

## INVITED COMMENTARY

## The Central Role of Vascular Surgeons in Innovation

Anne Lejay <sup>a,b</sup>, Nabil Chakfé <sup>a,b,\*</sup><sup>a</sup> Department of Vascular Surgery and Kidney Transplantation, University Hospital of Strasbourg, Strasbourg, France<sup>b</sup> Groupe Européen de Recherche sur les Prothèses Appliquées à la Chirurgie Vasculaire, France

Article history: Received 3 September 2020, Revised 12 September 2020, Accepted 17 September 2020

In their report, Côté et al. presented the case of a patient with critical limb threatening ischaemia in which they used a homemade stapled pericardial tube graft with off the shelf porcine patches implanted as a femoro-tibioperoneal trunk bypass, in the absence of suitable or available material.<sup>1</sup> Even if the technique has already been described by the same team to create a shorter conduit, in this report the authors proposed to push forward the challenge with a longer conduit.<sup>2</sup> However, some points need to be discussed.

Susceptibility to infection needs to be considered. Compared with synthetic grafts, the infectability of large diameter tubularised pericardial patches has been found to be lower.<sup>3</sup> This prompted a number of teams to use them in infected fields.<sup>3</sup> In their report, the authors advocate the advantages of rapid and easy construction of tubularised grafts using vascular staplers, rather than a running suture.<sup>1</sup> However, metallic staples can be considered as foreign material that should be avoided in the setting of infection.<sup>3,4</sup> Even if it would take longer to perform a running suture, and even if the suture must be cut when the created graft is too long, a running suture should be favoured over stapling. In cases where it is not possible to accurately determine the required graft length, the suture could be left uncompleted approximately 1–2 cm from the end of the patch to be completed *in situ*. However, time sparing is no longer an issue if the tube construction is performed by a company rather than in the operating room.

Mechanical properties must also be considered. Pericardial patches have several advantages over prosthetic materials, such as good handling and high material strength. Their biocompatibility is significantly higher, attributed to the collagen fibre structure, which offers an ideal environment for the migration of fibroblasts, contributing to rapid integration and epithelialisation.<sup>4</sup> However, these advantages have not been documented in an evidence based manner. Moreover, stapling pericardial patches can lead to material damage or changes that might modify the

biomechanical properties or the biocompatibility characteristics. In fact, the authors reported that additional stitches in some parts of the staple lines were necessary owing to oozing.<sup>1</sup> Accordingly, biomechanical properties such as resistance, durability, and the compliance of such homemade stapled pericardial tube grafts need to be investigated to know how the stapling line behaves compared with a running suture before promoting large scale use of these grafts.

Finally, the cost of homemade substitutes also needs to be considered. The cost of such a pericardial tube, including the pericardial patches, the stapler, and the chargers, is expensive. In order to be attractive, an ideal homemade graft should be easily and rapidly constructed at an economically viable cost. Again, off the shelf products could help in saving time and money.<sup>5</sup>

In conclusion, this report demonstrates the central role of surgeons in innovation, showing that the use of homemade pericardial tube grafts with off the shelf porcine patches for long and small diameter tubes for lower limb revascularisation is feasible. However, a better understanding of the biomechanical properties is required, with data from simulation studies and *in vivo* trials. Additionally, knowledge of how the graft behaves, integrates after implantation, and remodels into a part of the vascular network will be crucial.

## REFERENCES

- Côté E, Trunfio R, Deslarzes-Dubuis C, Tran K, Corpataux JM, Déglise S. Innovative technique for below-the-knee arterial revascularization using porcine self-made stapled pericardial tube grafts. *Eur J Vasc Endovasc Surg Vasc Forum* 2020;48:23–6.
- Del Tatto B, Saucy F. A new homemade stapled vascular tube graft. *Eur J Vasc Endovasc Surg* 2020;59:320–1.
- Chakfé N, Diener H, Lejay A, Assadian O, Berard X, Caillon J, et al. European society for vascular surgery (ESVS) clinical practice guidelines on the management of vascular graft and endograft infections. *Eur J Vasc Endovasc Surg* 2020;59:339–84.
- Mallee WH, Wijsbek AE, Schafroth MU, Wolke J, Baas DC, Vervest TMJS. Wound complications after total hip arthroplasty: a prospective, randomized controlled trial comparing staples with sutures. *Hip Int* 2020. <https://doi.org/10.1177/1120700020939075>, [epub ahead of print].
- Zouhair S, Aguiari P, Iop L, Vasquez-Rivera A, Filippi A, Romanato F, et al. Preservation strategies for decellularized pericardial scaffolds for off-the-shelf availability. *Acta Biomater* 2019;84:208–21.

\* Corresponding author. Department of Vascular Surgery and Kidney Transplantation, University Hospital of Strasbourg, 1 place de l'hôpital, 67091, Strasbourg, Cedex, France.

E-mail address: [nabil.chakfe@chru-strasbourg.fr](mailto:nabil.chakfe@chru-strasbourg.fr) (Nabil Chakfé).

2666-688X/© 2020 The Authors. Published by Elsevier Ltd on behalf of European Society for Vascular Surgery. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.ejvsf.2020.09.002>