FIGURE 1. Stented graft. A, Catheter sheath containing the stented graft in a bound and compressed state. B, Stent graft springs open and expands completely.

temperature was reached. SACP was initiated through the right axillary artery. The ascending aorta and transverse arch were opened. The stented elephant trunk was then inserted into the true lumen of the descending thoracic aorta in a compressed state. The proximal edge of the residual aorta was trimmed to match the proximal end of the stent graft. The anastomosis between the 4-branched prosthetic graft and the distal aorta containing the intraluminal stented graft was carried out using the “open” aortic technique. Once the anastomosis was completed, lower body perfusion was started via the limb of the 4-branched prosthetic graft. Then the left common carotid, innominate, and left subclavian arteries were anastomosed to the respective limbs of the 4-branched prosthetic graft in an end-to-end style in turn.

In conclusion, the benefits of the Sun’s procedure (1) result in less late dilatation of the dissected descending aorta, (2) prolong the reoperation interval or reduce the number of late thoracoabdominal aortic replacements except in a patent false lumen around the stented elephant trunk, and (3) facilitate late thoracoabdominal aortic

replacement. Other than that, compared with the CSB procedure, only 1 anastomosis needs to be finished under HCA with SACP, which could shorten SACP time during HCA, possibly decreasing cerebral injury during HCA and also avoiding radiology exposure to the patients with staged thoracic stent grafting to achieve hybrid arch reconstruction.

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References

1. Xydias S, Wei B, Takayama H, Russo M, Bacchetta M, Smith CR, et al. Use of carotid-sub-

clavian arterial bypass and thoracic endovascular aortic repair to minimize cerebral ischemia in total aortic arch reconstruction. *J Thorac Cardiovasc Surg.* 2010;139:717-22.

2. Sun L, Qi R, Chang Q, Zhu J, Liu Y, Yu C, et al. Surgery for Marfan patients with acute type A dissection using a stented elephant trunk procedure. *Ann Thorac Surg.* 2008;86:1821-5.
3. Sun LZ, Qi RD, Chang Q, Zhu JM, Liu YM, Yu CT, et al. Surgery for acute type A dissection using total arch replacement combined with stented elephant trunk implantation: experience with 107 patients. *J Thorac Cardiovasc Surg.* 2009;138:1358-62.
4. Sun L, Qi R, Chang Q, Zhu J, Liu Y, Yu C, et al. Surgery for acute type A dissection with the tear in the descending aorta using a stented elephant trunk procedure. *Ann Thorac Surg.* 2009;87:1177-80.
5. Liu ZG, Sun LZ, Chang Q, Zhu JM, Dong C, Yu CT, et al. Should the “elephant trunk” be skeletonized? Total arch replacement combined with stented elephant trunk implantation for Stanford type A aortic dissection. *J Thorac Cardiovasc Surg.* 2006;131:107-13.
6. Ji B, Sun L, Liu J, Liu M, Sun G, Wang G, et al. The application of a modified technique of SCP under DHCA during total aortic arch replacement combined with stented elephant trunk implantation. *Perfusion.* 2006;21:255-8.

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Reply to the Editor:

We read with appreciation the letter by Ji and associates from the Beijing Anzhen Hospital concerning our article, “Use of Carotid–Subclavian Bypass and Thoracic Endovascular Aortic Repair to Minimize Cerebral Ischemia.”¹ We described the use of left carotid–subclavian bypass (CSB) combined with staged thoracic stent grafting to achieve total aortic arch replacement (TAAR) with decreased selective antegrade cerebral perfusion (SACP), cardiopulmonary bypass (CPB), and aortic crossclamp times.

