

Prejudices and realities in the use of 'unsuitable' saphenous vein graft for infrapopliteal revascularization

A. SIANI, F. ACCROCCA, R. ANTONELLI, G. A. GIORDANO, R. GABRIELLI, L. M. SIANI,
E. BALDASSARRE, F. MOUNYERGI, G. MARCUCCI

SUMMARY: Prejudices and realities in the use of 'unsuitable' saphenous vein graft for infrapopliteal revascularization.

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Background. Aim of this paper is to evaluate the safety and the patency rate of the infrapopliteal bypass grafts performed with the great saphenous vein (GSV) with small (<2.5 mm) or large calibre (>5 mm).

Patients and methods. Between January 2003 and May 2007, 73 infragenicular bypass with autologous saphenous vein were performed in patients affected by atherosclerotic femoropopliteal disease. In 8 cases a bypass grafts with small saphenous vein (diameter 2.2-2.5 mm) were performed, in 4 cases a bypass with segmental varicose saphenous vein (diameter 5.7-6.4 mm) were carried out. In 64 cases the bypass was carried out with the reversed technique, in 9 cases with the in situ technique.

Results. Thirty day mortality was 3/82 (3.6%) and 30 day cumulative patency rate was 95.1% (78/82) with limb salvage of 96.3% (79/82). All the patients with small diameter vein showed a normal patency at the follow-up and at the duplex scan examination no complications occurred. The mean calibre of the arterialized vein increased to 2.6-3.4 mm at 1 week with maintenance during the follow-up. Patients with varicose vein implanted present a mean dilatation of 6.4-7.2 mm at 1 week and no dilatative complication were detected at the follow-up.

Conclusion. The risk of stenosis, graft thrombosis or aneurismal degeneration doesn't seem to be higher respect normal GSV either for small or for large veins. Large series and longer follow up are mandatory for an extensive clinical application.

RIASSUNTO: Pregiudizi e realtà nelle rivascolarizzazioni arteriose infrapoplitee con l'utilizzo di vena safena 'inadatta'.

A. SIANI, F. ACCROCCA, R. ANTONELLI, G.A. GIORDANO, R. GABRIELLI, L.M. SIANI, E. BALDASSARRE, F. MOUNYERGI, G. MARCUCCI

Introduzione. Gli Autori riportano la propria esperienza nell'utilizzo della vena grande safena sia di piccolo (<2.5 mm) che di grande (>5 mm) calibre nelle rivascolarizzazioni infrapoplitee eseguite per patologia ostruttiva degli arti inferiori.

Paziente e metodi. Da gennaio 2003 a maggio 2007 sono stati eseguiti 73 bypass infragenicolari in vena safena autologa per patologia ostruttiva degli arti inferiori. In 8 casi sono state utilizzate vene safene di piccolo diametro (2.2-2.5 mm), in 4 casi con grosso diametro (5.7-6.4 mm) o con franca dilatazione varicosa segmentale. In 64 casi i bypass sono stati eseguiti con tecnica reversed, mentre in 9 casi mediante tecnica in situ.

Risultati. La mortalità a 30 giorni è stata del 3.6% (3/82), la pervietà primaria cumulativa è stata del 95.1% (78/82) con una percentuale di salvataggio d'arto del 96.3% (79/82). In tutti i pazienti in cui è stata impiegata una safena di piccolo o grande diametro è stato eseguito un attento e stretto follow up che non ha evidenziato complicanze a distanza in nessun caso. Il diametro medio postarterializzazione a 1 settimana è aumentato di 2.6-3.4 mm per le vene di piccolo calibre e di 6.4-7.2 mm per le vene di grosso calibre. In entrambe i casi non si sono evidenziate complicanze a distanza.

Conclusioni. Il rischio di stenosi, trombosi o degenerazione aneurismatica del graft non sembrerebbe maggiore rispetto alle vene grandi safene di calibre normale. Casistiche più ampie ed un follow up più lungo potranno fornire informazioni più esaustive sul comportamento a distanza delle safene di diametro inferiore o superiore alla media utilizzate nella rivascolarizzazione per patologia ostruttiva degli arti inferiori.

KEY WORDS: Limb ischemia - Varicose veins - Surgery.
Ischemia acuta arti inferiori - Vene varicose - Chirurgia.

Introduction

The ipsilateral greater saphenous vein (GSV) remains the conduit of choice in patients with lower extremity arterial disease requiring revascularization,

"S. Paolo" Hospital, ASL RM F, Civitavecchia (Roma), Italy
Vascular and Endovascular Surgery Unit
(Chief : Dr. G. Marcucci)

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with unequal long-term patency and limb salvage rates. Limitations arise in those patients in whom the greater saphenous vein has previously been harvested or especially in cases of vein's poor quality due to small diameter, diffuse fibrosis or varicose involvement.

