Author’s response to reviews

Title: Modification in aortic arch replacement surgery

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Some questions concerning technique and case:

1. In how many patients did you perform this technique?

Since 2012, 41 patients (aortic dissection, 36 cases; arch aneurysm, 5) have undergone this modified procedure.

2. What are your results? What kind of complications did you observe?

Arch replacement surgery could be completed within approximately 4 hrs, and during 2 years of treating aortic dissection or arch aneurysm, only four anastomoses were required during the first stage of surgery: two in the aorta and one each in the innominate and left common carotid arteries. No patient died of surgical causes, and no stent grafts deployed into the false lumen, which tends to occur with traditionally antegrade deployment.

3. I'd like to read more about your postulated advantages compared to traditional arch replacement techniques. Why do you think we should use your replacement strategy, which needs two procedural steps?

The following advantages were achieved for acute aortic dissection:

The left subclavian artery remained perfused by the aorta from the true or false lumen. It could be covered by the stent graft or reserved for the second stage. Thus, only four anastomoses were
required during the first stage of surgery: two in the aorta and one each in the innominate and left common carotid arteries.

The retrograde manner of stent deployment avoids plunging the stent graft into the false lumen through the torn intima.

We have more choosable specifications and models of the interventional stent grafts than the graft of stented trunk in China. That is important for protecting the descending aorta containing stent graft. The best stent graft we think is as soft as it can be to fit the diameter and shape of descending aorta.

Cardiac arrest is avoided unless the femoral approach of stent graft delivery is not permitted.

4. Centers use more and more antegrade perfusion strategies because of better outcome. Do you really need retrograde perfusion in your Setting? Don't you think that cannulation of the branched prosthesis might be sufficient?

The left femoral artery was exposed and cannulated using a cannula connected to the cardiopulmonary bypass to yield retrograde artery perfusion. This step could be performed along with steps in the chest to save time. After inserting a two-stage cannula in the right atrium, we established another artery cannula branched from the artery end of cardiopulmonary bypass using a Y-shaped connector to the perfusion branch of the graft. Accordingly, the aorta was perfused in both an antegrade and retrograde manner, which allowed adequate perfusion of the viscera, even in the presence of preoperative malperfusion syndrome. Sometime, cannulation of the branched prosthesis for antegrade perfusion is not sufficient for aortic dissection patients.

5. In Basel we do hemi-arch replacement with placement of a stented Graft into the proximal descending Aorta. Additionally we use cerebral perfusion catheters during hypothermic (30°C) circulatory arrest. The Operation is performed in less than 3h with very good Long-term results. Why and if, when should I Switch?

Yes, very good question. For type A dissection, in order to shorten surgery time as possible, we recommend that our procedure be performed in two stages, especially for patients with the most severe conditions (e.g., hypotension with heart/brain/liver/kidney injury; older age; obese; cerebral infarction).

An arch aneurysm can be treated in a single stage, as false lumen deployment is not a concern. This is very similar to hemi-arch replacement with a stented graft/elephant trunk into the proximal descending aorta. The former avoids temporary cardiac/cerebral arrest, risk of stenting
into false lumen. The latter has no restriction of bad stent graft delivery access retrogradely. I think you might save more time if choosing our modified procedure in treating arch aneurysm.