does not differ significantly from other recently published data [10].

Conclusion

Minimally invasive harvesting techniques of saphenous vein grafts are safe methods which in the postoperative period significantly reduce the incidence of wound complications as well as soreness in the donor leg and need for readmission to hospital. Thus, expenses in treatment are significantly reduced and, at the same time there is a major improvement in patient satisfaction and better cosmetic results. In comparing these two methods – the endoscopic and the bridging techniques – our data have shown better results for the endoscopic method. Even the use of two types of minimally invasive harvesting methods on one patient during one surgery represents a safe method of harvesting. There are some limitations to this specific group in that total number of patients involved is small.

References

[1] Patel AN, Hebeler RF, Hamman B. Prospective analysis of endoscopic vein harvesting. Am J Surg 2002;182:716–9.
[2] Andreasen JJ, Nekrasas V, Dethlefsen C. Endoscopic vs. open saphenous vein harvest for coronary artery bypass grafting: a prospective randomized trial. Eur J Cardiothorac Surg 2008;34:384–9.
[3] Vaidyanathan KR, Sandak MN, Cherian KM. Endoscopic vs. conventional vein harvesting: a prospective analysis. Asian Cardiovasc Thorac Ann 2008;16:134–8.
[4] Athanasiou T, Aziz O, Al-Ruzzeh S, et al. Are wound healing disturbances and length of hospital stay reduced with minimally invasive vein harvest? A metaanalysis. Eur J Cardiothoracic Surg 2004;26:1015–26.
[5] Kurfirst V, Dusil I, Rezler M, Mokráček A. Endoskopický odběr v. saphena magna – výskyt ranných komplikací. Rozhl Chir 2009;88:625–8.
[6] Patel AN, Hebeler RF, Hamman BL, et al. Prospective analysis of endoscopic vein harvesting. Am J Surg 2001;182:716–9.
[7] Kiaii B, Moon BC, Massel D, et al. A prospective randomized trial of endoscopic versus conventional harvesting of the saphenous vein in coronary artery bypass surgery. J Thorac Cardiovasc Surg 2002;123:204–12.
[8] Shurr UP, Lachat ML, Reuthebuch O, et al. Endoscopic saphenous vein harvesting for CABG: a randomized, prospective trial. Thorac Cardiovasc Surg 2002;50:160–3.
[9] Felisky CD, Paull DL, Hill ME, et al. Endoscopic greater saphenous vein harvesting reduces the morbidity of coronary artery bypass surgery. Am J Surg 2002;5:576–9.
[10] Kolh P, Wijns W, Danchin N, et al. Guidelines on myocardial revascularization. Eur J Cardiothorac Surg 2010;38:1–52.