Several alternatives conduits can be used, but yield a inferior patency rates and are more prone to late complications (1, 2). Some Authors advocate the need of a policy towards a more extensive employment of venous conduits, including a careful evaluation of the small and very large saphenous vein too (3).

Purpose of this study is to evaluate the results and surgical feasibility of the 'unsuitable' saphenous vein in infragenicular revascularization.

Patients and methods

Between January 2003 and May 2007, 82 infragenicular bypass were performed in 71 patients affected by atherosclerotic occlusive femoropopliteal disease. The demographics and clinical data, morbidity, risk factor and anaesthesiological classification were report in Table 1.

The indications for operation was worsening claudicatio in 11 patients (15.4%), ischemic rest pain in 42 patients (33.8%) and tissue loss or gangrene in 18 patients (25.3%). All the patients were submitted to preoperative angiography and classified in accord with TASC consensus in C and D class.

In 73 patients (89%) a infragenicular bypass with autologous saphenous vein were carried out. In 9 patients (11%) an infragenicular prosthetic bypass graft was performed with 7 mm Dacron knitted ultrathin heparin-bonded in 4 cases (4.8%), 7 mm PTFE Distaflon in 3 cases (3.6%) or Omniflow II in 2 cases (2.4%). Ipsilateral great saphenous veins were used in 70 cases (95.9%), contralateral vein in 3 cases (4.2%).

In 64 cases (87.6%) the bypass was performed with reversed technique, in 9 cases (12.4%) with the *in situ* technique. General anaesthesia was performed in 21 cases (28.9%), epidural anaesthesia in 52 cases (71.2%).

Seven patients (9.5%) underwent common and profunda femoral endoarterectomy with synthetic patch closure, and in 6 cases (8.2%) a composite bypass with 8 mm Dacron graft was performed. The proximal anastomosis was placed on the common femoral artery in 69 cases (94.5%) and on the superficial femoral

artery in 4 cases (5.5%). In no cases the profunda femoral artery was used. The distal anastomosis was placed below the popliteal artery in 54 cases (73.9%), on the tibioperoneal trunk in 12 cases (16.4%), on the posterior tibial artery in 4 cases (5.5%), on the anterior tibial artery in 3 cases (4.2%).

All the patients were submitted to preoperative evaluation of the great saphenous vein by means of duplex scan examination. In all the cases we evaluated the diameter of the great saphenous vein in orthostatic position at the thigh and at the leg. The diameter was measured on the inner lumen, excluding the wall and the morphology and route were marked. The greater saphenous vein was considered unsuitable only in cases of diffuse varicose involvement (3 cases, 3.6%), vein thrombosis (1 case, 1.2%) or diffuse postinflammatory retraction stenosis (2 cases, 2.4%). In three patients (4.1%) the vein was previously used for coronary artery bypass grafting. The mean vein diameter was 2.6-4.4 mm. In 8 cases (10.9%) the greater saphenous vein showed a calibre of 2.2-2.5 mm. In this cases the vein was harvested and gently irrigated with heparinized papaverine solution to assess the intraoperative diameter and in all the cases the vein was used to perform the bypass. In 4 cases (5.5%) a segmental varicose dilatation of 5.7-6.4 mm in one or two segment area was detected. In this cases excessively vein dilatation was removed by means of termino-terminal anastomosis or running suture venorrhaphy.

Results

All the bypass performed with the greater saphenous vein with small or large diameter were submitted to intensive postoperative duplex scan examination follow-up at 1, 2 and 3 weeks, and than at 1, 6 and 12 months.

Thirty day mortality was 3/82 (3.6%). In two cases the deaths occurred in 2 and 6 postoperative day for acute myocardial infarct, and in one case in 22 postoperative day for sepsis with multi organ failure due to acute disruption of the proximal anastomosis, treated by common femoral artery ligation and femoro-femoral cross-over transperineal revascularization with 8 mm silver Dacron rifampicin-bonded radially supported prosthesis.

Thirty day cumulative patency rate was 95.1% (78/82). In four cases (3 prosthetic and 1 GSV) an acute postoperative thrombosis occurred to poor runoff and a lower limb amputation were carried out in three cases, while a percutaneous transluminal angioplasty (PTA) of the deep femoral artery was performed in the last one. Limb salvage was 96.3% (79/82).

