

Extended mild hypothermic aortic surgery[†]

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We read with great interest the report by Urbanski *et al.* [1] on their approach to mild hypothermic aortic arch surgery and the associated editorial [2]. We congratulate the authors for their impressive series, thoughtful approach and excellent results. We would like to discuss the previously published alternative strategies for mild and normothermic total arch replacement.

They demonstrate that an approach to bypass tailoring the degree of cooling to the anticipated extent of repair and duration of corporeal circulatory arrest can be rewarded with excellent outcomes [2]. Nonetheless, the authors had a mean circulatory arrest time of the lower body of 34 ± 12 min, extending to 70 min, at 30°C. These numbers are pushing the limits on warm ischaemia, as 'safe' ischaemic times are in the range of 35 min for the liver, 90 min for the kidneys and 20 min for the spinal cord [3] at mild hypo- or normothermia. Furthermore, their approach required an elaborate succession of cannulations (up to four) and retrograde descending aorta perfusion (as well as a portion of the arch vessels at intermediate steps of completing the arch replacement) through the femoral artery. In a patient population burdened with atheromatous large vessel disease such as this one, this is not an innocuous choice devoid of risk compared with antegrade perfusion.

Axillary artery cannulation has been shown to provide adequate antegrade cerebral perfusion, which we have been using routinely since 2001, including in patients with acute aortic dissection [4]. We have continued to apply this approach routinely since then, with comparable results.

Total arch replacement is also possible under whole body antegrade perfusion [5], by placing a Medtronic DLP[®] venous cannula (Y-ed from the arterial line) through the tube graft into the distal aorta for antegrade lower body perfusion (see figure available at: <http://ats.ctsnetjournals.org/content/vol85/issue1/images/large/347.S0003497507013525.gr1.jpeg>). The brain and lower body are continuously perfused with the exception of a

very limited circulatory arrest time (6–8 min) of the lower body, which only represents the time necessary for resection of the aortic tissues, positioning of the cuffed DLP cannula in the descending aorta and the inflation of the occlusion balloon. In this way, an arch repair is transformed into a standard cardiopulmonary bypass heart operation, with vascular exclusion of the aortic arch and total body antegrade perfusion. The 8 min limited duration of the circulatory arrest in the lower body is safe for the spinal cord and splanchnic organs at this temperature and even in normothermia, as can be necessary in patients who cannot be cooled, such as with cold reactive agglutinins [6]. Furthermore, cannulation of the newly implanted graft is not necessary to achieve antegrade systemic perfusion after the completion of the distal aortic anastomosis. We would also like to note that we have applied this approach in emergent situations, such as acute aortic dissection, with good results, and not restricted this technique to elective cases as reported by Urbanski *et al.* [1].

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