Ji’s group (Sun and colleagues²⁻⁴) have recently reported their experience with the “Sun procedure,” with total arch replacement and concomitant stented elephant trunk implantation to treat acute type A aortic dissection. Their general approach involves cannulation of the axillary artery and antegrade perfusion via 1 limb of a 4-branched prosthetic graft. Cooling is performed with a target temperature of 18°C to 22°C. SACP is initiated, the stented elephant trunk is deployed, and the distal aortic anastomosis is

performed. Subsequently, perfusion is restored to the lower body via the perfusion limb of the branched prosthetic graft, and the left carotid artery anastomosis is conducted. The left subclavian and innominate anastomoses are done after initiation of full CPB and the re-warming process. This leaves 2 anastomoses (the distal and left carotid) to be done under SACP. We applaud the fact that this approach avoids full HCA as part of the TAAR.

These general approaches do have some key similarities. We believe that the common goals of minimizing HCA and SACP times as a means of minimizing neurologic sequelae of TAAR are paramount to obtaining optimal clinical outcomes. Both operations do allow for stent procedures to treat both the distal aortic arch and proximal descending aorta. Our approach does also allow for concomitant distal arch and descending TEVAR (thoracic endovascular aneurysm repair) as a means of a single stage approach if this is deemed desirable (as opposed to staged TEVAR during the same patient hospitalization).

There are subtle differences, however, that may result in clinical advantages to our approach. As described in our series, the performance of CSB simplifies the approach to TAAR and decreases the number of arch anastomoses from 3 to 2. In other words, this avoids the need for the left subclavian-graft anastomosis through a sternotomy, which is usually technically challenging and unduly prolongs SACP times. This also allows for neu-

rologic protection during the de-branching of the left common carotid artery owing to temporary left subclavian-carotid artery flow via the SCB. If desired, the left carotid-graft anastomosis may even be constructed off-pump. CSB also allows the graft-distal aortic anastomosis to be performed between the left carotid and left subclavian artery takeoff and therefore more proximally than in the Sun or conventional TAAR approaches (ie, after the takeoff of the left subclavian artery). This typically means that the distal anastomosis is performed with better visualization and relative ease, minimizing the SACP time required. Not surprisingly, comparison of the average SACP, CBP, and crossclamp times would indicate shorter and simpler means of TAAR with our approach by considerable margins in comparison of published results of the Sun approach.²⁻⁴ As such, the target cooling temperature with our series was 28°C, in contrast to 18°C to 22°C with the Sun procedure.

Last, although we do not have experience with the MicroPort stent graft (MicroPort Medical Company Limited, Shanghai, China) used with the Sun procedure, our approach would be compatible with use of any commercially available stent devices for completion of the TEVAR, concomitantly or during a staged procedure.

Only long-term and likely multicenter trials involving hybrid and endovascular approaches to TAAR can evaluate their efficacy and durability in comparison with conventional open TAAR.

Comparison of the Sun and other hybrid approaches may similarly be worthwhile. The overall goals of decreasing the neurologic and other mortality and morbidity associated with TAAR are an important end goal given the significant cerebral ischemia risks of conventional open TAAR.

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References

1. Xydas S, Wei B, Takayama H, Russo M, Bacchetta M, Smith CR, et al. Use of carotid-subclavian arterial bypass and thoracic endovascular aortic repair to minimize cerebral ischemia in total aortic arch reconstruction. *J Thorac Cardiovasc Surg*. 2010;139:717-22.
2. Sun L, Qi R, Chang Q, Zhu JM, Liu YM, Yu CT, et al. Is total arch replacement combined with stented elephant trunk implantation justified for patients with chronic Stanford type A aortic dissection? *J Thorac Cardiovasc Surg*. 2009;138:892-6.
3. Sun LZ, Qi RD, Chang Q, Zhu JM, Liu YM, Yu CT, et al. Surgery for acute type A dissection using total arch replacement combined with stented elephant trunk implantation: experience with 107 patients. *J Thorac Cardiovasc Surg*. 2009;138:1358-62.
4. Sun L, Qi R, Chang Q, Zhu J, Liu Y, Yu C, et al. Surgery for acute type A dissection with the tear in the descending aorta using a stented elephant trunk procedure. *Ann Thorac Surg*. 2009;87:1177-80.

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