

Shimamura and colleagues [9] repaired the aortic arch with the open stent grafting technique using a branched endoprosthesis to reconstruct simultaneously the arch branches and the descending aorta, with satisfactory early results. Chen and colleagues [6] reported the success of the treatment of type A dissection in 30 patients using the 3-branch stent graft. Using similar technology, we only needed to implant the stent graft and complete one clearly exposed vascular anastomosis during the deep hypothermic circulatory arrest time. This procedure not only avoided the difficulty of performing the distal anastomosis in the descending aorta but also prevented injury to the recurrent laryngeal nerve.

We think the cause of the 1 death might have been the rupture of the bronchial artery, which was caused by the endoleak. The exact cause of the endoleak was not discovered. One reason we think may be that the proximal stent-free sewing Dacron tube of the main graft did not have a tight fit with the aortic wall during the reconstruction of the transected distal stump of the ascending aorta.

The primary limitation of this study was that comparisons between the total arch replacement group and the triple-branched stent graft group were not made. The number of patients was small, and the data preliminary. Our long-term follow-up results and the experience of this technique for Marfan patients were limited. To elucidate the precise advantage of this technique, a prospective case-control study would be required.

References

1. Concistrè G, Casali G, Santaniello E, et al. Reoperation after surgical correction of acute type A aortic dissection: risk factor analysis. *Ann Thorac Surg* 2012;93:450-5.
2. Esposito G, Cappabianca G, Ciano M, et al. Mid-term results of the Lupiae technique in patients with De Bakey type I acute aortic dissection. *Eur J Cardiothorac Surg* 2012;42:242-7. discussion 247-8.
3. Cirillo P, Iannelli G, Piscione F. Endovascular treatment of residual type A aortic dissection preserving patency of supra-aortic vessels by implantation of the Djumbodis® system. No more surgery for the aortic arch? *J Invasive Cardiol* 2011;23:E251-3.
4. Kato M, Ohnishi K, Kaneko M, et al. New graft-implanting method for thoracic aortic aneurysm or dissection with a stented graft. *Circulation* 1996;94(suppl II):II188-93.
5. Sun L, Qi R, Zhu J, Liu Y, Zheng J. Total arch replacement combined with stented elephant trunk implantation a new "standard" therapy for type a dissection involving repair of the aortic arch? *Circulation* 2011;123:971-8.
6. Chen L, Dai X, Lu L, Zhang GC, Cao H. Extensive primary repair of the thoracic aorta in acute type A aortic dissection by means of ascending aorta replacement combined with open placement of triple-branched stent graft early results. *Circulation* 2010;122:1373-8.
7. Tsagakis K, Kamler M, Kuehl H, et al. Avoidance of proximal endoleak using a hybrid stent graft in arch replacement and descending aorta stenting. *Ann Thorac Surg* 2009;88:773-9.
8. Borst HG, Walterbusch G, Schaps D. Extensive aortic replacement using elephant trunk" prosthesis. *Thorac Cardiovasc Surg* 1983;31:37-40.
9. Shimamura K, Kuratani T, Matsumiva G, et al. Hybrid endovascular aortic arch repair using branched endoprosthesis: the second-generation "branched" open stent-grafting technique. *J Thorac Cardiovasc Surg* 2009;138:46-52. discussion 52-3.

INVITED COMMENTARY

Total arch replacement in acute aortic dissection is a challenging procedure because of tissue fragility of the aorta and supraaortic trunks. The paper by Pan and colleagues [1] suggests a possible "hybrid solution" to increase the safety of the operation, which, however, remains complex and raises some concerns. The possible presence of distal reentries in dissected supraaortic trunks and reperfusion of the false channel around the stented true lumen may sustain endovascular leaks and bleeding. The distal landing zone in the dissected descending thoracic aorta are additional concerns. Reconstruction of the proximal arch wall and anastomosis to a hybrid graft placed inside may be cumbersome and may lead to development of endovascular leaks. Finally, the need to respect precise dimensional relationships between vessel diameter and the size of the implanted stent graft to achieve effective endovascular sealing raises concern. Because the aortic and each supraaortic trunk diameters are virtually infinite (and may require customization of the prosthesis), the chance to achieve a "perfect fitting, using a one-piece aorta three-branched graft" in an

emergent situation is not likely. Nevertheless the results reported by the authors suggest that these are not particularly crucial issues.

Endovascular grafting of the aortic arch remains a pioneer procedure of unknown effectiveness until proved by long-term follow-up studies. Arch anatomy together with unique torsion forces and stresses are not ideal for safe and effective endovascular procedures, which so far are not reserved for patients ineligible for conventional surgical repair. Such considerations are obviously exacerbated by aortic dissection.

Nonetheless, development of prostheses based on endovascular technology implanted during open surgical repair (sutureless valves, Evita and Thoraflex hybrid grafts) is an interesting new field. This phenomenon clearly takes into account the great need for adaptability and creativity required by aortic surgery. New and better solutions, which take advantage of advances offered by our "sister" specialties (eg, radiology, interventional cardiology) are needed. In their practice, cardiac surgeons "see" the disease and know details, pitfalls, and potential sources of catastrophes. Having direct

experience with the problems, they are always ready to improvise effective solutions to improve the surgical results. Obviously it is not conceivable surgeons creating “their own prosthesis” can use it in clinical practice freely on their own. All new technologies and devices must undergo strict ethical rules and obtain informed consent before safety and efficacy can be established by controlled pilot studies.

The experience of Pan and coworkers [1], with the above caveats but also with the perspectives of existing technology, demonstrates that in the first decade of the millennium cardiac surgery was changing and is beginning to write its future, in which we all will have to become “hybrid surgeons.”

Luigi Muzzi, MD
Eugenio Neri, MD

Heart and Great Vessels Surgery Unit
Department of Cardiothoracic Surgery
Siena University Hospital S. Maria alle Scotte
Viale M. Bracci 1
Siena 53100, Italy
e-mail: euxneri@tin.it

Reference

1. Pan J, Li Q-G, Zhou Q, Wang Q, Wu Z, Wang D-J. Repair of acute type A aortic dissections using open replacement with triple-branched stent grafts. *Ann Thorac Surg* 2013;96:559–63.