Application of the “branch-first technique” in Sun’s procedure

Jun Zheng, Shang-Dong Xu, Chang-Wei Ren, Sheng Yang, Yong-Min Liu, Jun-Ming Zhu, Li-Zhong Sun, Hui-Qiang Gao

Department of Cardiac Surgery, Beijing Anzhen Hospital, Capital Medical University, Beijing 100029, China.

To the Editor: The branch-first technique has been reported in arch replacement for patients with lesions in order to provide total cerebral perfusion during the operation. A double “Y,” or modified three-branch graft, was used in this technique. Here we reported a branch-first technique combined with Sun’s procedure using a “Y” shaped graft.

A 62-year-old man was found having a localized penetrating ulcer at the junction of the ascending aorta and the aortic arch [Figure 1A]. Replacement of the ascending aorta and the arch was planned. Under general anesthesia, the right axillary artery and the right common femoral artery were mobilized. A median sternotomy was made, and 3 arch vessels were mobilized. A “Y” shaped graft was made with a 16 mm straight Dacron graft (Vascutek, Inchinnan, Scotland, UK) and an-8 mm straight Dacron graft (InterGard, France) as shown in Figure 1B. The 16 mm graft was the trunk and the 8 mm graft was the side arm. The right axillary artery, right common femoral artery and right atrium were cannulated to establish the cardiopulmonary bypass (CPB). The CPB was started without lowering the temperature and with a beating heart. The average arterial blood pressure was maintained at about 80mmHg. The innominate artery was clamped and transected 1 cm distal to its origin. The stump of the innominate artery was closed by continuous prolene running suture. After the anastomosis was done, systemic perfusion was resumed. Follow deairing of the heart, the cross clamp was opened. A side bite clamp was applied to the ascending aorta graft. A fenestration was made. The proximal end of the 16 mm graft was then anastomosed to the ascending aorta graft in an end-to-side fashion [Figure 1D]. The cross clamp time was 58 min, the CPB time was 107 min and the circulatory arrest with total cerebral perfusion time was 13 min in this case. The patient recovered well after surgery and had no neurological complications. CT angiography showed good results postoperatively [Figure 2].

Surgery of aortic dissections, penetrating ulcers, and aneurysms involving the aortic arch has had difficult problems in cardiac surgery. The emergence of Sun’s procedure has solved this problem and has greatly improved the feasibility of aortic arch surgery. The procedure introduced in this report, using branch-first technology, is a new variant of Sun’s procedure.

The branch-first technique originated from an improvement of Spielvogel’s approach to aortic arch surgery. He was the first to reconstruct the aortic arch vessels using the three-branch graft. The surgery was performed under the axillary artery cannula. After systemic cooling, the reconstruction of
the aortic arch vessels was completed under circulatory arrest and selective cerebral perfusion. The order of vascular reconstruction was the left common carotid artery first, then the left subclavian artery, and finally the innominate artery. Because only the axillary artery cannula is used, the cooling process must be completed before the innominate artery can be reconstructed. In 2011, Matalanis et al.\textsuperscript{[5,6]} reported a series of cases and improved the method. In these reports,
they simultaneously cannulated the femoral artery and the axillary artery. In this way, the innominate artery was first cut-off for reconstruction without affecting the lower body perfusion, not affecting the cooling and rewarming process. The reconstruction order was changed to the innominate artery first, then the left common carotid artery, and finally the left subclavian artery. A modified 3-branch graft was used in reconstruction of the 3 arch vessels. After the innominate artery and left common carotid artery anastomosis was completed, the 3-branch graft was desired. The 3-branch graft supplies blood simultaneously to the innominate artery and the left common carotid artery. Finally, the left subclavian artery was reconstructed. By using this method, there was only a temporary ischemia of the left common carotid artery when the left common carotid artery was reconstructed, and during the remaining time, there was continuous bilateral cerebral perfusion.

In conclusion, the “Y” shaped graft is feasible in Sun’s procedure with the branch-first technique in arch replacement.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflicts of interest

None.

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