Techniques for Aortic Arch Exclusion and Stent Grafting for Arch Aneurysms and Dissections

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Patrice F. Bergeron, MD, Marseille, France; P. Coulon; T. de Chaumaray; M. Ruiz Patino; F. Mariotti; J. Gay, Marseille, France

Introduction

Aortic arch (AA) aneurysms and dissections have remained a challenge for vascular physicians during the past 2 or 3 years. Conventional open repair of the AA is still the "gold standard" technique for low-risk patients, but high-risk patients (HRP) have long been excluded. Although endovascular aneurysm repair (EVAR) of descending thoracic aortic diseases (TAD) has been proved to be safe and feasible for more than 10 years, it was not considered in the AA, except through experimental approaches such as branched stent grafts. For 3 years, we have been developing a new hybrid approach of aortic arch pathologies, available to vascular surgeons, and we report here our experience and mid-term results.

Material and Methods

Between May 2001 and June 2005, we treated 28 high-risk patients (HRP) (male/female ratio = 4.75; mean age: 70.7 ± 9.7 years old [51 to 85]) with industrial SG for TAD involving the AA. Fourteen (50%) had pure thoracic aortic aneurysms, 13 had a thoracic aortic dissection, and 1 was treated for a false aneurysm of the distal ascending aorta. We performed 13 total arch transpositions (46%) and 15 hemi-arch transpositions. We used industrial endografts, available during the period: 12 Talent, 4 Excluder, 6 TAG, and 6 Zenith devices.

Results

Technical success rate of hemi-arch exclusion was 93% owing to one unfit patient in which intravascular ultrasonography showed proximal neck to be < 20 mm. One patient died from iliac artery rupture, and another one had a minor stroke after transposition, which worsened to major stroke after EVAR.

All total-arch transpositions and SG deployment over the aortic arch were carried out successfully. We had 1 delayed retrograde Stanford type A dissection that remained uncomplicated, 1 localized uncomplicated hemopericardium, 1 delayed minor stroke due to carotid bypass occlusion, and 1 fatal left ventricle perforation. Overall in-hospital major stroke/death rate was 10.7% (3 of 28).

As for successful exclusion rates, we had 2 early endoleaks (14.3%) on aortic aneurysm, of which 1 transient type 1 and 1 type 2 (left subclavian artery) successfully treated. On aortic dissection, we observed 2 persistent antegrade patent false channels (15.4%): 1 was successfully treated by graft extension, and the second has remained under surveillance. Neither paraplegia nor stent related complication was reported.

During a mean follow-up of 19.3 ± 14.2 months, 1 new endoleak appeared distally on an excluded thoracic aortic aneurysm and was treated by graft extension, leading to a successful exclusion rate of 93% on aneurysms. We also had 1 new retrograde recirculation on a thoracic aortic dissection, decreasing the successful exclusion rate of false channels to 77%. One patient (3.6%) developed unilateral lower limb deficit, which resolved after by CSF drainage and then was recurrent. One patient died at 3 months after the procedure from acute respiratory worsening. The survival rate at 19 months was 89.3%.

Conclusions

Thanks to the hybrid technique, HRP can benefit from EVAR for AA diseases. Our results show that in this case, the staged combined technique is reliable and offers encouraging mid-term results. Although its results rely on the long-term outcomes of EVAR in the descending aorta, its efficacy and security in the AA, in terms of freedom from aortic rupture and survival rate, look acceptable. Thanks to this strategy, vascular surgeons now have an access to AA repair and perhaps maybe extend their expertise to the ascending aorta.