► **Case Report** ◀

Peripartum Type A Aortic Dissection Repair Using Frozen Elephant Trunk Technique

Yasunori Iida, MD, PhD,^{1, 2} Tsutomu Ito, MD, PhD,¹ Yu Inaba, MD,¹ Sachiko Hayashi, MD,¹ Takahiko Misumi, MD, PhD,¹ and Hideyuki Shimizu, MD, PhD²

A 43-year-old woman with abdominal and back pain during childbirth consulted us 1 day postdelivery. Contrast-enhanced computed tomography (CT) revealed partially thrombosed type A aortic dissection with intimal tear in the proximal descending thoracic aorta. Conservative antihypertensive treatment was started. However, her abdominal pain progressively deteriorated. Repeat CT revealed narrowing of the descending aorta true lumen and progressive bowel malperfusion. Total arch replacement was urgently performed using the frozen elephant trunk technique. Postoperative CT showed true lumen widening and symptom disappearance. Follow-up CT demonstrated excellent aortic remodeling.

Keywords: peripartum aortic dissection, pregnancy, aortic remodeling

Introduction

Aortic dissection during pregnancy is a life-threatening complication for the mother and fetus in emergency obstetrics. The International Registry of Acute Aortic Dissection reported a 0.2% increase in the risk of aortic dissection during the third trimester or early postpartum period.¹⁾

We successfully treated the type A aortic dissection of a 43-year-old woman which developed during labor by total arch replacement using the frozen elephant trunk (FET) technique 8 days postdelivery.

¹Department of Cardiovascular Surgery, Saiseikai Yokohamashi Tobu Hospital, Yokohama, Kanagawa, Japan

²Department of Cardiovascular Surgery, School of Medicine, Keio University, Tokyo, Japan

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Corresponding author: Yasunori Iida, MD, PhD. Department of Cardiovascular Surgery, Saiseikai Yokohamashi Tobu Hospital, 3-6-1 Shimosueyoshi, Tsurumi-Ku, Yokohama, Kanagawa 230-8765, Japan

Tel: +81-3-5363-3804, Fax: +81-3-5379-3034

E-mail: y.iida@vanilla.ocn.ne.jp

Case Report

A 43-year-old woman under hypertension medication consulted us for sudden postpartum upper abdominal and back pain. She delivered a baby girl 7 days ago and since then felt refractory continuous upper abdominal and back pain. On admission, her height was 157 cm and her weight was 68 kg, without any Marfan syndrome or Loeys-Dietz syndrome features. Her blood pressure was 182/92 mmHg, with no difference in both arms. Chest X-ray showed mediastinal enlargement.

Contrast-enhanced computed tomography (CT) showed type A aortic dissection. The primary entry tear was in the proximal site of the distal arch (Fig. 1A). The descending aorta true lumen was compressed by the false lumen owing to the large entry in the distal arch (Fig. 1B). Conservative antihypertensive treatment was started because of the thin and thrombosed ascending aorta false lumen. The patient's blood pressure decreased to 122/56 mmHg. However, her abdominal pain progressively deteriorated. Repeat CT revealed narrowing of the descending aorta true lumen (Fig. 2A); visceral malperfusion worsening was anticipated (Fig. 2B).

Considering the progressive risk of visceral malperfusion, the patient underwent urgent operation. To resect the primary entry tear and enlarge the true lumen distally as extensively as possible, we performed total arch replacement using the FET technique. Following median sternotomy, cardiopulmonary bypass (CPB) was established. Under circulatory arrest (CA) with selective cerebral perfusion (SCP) at a rectal temperature of 25°C, the ascending aorta was opened. There was an intimal tear in the proximal descending aorta. The proximal descending aorta was constituted to obliterate the false lumen. For the FET technique, a 26-mm-diameter stent graft (J Graft open stent graft, Junken Medical Co., Ltd., Chiba, Japan) was introduced and deployed antegradely into the descending aorta true lumen. The integrated Dacron graft was pulled out and sutured with the orifice of the previously constituted descending aorta. Three arch vessels were reconstructed using a tetrafurcated 24-mm-diameter woven Dacron graft (J Graft Shield Neo, Junken Medical Co.,

Fig. 1 (A) Preoperative contrast-enhanced CT showing type A aortic dissection with the primary entry tear in the proximal distal arch (arrow). (B) CT showing the true lumen of the descending thoracic aorta compressed by the enlarged false lumen (arrow). CT: computed tomography

Fig. 2 (A) Repeat contrast-enhanced CT showing a narrowed true lumen of the descending aorta compared with the initial CT shown in **Fig. 1B** (arrow). (B) CT also demonstrated a narrowed true lumen of the superior mesenteric artery (arrow). CT: computed tomography

Ltd.) followed by proximal anastomosis. The CPB, CA, and SCP times were 215, 69, and 150 minutes, respectively.

