Letters to the Editor

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Left ventricular volume reduction and reshape – ‘Re-STICHING’ the field. Letter regarding the article ‘Less invasive ventricular reconstruction for ischaemic heart failure’

We read with interest the study by Klein et al.1 exploring the effect of a less invasive device in inducing left ventricular reconstruction in failing hearts post-myocardial infarction. Left ventricular remodelling following an anterior myocardial infarction has detrimental effects to the efficacy of the left ventricle. This stems not only from the Laplace law but in addition from the impaired blood flow kinetics within the remodelled left ventricle. The concept of surgical volume reduction of the dilated left ventricle is to exclude the infarcted myocardial tissue, reshape and increase the efficacy of the left ventricle. This strategy faces two major challenges.

First, the final end-diastolic volume should be reduced enough in order to allow the Laplace law to take place effectively. However, the final volume should not be that small, otherwise restrictive phenomena will occur, stroke volume will be reduced, left ventricular filling pressures will rise and re-dilatation of the left ventricle might occur. In those cases, any potential benefit from volume reduction therapies will be eliminated.3 4 In order to avoid the left ventricular excessive volume reduction during the procedure, surgeons are trying to keep the final left ventricular remaining volume close to 60 mL/m² using the ‘balloon sizing’ technique. However, even if it is true that a final volume at that level is sufficient for the normally working heart, we still do not know whether this is also true for an impaired left ventricle that has undergone remodelling.

The second challenge for left ventricular reconstruction surgeries is the restoration of a more conical shape of the left ventricle. Studies have shown that a conical shape results in better outcomes since this shape improves blood flow hydrodynamics. In the STICH trial, left ventricular geometry worsened after left ventricular reconstruction surgery and the left ventricle became more spherical.3 Only those patients that obtained a conical left ventricular shape demonstrated improved outcomes.

Left ventricular reconstruction surgery is not a one size fits all patients, and a more individualized approach should be implemented. Klein et al.1 in a less invasive approach attempted to reduce the volume of the infarcted left ventricle, excluding the non-functioning scarred myocardium. There was a significant reduction in left ventricular volumes and a significant increase in left ventricular ejection fraction. A total of 46 out of 86 participants were characterized as ‘responders’ since they revealed improvement in the 6-min walk test and in their quality of life.

To the direction of a more individualized approach for ventricular volume reduction and reshaping therapies, it would be very helpful if authors could provide also parameters of the shape of the left ventricle before and following the application of the device (apical concinity index, left ventricular sphericity index). The device proposed by Klein et al.1 has the advantage of requiring no cardiopulmonary bypass. In that way, haemodynamic parameters obtained by a Swan–Ganz catheter at the time of the deployment of the device could provide important prognostic information on the short- and long-term adaptation of the left ventricle to the newly acquired volume and shape in a real time way.

Again, we find the study of Klein et al.1 a very important step for a more quantitative and personalized application of left ventricular reshaping and volume reduction therapies.

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Let’s ventricular volume reduction and reshape – ‘Re-STICHING’ the field. Reply

We thank Bonios et al. for their interesting and relevant remarks to our study of the Revivent TC System as an additional personal- ized therapy for a specific type of patients with heart failure after myocardial infarction with scar tissue in the antero-septal or apical wall of the left ventricle.1 Multiple publications described the clinical and functional improvement after (open) surgical ventricular reconstruction in patients with ischaemic cardiomyopathy. In line with these findings, we demonstrated at least equivalent functional and echocardiographic improvements by hybrid left ventricular (LV) reconstruction using the Revivent TC system. The basis for the rationale of LV reconstruction is, as Bonios et al. rightfully refer to, formed by the LaPlace law: decrease of LV volume reduces LV wall stress and both this and the (anatomic/physiologic) reconstruction improve LV contractile properties. Pressure–volume analysis provides the most comprehensive means of assessing
Concluding the changes in LV shape, we agree that additional data on pre- and postoperative shape would be very interesting. However, DiDonato and the RESTORE Group published already in 2006 that the adverse effects of ischaemic cardiomyopathy are statistically evident in every parameter except global sphericity, which remained unchanged between normal patients and those with dilated hearts after anterior infarction. Both ventricular length and width increased following anterior infarction, and hence the dimensionless ratio between length and width did not change, so that the sphericity index was unaltered. Classical parameters of LV shape such as the sphericity index therefore seem insufficient to assess improvements in LV shape post-reconstruction and therefore there is a need for new (perhaps three-dimensional or fusion) imaging parameters on shape (and function) in LV reconstruction procedures.

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Why do left ventricular assist device recipients remain heart failure patients? Letter regarding the article ‘Effects of left ventricular assist device on cardiopulmonary exercise performance’

We read with interest the paper by Trombura et al.1 concerning cardiopulmonary exercise test (CPET) performance after implantation of a single-type left ventricular assist device (LVAD). At 4 postoperative months, 15 patients receiving the continuous-flow axial LVAD Jarvik 2000 (Jarvik Heart Inc., New York, NY, USA) as destination therapy showed an improvement of peak oxygen uptake (VO2), minute ventilation/carbon dioxide production relationship and anaerobic threshold. These findings are worth of interest, since due to donors’ penury, indications for LVAD support are progressively extending towards INTERMACS profiles 4 and 5. As also stated by the Authors, evidence about the real substantial recipients’ gain in terms of exercise capacity remains controversial2 and, even if they report encouraging results, following a down to earth reasoning, we would expect a greater benefit consisting in an almost normalised peak VO2 (or at least a value above the cut-off of 14 mL/kg/min).

We would like to ask Authors’ opinion about the possible influence of several factors theoretically able to partially explain patients’ postoperative still impaired functional status.

For instance, may the intrinsic pulsatility of more recent fully magnetically levitated centrifugal-flow devices (HeartMate 3,