



## Invited Commentary

## Lower Limb Revascularization with Infragenicular Bypass Using PTFE Graft and the Distal Vein Patch Technique: Does It Confer Any Advantage over the Distal Vein Cuff Techniques?

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The need for a prosthetic graft in lower limb revascularization is increasing because of the lack of venous conduits as a result of previous revascularization in the same limb or coronary bypass. Evidence that a PTFE graft with the use of a vein patch or cuff at the distal anastomosis can be associated with acceptable patency rates for femoropopliteal below the knee or femorodistal bypass has provided a new alternative for limb-salvaging procedures.<sup>1–4</sup>

However, technical skills remain of paramount importance for the successful construction of these complex distal anastomoses using a vein cuff or patch. It is therefore of special interest the results of another vein patch technique that Neville et al. present in their article claiming that it confers at least equivalent patency with the previously described techniques in association with simplicity in its construction.<sup>5</sup> The authors present in their current publication their mature experience on a previously described by them technique,<sup>6</sup> the use of distal vein patch (DVP), reporting on 270 infrapopliteal prosthetic bypass grafts performed in 252 patients using a distal vein patch.

From a technical point of view the DVP technique described by Neville et al.<sup>5,6</sup> appears as being simpler than the other previously described vein patch or cuff techniques. From a clinical effectiveness viewpoint the authors in their current report using their technique showed remarkable patency rates of 79% at 1 year, 75% at 2 years, 65% at 3 years and 51% at 4 years, which are favourably comparable with those reported in the literature using either the Taylor patch<sup>1,7</sup> or the Miller cuff.<sup>8,9</sup> Unfortunately because this study was of the retrospective nature the authors could not provide an analysis of the factors determining graft failure, including data on the status of run-off vessels.

The main reasons for the use of an interposition vein material between prosthesis and artery at the distal anastomosis of an infragenicular bypass are considered to be technical by avoiding to suture the prosthetic material to small and very often calcified small arteries and haemodynamic by creating a “buffer” venous

zone in which the hyperplastic response may be less intense and when it happens this to be in the vein and not in the tibial artery. It was proposed that the interposed vein improves distal flow because it reduces the anastomotic resistance as it is more compliant.<sup>10</sup> Subsequently, it was shown that the use of a venous cuff may optimise the mechanical properties of saphenous vein, protect small arteries from anastomotic distortion<sup>11</sup> and decreases the downstream resistance.<sup>12</sup>

Nevertheless, it appears that when using a vein cuff in the distal anastomosis of an infragenicular bypass the geometry, specifically the length-to-height ratio of the cuff configuration, plays important role in the favourable redistribution of intimal hyperplasia. A large length-to-height ratio may result in an unfavourable cuff performance.<sup>13</sup> Most of anastomoses in practice have non-planar configuration, which induce a swirling flow pattern that may normalize wall shear stress and reduce intimal hyperplasia.<sup>14</sup> However, the configuration may depend to the tunnelling of the graft and thus, alteration of the non-planar configuration may occur on several occasions. This approach is giving emphasis to the geometry and not the material used (e.g. vein) and thus it formed the theoretical basis of producing the PTFE pre-cuffed grafts.

The DVP technique described by Neville et al.<sup>5,6</sup> has several advantages over the Miller cuff and St. Mary's boot. Technically it can be performed easier, with a more uniform manner among various surgeons. Haemodynamically-wise it closely approximates the conventional straight flow pattern. This was shown in a previous work by Neville et al.<sup>15</sup> where their technique resulted in uniform flow with a low angle of impingement on the recipient vessel with only a small vortex at the anastomotic heel creating minimal recirculation. In contrast, the pre-cuffed geometries resulted in a large recirculation of low flow chaotic vortex that increased throughout the pulsatile cycle forming regions of low flow velocity in a substantial portion of the pre-cuffed anastomotic configuration.

Nevertheless, as the data in the existing literature on the patency of the infragenicular grafts using distal vein patches or cuffs and the associated limb salvage is derived only from case series, without randomization and with several biases, at least one multicentre randomized trial would be of paramount importance to prove the clinical superiority of one technique versus the other.

DOI of original article: [10.1016/j.ejvs.2012.04.014](https://doi.org/10.1016/j.ejvs.2012.04.014).

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