The postoperative course was uneventful and the patient was discharged on postoperative day 14. Discharge CT scans demonstrated intimal tear closure in the proximal descending aorta and widening of the descending aorta true lumen by the FET technique (**Fig. 3A–C**). Follow-up CT 6 months postoperation revealed excellent aortic remodeling in the descending and abdominal aorta (**Fig. 3D–F**).

Discussion

Type A aortic dissection during pregnancy is a rare life-threatening complication for the mother and fetus. Hemodynamic and endocrine changes of pregnancy (e.g., increased heart rate, stroke volume, cardiac output, and left ventricular mass) significantly increase aortic wall

stress.²⁾ Estrogen receptors are expressed in aortic tissue. Elevated estrogen concentrations increase reticular fiber fragmentation, and reduce acid mucopolysaccharides and the normal elastic fiber wavy form.³⁾

Immer et al. reported a 16% maternal mortality rate for type A and 0% for type B aortic dissections in 57 pregnant women. The fetal mortality rate was 29% for type A and 25% for type B aortic dissections.³⁾ Rajagopalan et al. reported a 21% maternal mortality rate for type A and 24% for type B aortic dissections in 75 pregnant women. The fetal mortality rate was 10% for type A and 35% for type B aortic dissections.⁴⁾ Our patient felt sudden upper abdominal and back pain during labor. However, aortic dissection was not diagnosed until her consultation 7 days postdelivery. Considering the risk of aortic dissection during pregnancy and delivery, a previous report stated that hypertension should be prevented aggressively, and recommended a cesarean section under regional anesthesia.³⁾

Fig. 3 (A) CT scan on postoperative day 5 demonstrated closure of the intimal tear and reconstruction with the bioprosthetic graft. (B) At the descending aorta level, a patent true lumen was recognized. (C) Partial thrombosis of the false lumen was observed at the renal artery level. (D) A longer follow-up CT showing a diminished false lumen. (E) At the descending aorta level, an enlarged true lumen and a diminished false lumen were recognized. (F) At the abdominal aorta level, aortic remodeling was achieved with false lumen closure. CT: computed tomography

We initially chose conservative antihypertensive treatment because the thrombosed ascending aorta false lumen was thin, precluding an emergency operation. However, her abdominal pain persisted and repeat CT revealed downstream aorta true lumen narrowing. Visceral malperfusion progressive deterioration was anticipated because of the compression by the enlarged false lumen.

The patient suffered from aortic dissection during labor and CT revealed dissected aorta with malperfusion in the lower half of the body, possibly with bowel ischemia after childbirth. It is difficult to diagnose aortic dissection during pregnancy and the diagnosis is often overlooked. In this patient, the continuous abdominal pain deterioration led to the diagnosis of aortic dissection. The 2006–2008 Saving Mothers' Lives Report⁵⁾ emphasized that aortic dissection during pregnancy is a rare but potentially fatal cause of chest or interscapular pain, particularly with systolic hypertension. Importantly, a high index of clinical suspicion of aortic dissection is indispensable.

For our patient, we performed total arch replacement using the FET technique for resecting the intimal flap to optimally widen the true lumen and to improve abdominal organ ischemia, with excellent aortic remodeling.⁶⁾ We also considered the conventional elephant trunk technique. However, to make the true lumen as long as possible, the FET technique would be better than the conventional elephant trunk technique. This is apparently the first case report describing the successful treatment of a patient with aortic dissection occurring during pregnancy using a tetra-furcated artificial prosthesis and the FET technique.

Conclusion

We successfully treated a 43-year-old woman with type A aortic dissection that developed during labor by total arch replacement using the FET technique 8 days post-delivery. Aortic dissection should be suspected, accurately diagnosed, and effectively treated in pregnant

women with progressive abdominal pain due to visceral malperfusion.

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Disclosure Statement

None declared.

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