Case Reports in Women's Health 25 (2020) e00163

Contents lists available at ScienceDirect

Case Reports in Women's Health

journal homepage: www.elsevier.com/locate/crwh

Surgical treatment of acute aortic dissection Stanford type A in the third trimester of pregnancy: A case report

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ARTICLE INFO

Article history:
Received 2 October 2019
Received in revised form 7 November 2019
Accepted 8 November 2019

Keywords:
Aortic dissection
Pregnancy
Multidisciplinary

ABSTRACT

Background: Aortic dissection is rare in pregnancy, but it is often life-threatening. Thus, early diagnosis and optimal treatment are crucial. In addition, regular multidisciplinary care plays an important role in improving the therapeutic outcome.
Case: A 31-year-old pregnant woman (gravida 2, para 1, abortus 0) was transferred to our centre at 34 weeks of gestation with onset of dyspnoea and serious chest pain radiating to her back. Ultrasonography unexpectedly revealed a dilation of the aortic root with a sign of dissection. Computed tomography confirmed a type A aortic dissection based on the Stanford classification. She was successfully treated by caesarean section prior to open repair of acute type A dissection and received multidisciplinary care. The patient was discharged on the 16th postoperative day, and the baby is still alive without adverse events.
Conclusion: Aortic dissection in pregnancy is relatively rare, but physicians should be on high alert for the condition when a pregnant woman has chest pain. Early diagnosis and adequate treatment in addition to regular multidisciplinary care are crucial to achieve favourable results.
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1. Introduction

Although acute aortic dissection (AD) rarely occurs in pregnancy, it is often life-threatening. A previous study reported that the overall incidence of acute AD was approximately 0.4 cases per 100,000 women aged 15–45 years [1]. Theoretically, hormonal and haemodynamic alterations during the gestational period are responsible for the aortic wall density and tears on the endothelial aortic wall. These changes could commence in the first or second trimester but most commonly occur in the third trimester and postpartum period (50% and 33%, respectively) [2]. Some genetic disorders such as Marfan syndrome are also considered to be closely related to AD in pregnancy [3]. The treatment of AD during pregnancy is a challenge for clinicians; thus, early recognition and multidisciplinary care are crucial to reduce mortality and attain a favourable outcome. In this report, we present a case of acute type A AD occurring in the third trimester of pregnancy which was successfully treated by caesarean section prior to aortic repair and regular multidisciplinary care.

2. Case Presentation

A 31-year-old pregnant woman (gravida 2, para 1, abortus 0) was transferred to our centre at 34 weeks of gestation with onset of dyspnoea and marked chest pain radiating to her back. The pain had begun two days prior to admission, and had gradually increased in level despite the patient taking oral pain relief. Her medical history was uneventful, and she had delivered a singleton baby four years previously via elective caesarean section under spinal anaesthesia without adverse postpartum events.

On initial examination, the patient's blood pressure was 140/90 mmHg; heart rate 81 beats; respiratory rate 22 breaths per minute; and oxygen saturation 97%. Cardiovascular examination revealed a regular heartbeat without murmur, rub, or gallop. There was no wheezing, rhonchi, or rale on auscultation. There was no sign of pain or swelling in her legs; there was no jugular venous distension. The fetal condition was normal and there was no uterine contraction, vaginal bleeding, or leakage of amniotic fluid. The fetal heart rate was approximately 125 beats per minute. The blood and coagulation test results were unremarkable: red blood cell count 4.28 million cells per microliter; haematocrit 40.1%; platelets 156,000 per microliter; and white blood cell count 12,200 per microliter (slight increase). The results of a urine analysis and liver and kidney function tests and levels of electrolytes and amylase were also in the normal range. The levels of cardiac enzymes (including troponin I) were not increased. The 12-lead

Abbreviations: AD, aortic dissection; CT, computed tomography.

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https://doi.org/10.1016/j.crwh.2019.e00163
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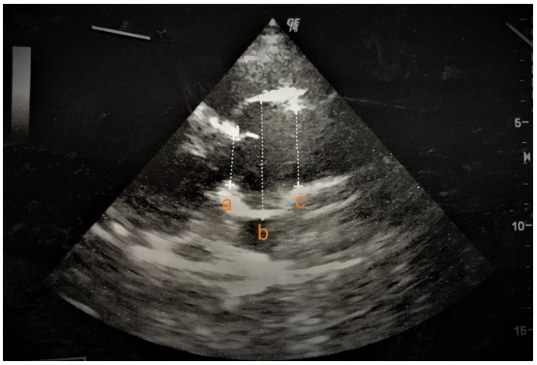

Fig. 1. Transthoracic ultrasonography image showing aortic root dilation. The diameter of the aortic annulus was 23 mm (a), the valsalva sinus was 55 mm (b), and sinotubular junction was 36 mm (c).

electrocardiogram (ECG) indicated a sinus rhythm with a rate of 85 beats per minute and no signs of ischaemia.