The three years primary patency rate was 73.9% (54/73), secondary 80.8% (59/73), and the limb salvage 83.5%(61/73).

All the patients with small and large diameter vein showed a normal patency of the graft at the follow-up (1-24 months, mean 10 months). At duplex scan examination no anastomotic problems was detected and no stenosis or intimal hyperplasia occurred in the point with previous small or large calibre. The mean calibre of the arterialized vein increased to 2.6-3.4 mm at 1 week without enlargement at the follow-up. Pa-

TABLE 1 - CHARACTERISTICS OF PATIENTS.

	n (%)	
Male	53	(74.6)
Female	18	(25.3)
Mean age (yrs)	72	(range 62-81)
Diabetes	27	(38)
Hypertension	58	(81.6)
Hyperlipemia	43	(60.5)
Ischemic heart disease	54	(76)
ASA II	22	(30.9)
ASA III	35	(49.2)
ASA IV	14	(19.7)

tients with varicose vein implanted present a mean dilatation of 6.4-7.2 mm at 1 week and no dilatative complication were detected at the follow-up.

Discussion

The ipsilateral greater saphenous vein remains the best arterial substitute for infrapopliteal bypass surgery, but unfortunately in 20-40% of the cases the greater saphenous vein will be unavailable because previously excised or unsuitable (4).

The prosthetic materials, like PTFE or Dacron, seems to be offer good results only in cases of above the knee revascularization (5), but in the infragenicular position remain markedly inferior despite technical adjunct like complementary distal arteriovenous fistula with deep vein interposition or distal venous cuff. Indeed complementary distal arteriovenous fistula and distal venous cuff show a low patency rate of 48% a 3 years (6).

The experience with allograft presents an high incidence of late complications and low patency rate (7). Alternative autologous vein can be achieved from several sources, including the contralateral greater saphenous vein, the lesser saphenous vein or the arm vein although several factors detract from the use of these veins. The need for contralateral or myocardial revascularization has been reported to be 20 to 23% especially in presence of diabetes, coronary artery disease, age older of 70 years and ankle brachial index less than 0.53 (8). The lesser saphenous and the arm veins seems to be more difficult to manipulate for a very thin-wall, often with focal area of stenosis due to previous venipuncture, with an high incidence of aneurismal and fibrotic degeneration, conditioning a patency rate of 50% a 3 years (9,10).

Beside those conduits required time-consuming with an high anesthesiological impact in high risk patients. The use of composite prosthetic – autogenous bypass graft or the superficial femoral or popliteal arteries like inflow sites in cases of short suitable vein presents a 5 years patency rate of 46.7 % (11-13).

It's our opinion that an aggressive policy to achieve more omolateral venous material should be mandatory. The extensive use of the preoperative color du-

plex scan examination can lead to a complete and safe evaluation of the vein's quality, while during the saphenous vein harvesting it's possible, through a careful evaluation, to extend the employ of previously defined 'unsuitable' veins.

Some Authors reject the use of small or very large diameter veins thinking that in these cases the wall of the vein can present some histological alteration with the possibility to cause acute and late complications like graft stenosis, thrombosis or aneurismal degeneration (14). It's our opinion that there is the necessity to distinguish between the veins with small or large diameter and the frank pathological unsuitable veins. In our experience in cases of small vein diameter (2.2-2.5 mm) a progressive distension occurred either during the intraoperative irrigation with physiological solution or after the vein arterialization, and at the follow-up by means of color duplex scan examination the vein diameter increased to 2.6-3,4 mm at 1 week.

The post-arterialization enlargement seems to be to an adaptative response of an healthy vein because the dilatation is circumferential and no blebs occur, does never exceed 40-50% of original diameter, presents a progressive course, and the maximal diameter remains stable at the follow-up (15, 16).

We rejected the very small calibre veins (<2.0 mm at preoperative duplex scan with low enlargement at intraoperative irrigation) because there is no evidence that this graft is considered suitable.

Diffuse varicose involvement of the greater saphenous vein is an exclusion criterion but, in presence of very large veins or segmental or multisegmental varicose vein's involvement, a venorrhaphy to reduce the dimension or end-to-end anastomosis seem to be an acceptable technique and no degeneration of the vein placed after or later the dilatation occurred. In our experience the post-arterialization distension does never exceed 40-50% of original diameter and remains stable at the follow-up.

On the basis of our experience the risk of stenosis due to hyperplasic degeneration, graft thrombosis or aneurismal degeneration doesn't seem to be higher in comparison with normal greater saphenous vein either for small or for large veins, but large series and longer follow-up are mandatory to achieve more information for a standardized definition of real 'unsuitable' vein.

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