The fenestrated frozen elephant trunk technique for acute type A aortic dissection

Homare Okamura, MD, PhD, Mamoru Arakawa, MD, PhD, Taro Takeuchi, MD, and Hideo Adachi, MD, PhD, Tokyo, Japan

From the Department of Cardiovascular Surgery, Nerima Hikarigaoka Hospital, Tokyo, Japan.

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Address for reprints: Homare Okamura, MD, PhD, 2-11-1 Hikarigaoka, Nerima-Ku, Tokyo 179-0072, Japan (E-mail: homareo@jade.com.jp).

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The fenestrated frozen elephant trunk technique.

▶ Video clip is available online.

Central Message

The fenestrated frozen elephant trunk technique for acute type A aortic dissection is a simple and effective procedure that does not require reconstruction of the left subclavian artery.

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In the treatment of acute type A aortic dissection, the frozen elephant trunk (FET) technique has been reported to promote thrombosis of the false lumen in the downstream descending aorta.^{1,2} Total arch replacement with the FET

FIGURE 1. Preoperative contrast-enhanced computed tomographic scan.

FIGURE 2. The fenestrated frozen elephant trunk technique. A, Schema of the procedure. B, Sagittal view of the postoperative computed tomography scan. C, Postoperative 3-dimensional computed tomographic scan. The *arrow* indicates the distal anastomosis. LSCA, Left subclavian artery.

technique is complex and technically demanding, however, especially for surgeons who do not encounter a high number of patients at their centers. We report a case of total arch replacement with a fenestrated FET technique.

CLINICAL SUMMARY

A 69-year-old woman who presented with syncope was transferred to our institution. Her previous medical history had no significant findings. Contrast-enhanced computed tomography (CT) demonstrated type A aortic dissection with an entry in the transverse arch and pericardial effusion (Figure 1).

Emergency surgery was performed through a median sternotomy. The patient was in cardiac arrest at the beginning of surgery, and cardiopulmonary bypass was established by cannulation of the apex of the heart, superior vena cava, inferior vena cava, and a left ventricular vent. Transapical cannulation was chosen because this technique is fast and allows the possibility for cannulation under direct cardiac massage. Hypothermic circulatory arrest was performed at a rectal temperature of

25°C. Retrograde and antegrade cold blood cardioplegic solutions were intermittently administered. Antegrade selective cerebral perfusion into the innominate and left common carotid arteries was initiated, and the entry tear in the transverse arch was excised. The transverse arch was transected proximal to the left subclavian artery (LSCA), and a commercially available FET graft (J Graft FROZENIX; Japan Lifeline, Tokyo, Japan)³ was deployed across the aortic arch into the descending aorta. The stent graft was sized at 90% of the diameter of the descending aorta according to the preoperative CT scan. The diameter and length of the FET were 25 mm and 90 mm, respectively. Subsequently, a hole approximately 10 mm in size was manually created on the LSCA side of the FET graft (Figure 2, A, and Video 1). After reinforcement with a felt strip, a 4-branched J graft (Japan Lifeline) was anastomosed to the distal end with 4-0 polypropylene running sutures. Total circulatory arrest time was 37 minutes. Subsequently, a proximal anastomosis was performed with 4-0 polypropylene continuous sutures, and the heart was restarted.

VIDEO 1. An intraoperative video that demonstrates the fenestrated frozen elephant trunk technique. Video available at: [https://www.jtcvs.org/article/S0022-5223\(18\)30879-1/fulltext](https://www.jtcvs.org/article/S0022-5223(18)30879-1/fulltext).

Reconstruction of the left common carotid and innominate arteries was performed with 5-0 polypropylene continuous sutures, with the heart beating. Cardiopulmonary bypass and aortic crossclamp times were 175 and 92 minutes, respectively.

The patient's postoperative course was uneventful. Postoperative CT showed that the blood flow into the LSCA was well preserved through the fenestration in the FET. The false lumen in the downstream aorta was thrombosed (Figure 2, B and C). The patient underwent surgery 2 months before this writing; to date, postdischarge follow-up CT has not been performed.

DISCUSSION

In the treatment of acute type A aortic dissection, the prevention of aneurysmal dilatation in the downstream aorta and the avoidance of subsequent distal reoperation remain important issues. The complexity of total arch replacement

with the FET technique in the acute setting, however, makes this procedure challenging.

In our technique, LSCA reconstruction was not necessary, because the fenestration allowed antegrade flow into the LSCA. Although with this technique there remains some concern regarding the risk of endoleak from the fenestration, unlike a true aneurysm, an endoleak through the fenestration does not directly cause aortic rupture after aortic repair with an entry resection for the aortic dissection. It is also possible to treat a potential endoleak later, if necessary, by stenting the LSCA.

We did not deploy the stent into the LSCA, because we thought that flow into the LSCA was well preserved without stenting. The fenestration was precisely created at the LSCA orifice under direct vision, and no differences in blood pressure in both arms were noted during surgery.

Roselli and colleagues⁴ previously reported a fenestrated FET technique. In their technique, however, the left common carotid artery was adjacent to the LSCA, and the secondary thoracic endovascular aortic repair for the aortic arch enlargement required a debranching procedure. Our technique provides a sufficient proximal landing zone for a future thoracic endovascular aortic repair option.

In conclusion, the fenestrated FET technique for treating acute type A aortic dissection is a simple and effective procedure that expedites aortic repair.

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