Surgical Treatment for Acute Type A Aortic Dissection in Pregnancy

— A Case of Aortic Root Replacement Just After Cesarean Section —

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A 25-year-old woman with Marfan syndrome in the 37th week of pregnancy was referred for acute chest pain and dyspnea. An emergency Cesarean section was performed because of fetal distress. Intraoperative echocardiography at the end of the Cesarean section showed dilatation of the aortic root and dissection of the ascending aorta. The patient underwent replacement of the aortic root and the ascending aorta on the following day because of uterine bleeding. The postoperative course was uneventful for the mother and her baby. (*Jpn Circ J* 2000; 64: 729–730)

Key Words: Aortic dissection; Cesarean section; Pregnancy

Aortic dissection in pregnancy is a rare but potentially catastrophic occurrence because the surgical treatment is complicated by concerns for lives of both the mother and the child. Previous studies showed that 50% of all dissections in women less than 40 years of age were associated with pregnancy.^{1–3} In addition, there is a significant association between pregnancy and dissection in relation to Marfan syndrome and the female sex hormones.^{1–3} However, reports of surgical repair for acute type A aortic dissection just after Cesarean section are rare. We describe here a case of successful repair during the 37th week of pregnancy.

Case Report

A 25-year-old woman in the 37th week of pregnancy was referred for acute chest pain and dyspnea. On admission (April 1998) arterial pressure was 122/58 mmHg, and heart rate was 111 beats/min. Initially, gestational toxicosis was suspected because the chest pain was not severe and a weight gain of 4 kg had been observed in the previous week. Echocardiography showed Grade III aortic regurgitation (AR) due to annulo-aortic ectasia (AAE) and minor pericardial effusion. The patient was initially scheduled for emergency Cesarean section because fetal distress was diagnosed by fetal pulse frequency monitor and 3 h after admission, a female baby was delivered without any problems (Apgar scores were 7 and 9 at 1 and 10 min, respectively; birth weight 2,796 g). After delivery, the mother's arterial pressure decreased to 110/50 mmHg and her heart rate was 116 beats/min. At the end of the procedure, transthoracic (Fig 1) and transesophageal echocardiography (TEE) confirmed the presence of an intimal flap caused by

dissection in the ascending aorta. She was immediately transferred to the cardiac care unit (CCU) where detailed TEE showed that the dissection started in the aortic root and was limited to the ascending aorta. No dissection was

Fig 1. Dilated aortic root (black arrows) and intimal flap (white arrow).

Fig 2. Aortic root dilatation and aortic dissection (arrow).

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found in the descending aorta. In her family history, her father had suddenly died at the age of 37 years old. In addition, physical examination revealed the presence of ectopia lentis, thumb sign and wrist sign. We diagnosed her as Stanford type A and DeBakey type II acute aortic dissection with Marfan syndrome and scheduled replacement of the aortic root and the ascending aorta for the day following the Cesarean section because of the presence of uterine bleeding.

Surgery revealed a dilated aortic root, 60 mm in diameter (Fig 2), and dissection that did not extend to the aortic arch. The patient was placed on cardiopulmonary bypass by means of 2 catheters in the vena cava superior and vena cava inferior and perfusion from the right femoral artery. A vent catheter was inserted through the right upper pulmonary vein and rapid cooling was instituted. After a rectal temperature of 32°C was achieved, the ascending aorta was clamped and opened. Blood cardioplegic solution was infused through the ostia of the right and left coronary artery. A wide circular tear just distal to the 3 coronary cusps was observed, indicating the initial tear, leading to the observed AR. There was no dissection in the distal ascending aorta. Clamping of the ascending aorta was performed under mild hypothermia. The left coronary ostium was incised in the shape of an aortic button and anastomosis between the left coronary ostium and a 8-mm Dacron graft was performed using 5-0 polypropylene because there was dissection of the aortic wall around the left coronary ostium and a direct anastomosis between the left coronary ostium and the composite graft was difficult. In fact, the distance between the left coronary ostium and the aortic valve annulus was 5 mm. Pledgeted 2-0 polyester sutures were placed around the aortic annulus and then a previously prepared composite graft (23 mm SJM and 26 mm Dacron prosthesis) was seated in the annulus after the annular valve sutures had been passed through the rim of the suturing ring. We do not use the aortic valve sparing procedure for Marfan syndrome. Next, distal aortic anastomosis was performed end-to-end with 4-0 polypropylene suture. The free extremity of the left coronary prosthetic graft was anastomosed to the right part of the composite valve graft. The right coronary ostium was directly anastomosed to the anterior part of the composite valve graft. Thereafter the aortic clamp was released gently. After evacuation of residual air, bypass was discontinued without any problems. The total aortic cross-clamp time was 140 min.

Postoperative recovery was uneventful with respect to hemodynamic status. Histologic examination of the aortic wall did not reveal distinct cystic medial necrosis or laminar necrosis. However, there was accumulation of acid mucopolysaccharides within the media, accompanied by focal degeneration of elastic fibers.

Discussion

Aortic dissection is rare in young women but, when it does occur, is often associated with pregnancy with the highest incidence of aortic dissection in the third trimester, thus leading to speculation of an association between a predisposition to dissection and the hyperdynamic and hypervolemic cardiocirculatory state of pregnancy. In addition, estrogen reportedly inhibits collagen and elastin deposition in the aorta, and progesterone accelerates deposition of noncollagen proteins in the aortas of rats.⁴ In the present case, the onset of aortic dissection was in the third

trimester.

During pregnancy, the timing of surgical repair of aortic dissection is the most important factor influencing outcome. Weiss et al reported that the outcomes of cardiovascular surgery during pregnancy in their series were fetal neonatal morbidity and mortality of 30% and 9%, respectively, and maternal morbidity and mortality of 24% and 6%, respectively.⁵ In addition, they reported that maternal complications and mortality from cardiovascular surgery performed immediately after delivery were 29% and 12%, respectively, and for surgery performed after a postpartum interval, the rates were 38% and 14%, respectively. In addition, maternal deaths were reported in 22% of aortic or arterial dissection repairs and maternal risk associated with cardiovascular procedures during pregnancy is moderate, but significantly increased if the operation is performed at or after delivery. The maternal and fetal morbidity of cardiovascular surgery in pregnancy remains high and, in particular, the maternal prognosis for aortic dissection is poor. Wahlers et al⁶ and Bercau et al⁷ recommended operating for aortic dissection immediately following Cesarean section. In the present case, diagnosis of the acute type A aortic dissection was determined just after delivery, but because slight uterine bleeding was observed, the cardiovascular operation was performed the day after the Cesarean section with a satisfactory result for both the child and mother.

Marfan syndrome is an important predisposing factor for aortic dissection. In pregnant woman with the syndrome, prognosis is worse if significant cardiovascular involvement existed before pregnancy. We suspect that the aortic root dilatation in the present case had been present before pregnancy, but that the lesion had not been identified because of the absence of symptoms and because no imaging examinations were performed. Histologic examination of the aortic material revealed accumulation of acid mucopolysaccharides and focal degeneration of elastic fibers, and ultimately, the clinical diagnosis was Marfan syndrome.

In conclusion, we have presented a case of aortic root replacement for type A acute aortic dissection in female patient with Marfan syndrome on the day following Cesarean section. We consider the timing of surgery for aortic dissection to be the most important factor influencing mortality. In the present case, the operation was performed after cessation of uterine bleeding. The postoperative course was uneventful for the mother and her baby.

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