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Should the porcelain aorta be revisited in the era of transcatheter aortic valve replacement?

Thierry Carrel*

Department for Cardiovascular Surgery, University Hospital and University of Bern, Bern, Switzerland

* Corresponding author. Department for Cardiovascular Surgery, University Hospital, Freiburgstrasse, 3010 Bern, Switzerland. Tel: +41-31-6322375; fax: +41-31-6324443; e-mail: thierry.carrel@insel.ch (T. Carrel).

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The overall incidence of major calcification of the ascending aorta is reported to be in the range of 6–8% in patients who are scheduled for aortic valve replacement and/or coronary artery bypass grafting (CABG) [1, 2]. This may lead to an increased rate of neurological complications of up to 30–50% [3].

The porcelain aorta is nowadays considered as a relative contraindication to conventional surgery due to the risk of uncontrollable calcific embolization during aortic manipulations.

The guidelines of the European Society of Cardiology/European Association for Cardio-Thoracic Surgery (ESC/EACTS) consider the porcelain aorta as a condition (among others), in which a catheter-based procedure should be preferred [4]. This strategy has been adopted by US institutions also [5]. Even though this statement appears justified for certain patients, especially for the older ones and those at the highest risk, younger patients may benefit from a more radical aortic procedure (also to avoid spontaneous embolization from the untreated aorta in the long term).

Since the early 1980s, multiple strategies have been described to avoid potential debris embolization during cardiosurgical procedures: (i) axillary or iliac cannulation for arterial return, (ii) intraluminal balloon occlusion of the aorta, (iii) hypothermic circulatory arrest to better control the site of cross-clamping or to replace the ascending aorta without prior clamping, (iv) no aortic touch off-pump coronary bypass grafting using *in situ* arterial grafts with T or Y connection to avoid proximal aortic anastomoses and (v) sutureless aortic valve replacement to speed up surgery if the latter is performed during circulatory arrest [6–9].

The case report by Belhaj *et al.* [10] is timely and demonstrates very well that even patients judged to be inoperable in the past (in this case with a logistic EuroSCORE of 38%) may undergo major aortic and valvular surgery with excellent results and without neurological complication. The described patient was found inoperable or at high risk but he underwent straightforward surgical valve replacement even being several years older.

The excision of the transcatheter aortic valve replacement (TAVR) device is sometimes demanding to avoid endothelial aortic damage in the aortic root. From this point, I can fully support

the technique used in the present case and the conclusions of these authors. However, in our institution we do not regularly decrease the core temperature to 22°C but usually to 28–30°C with a cerebral perfusate temperature at 24°C.

We have recently collected data on 52 consecutive patients with a porcelain aorta who underwent a conventional cardiosurgical procedure. The planning of such a procedure starts with an interdisciplinary Heart-Team discussion and includes a precise analysis of the distribution of the calcifications, the choice of the cannulation site, the definition of a minimal and maximal operative variant and the mode of cerebral protection.

We have used alternative cannulation sites for arterial return in 40 patients (through the right subclavian artery in the majority of the cases), whereas in 2 patients, the middle aortic arch was cannulated. The operation was performed under hypothermic circulatory arrest before cross-clamping in all these patients. Replacement of the ascending aorta was performed using an open aortic arch anastomosis technique when necessary (\pm local endarterectomy at the anastomotic site), while the cardiac part of the procedure was performed during rewarming with the prosthetic graft clamped. Seven patients underwent CABG on the beating heart with T- or Y-grafts using both internal thoracic arteries as the unique blood source for the revascularization. Before TAVR era, we performed an apicoaortic conduit (as an aortic valve replacement procedure) from a lateral thoracotomy under peripheral cardiopulmonary bypass and ventricular fibrillation in 3 patients.

The results were promising with an overall at neurological complication rate of 9.6% (5/52); 3 of these complications resolved until the patient was discharged.

This case report also demonstrates that the durability of TAVR prostheses may be rather short with severe degeneration leading to the need to exchange the valve as early as 5–7 years following the initial implantation.

Finally, the future generation of cardiac surgeons (even if hybrid or not) should keep in mind the armamentarium of surgical techniques to safely deal with a porcelain aorta in case TAVR is not indicated or (occasionally) is not feasible.

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