Invited commentary on 'Infrainguinal bypass using varicose veins with external scaffolding', by N. Montelione, et. al.

Transforming Varicose Veins into Viable Bypass Conduits

C Caradu, E Ducasse, X Bérard

Vascular Surgery Unit, Bordeaux University Hospital
submitted: Nov 29, 2024, accepted: Nov 29, 2024, EPub Ahead of Print: Dec 2, 2024
Conflict of interest: None

DOI: 10.24019/jtavr.213 - Corresponding author: Dr. Caroline Caradu, caroline.caradu@chu-bordeaux.fr

In their compelling study, Prof. Spinelli and colleagues report the outcomes of 63 infrainguinal bypasses performed with autologous varicose or ectatic veins supported by external scaffolding, achieving technical success in all cases and a 30-day limb salvage rate of 97.8%[1]. The primary assisted patency of 76.3% and limb salvage rate of 78% at nearly five years of follow-up are particularly notable given the complexity of this patient population.

This innovative technique addresses the challenge of suboptimal autologous veins in chronic limb-threatening ischemia (CLTI). The findings align with European Society for Vascular Surgery (ESVS) guidelines advocating autologous vein as the preferred conduit for infrainguinal bypass, while discouraging nonautologous materials unless no viable alternative exists[2]. This preference is based on the superior patency and limb salvage rates associated with autologous veins. By transforming veins previously deemed unsuitable into durable conduits, this method significantly expands surgical options.

Preclinical studies and historical data support this approach, with external reinforcement of vein grafts first described in 1963[3]. Chronic venous hypertension in ectatic or varicose veins causes inflammation, endothelial dysfunction, and venous wall remodelling due to fibrin and collagen deposition[4,5]. External scaffolding stabilizes these veins, reduces arterial stress, and minimizes focal stenosis from neointimal hyperplasia[5-9], a key cause of graft failure. By addressing these risks, including thrombosis and aneurysm formation under arterial pressure[6,7], external reinforcement could improve graft durability and outcomes.

The study also underscores the importance of preserving venous conduits through a "saphenous-sparing" approach during corrective venous surgeries to preserve veins for potential future use in revascularization procedures. Furthermore, composite grafts incorporating arm veins, represent an interesting extension of this concept, particularly in patients with limited venous resources. However, arm veins are prone to stenosis and aneurysmal changes, with reported abnormalities in up to 55% of cases[10]. The use of external scaffolding in such settings warrants further exploration.

This work exemplifies how innovation in surgical techniques can address unmet needs, providing durable solutions for complex vascular pathologies. Larger multicentre studies are now warranted to validate these promising findings and refine the technique.

References

1) Montelione N, Stilo F, Catanese V, Codispoti FA, Spinelli F. Infrainguinal bypass using varicose veins with external scaffolding. Journal of Theoretical and Applied Vascular Research. 2023;8(2):33–8. DOI: 10.24019/jtavr.171

2) Conte MS, Bradbury AW, Kolh P, White JV, Dick F, Fitridge R, et al. Global Vascular Guidelines on the Management of Chronic Limb-Threatening Ischemia. Eur J Vasc Endovasc Surg. 2019;58(1S):S1-S109.e33.

3) Parsonnet V, Lari AA, Shah IH. New stent for support of veins in arterial grafts. Arch Surg. 1963 Oct;87:696–702.

4) Jeremy JY, Gadsdon P, Shukla N, Vijayan V, Wyatt M, Newby AC, et al. On the biology of saphenous vein grafts fitted with external synthetic sheaths and stents. Biomaterials. 2007 Feb;28(6):895–908.

5) Vijayan V, Smith FCT, Angelini GD, Bulbulia RA, Jeremy JY. External supports and the prevention of neointima formation in vein grafts. Eur J Vasc Endovasc Surg. 2002 Jul;24(1):13–22.

6) Dashwood MR, Angelini GD, Wan S, Yim A, Mehta D, Izzat MB, et al. Does external stenting reduce porcine vein-graft occlusion via an action on vascular nerves? J Card Surg. 2002;17(6):556–60.

7) Arvela E, Kauhanen P, Albäck A, Lepäntalo M, Neufang A, Adili F, et al. Initial experience with a new method of external polyester scaffolding for infrainguinal vein grafts. Eur J Vasc Endovasc Surg. 2009 Oct;38(4):456–62.

8) Jeremy JY, Bulbulia R, Johnson JL, Gadsdon P, Vijayan V, Shukla N, et al. A bioabsorbable (polyglactin), nonrestrictive, external sheath inhibits porcine saphenous vein graft thickening. J Thorac Cardiovasc Surg. 2004 Jun;127(6):1766–72.

9) Bambang LS, Moczar M, Lecerf L, Loisance D. External biodegradable supporting conduit protects endothelium in vein graft in arterial interposition. Int J Artif Organs. 1997 Jul;20(7):397–406.

10) Armstrong PA, Bandyk DF, Wilson JS, Shames ML, Johnson BL, Back MR. Optimizing infrainguinal arm vein bypass patency with duplex ultrasound surveillance and endovascular therapy. J Vasc Surg. 2004 Oct;40(4):724–30; discussion 730-731.