

was "normal" by the prespecified TTF criteria (mean flow >10 ml/min), but this did not occur in any cases. Indeed, as clearly stated in the manuscript, the mean flow in abnormal (>50% occluded) grafts was  $24.4 \pm 8.6$  ml/min and was  $16.4 \pm 23.0$  ml/min in grafts deemed to be totally occluded by the reference standard. In secondary analyses, if we used a cutoff mean flow of 15 ml/min, we would have identified no additional true positives and 6 false positives. Using a mean flow cutoff of 20 ml/min, we would have identified only one additional true positive and 10 false positives. Our findings are in agreement with the only other prospective comparison of these two techniques by Taggart, who demonstrated that up to 10% of patients may receive erroneous graft revisions based on false positive TTF findings.<sup>5</sup>

Hence, our cutoff value of 10 ml/min minimizes false positives while identifying nearly all true positives and may be an ideal reference value when used in conjunction with PI and DFF. Higher mean flow cutoffs appear to have too many false positives to be reliable measures, and many surgeons are unlikely to revise grafts based on higher flow values for this reason.<sup>6</sup> This is especially true if revision means reinstating cardiopulmonary bypass.

Finally, in regard to cost effectiveness, we have not performed such a comparison, because this was a clinical effectiveness study. It is unlikely that either technology will be highly cost effective in terms of Quality Adjusted Life Years (QALY) which is the generally accepted measure, but there may be cost benefits from non-fatal events.

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## Temporary coronary artery occlusion during off-pump surgery and endothelial vessel dysfunction: Is it still an unresolved mystery?

### To the Editor:

We read with great interest the article by Bouchot and associates.<sup>1</sup> We would like to congratulate the authors for this well-designed study, but we would also add some comments. The aim was to determine the usefulness and safety of the poloxamer P407 gel (LeGoo; Pluromed, Woburn, Mass) to ensure a hemostatic effect at the anastomotic site during off-pump surgery in a porcine model. Twenty Landrace Yorkshire pigs, after median sternotomy, underwent internal thoracic artery off-pump grafting to the left anterior descending artery, the right coronary artery, or both by using the P407 gel to control the anastomotic-site bleeding. The major finding of the study was that the intracoronary injection of P407 gel allows a successful occlusion of the coronary vessel during grafting while preserving the endothelial function. The main limitation of the study protocol is essentially related to the health of the coronary artery tree used as a benchmark. Therefore, the presence of native atherosclerotic lesions might indicate the presence of further and otherwise undiscovered intimal injuries.

We maintain that shunting and snaring during off-pump coronary artery bypass

grafting are both risky procedures,<sup>2</sup> and thus the opportunity to use a gel effective in bleeding control without impairing the endothelial function might have a relevant effect on coronary artery bypass grafting surgery. Therefore, because there is a higher hazard of damage to the coronary wall during vessel manipulation with a more diseased atherosclerotic vessel, we suggest that testing the gel effects on the coronary arteries of patients affected by ischemic cardiomyopathy before heart transplantation and before the start of cardiopulmonary bypass should additionally be performed.

As clinicians continuing to educate ourselves on the benefits of new technologies, we conclude that a more carefully conducted study on a human model might resolve the issue of whether one technique is more suitable than another.

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## Reply to the Editor:

We thank Dr Bottio and collaborators for their kind comments and insightful remarks concerning our recent article in the *Journal* on temporary coronary occlusion with the new poloxamer P-417 (LeGoo; Pluromed, Woburn, Mass) for off-pump coronary artery bypass grafting. We concur with them that one of the limitations of the porcine model used is the presence of normal coronary endothelial coverage and function,