Conditions that may be responsible for severe chest pain include acute myocardial infarction, pulmonary embolism, aortic dissection, and pneumothorax [4]. These conditions may be fatal for the both mother and fetus. The diagnosis and differential diagnosis were established via clinical examination and imaging. Myocardial infarction was excluded on the basis of the ECG and cardiac enzymes results. Pneumothorax was also excluded based on the auscultation of the lungs. Although there was no sign of deep vein thrombosis, there was still the possibility of pulmonary embolism. We performed a transthoracic echocardiogram because it was available in the emergency department and did not involve radiation exposure. It unexpectedly revealed dilation of the aortic root with a sign of dissection. The diameter of the aortic annulus was 23 mm, valsalva sinus 55 mm, and sinotubular junction 36 mm (Fig. 1). The ascending aorta was also dilated, with a diameter of 37 mm. To clarify the diagnosis, computed tomography (CT) was performed with the consent of the family and patient despite the fetal risk. CT confirmed a type A AD based on the Stanford classification (Fig. 2). The dissection initially manifested from the aortic root, inferiorly extended to the descending aorta including the innominate artery. The condition was critical for both the mother and fetus. Thus, with urgent multidisciplinary consultation, including consultation with cardiovascular surgeons, anaesthesiologists, intensivists, obstetricians, and neonatologists, we decided to perform caesarean section prior to AD repair. Preoperative management focused on controlling the blood pressure and heart rate by intravenous administration of nicardipine and oral administration of beta-blockers [5]. In addition, we used corticosteroid therapy (12 mg betamethasone administered intramuscularly at an interval of 24 h) to reduce the risk of perinatal mortality and morbidity [6].

Immediately after receiving consent from the patient and her family regarding the treatment, subsequent management, and potential complications for both the mother and fetus, the surgery was performed under general anaesthesia. The intra-arterial blood pressure (IBP) and central venous pressure catheter (CVP) were set to monitor the intraoperative haemodynamics. Firstly, the caesarean section was successfully performed via a horizontal incision. A male infant was delivered and weighed 2600 g; the Apgar score was 7 and 8 points after 1 and 5 min, respectively. The baby was immediately transferred to the neonatal care unit for observation. One dose of carbetocin was given intravenously to reduce the risk of postpartum haemorrhage. Abdominal drainage was also performed to control postoperative bleeding.

AD repair was performed immediately after the caesarean section via full sternotomy on cardiopulmonary bypass with hypothermia at 25 °C; the systolic blood pressure and heart rate were maintained at approximately 100 mmHg and 80 beats per minute, respectively. The central venous pressure was maintained at approximately 9 cm H2O. Aortotomy revealed dissection from the aortic root, with the intimal tear being located in the ascending aorta. The aortic root and ascending aorta were successfully replaced by a 28-mm valve-sparing prosthesis (Gelweave™ Valsalva Grafts, Terumo), and the coronary arteries were sewn into the valsalva graft (Tirone David technique). Thereafter, drainage tubes were inserted into the mediastinum and bilateral pleura.

The postoperative course was stable. The patient was discharged on the 16th postoperative day. After three months, the baby was alive without adverse events, and we were still monitoring the patient and baby every 2 weeks.

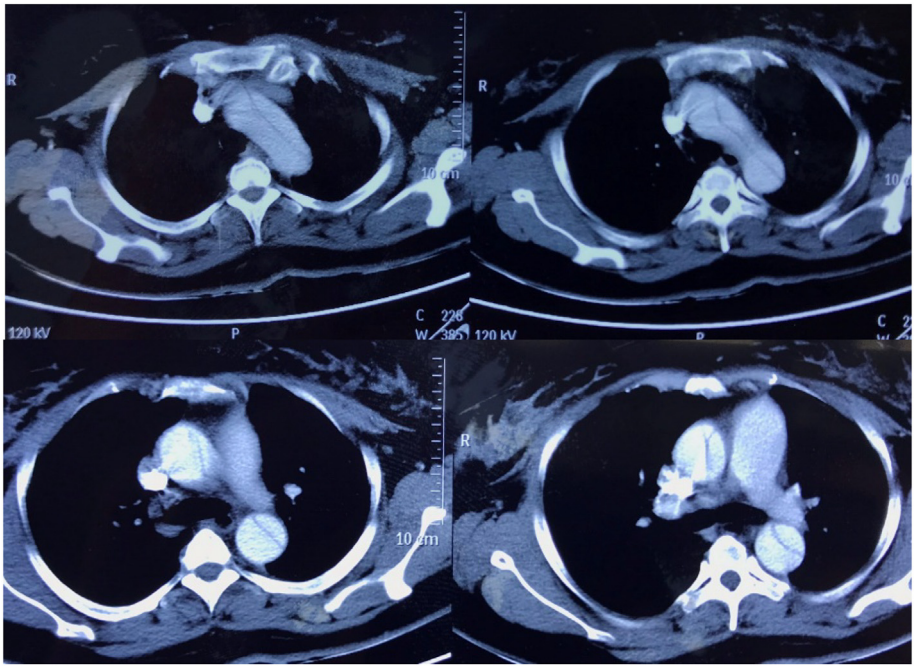

Fig. 2. Chest computed tomography scan of acute dissection in the ascending and descending aorta.

3. Discussion

Acute aortic dissection (AD) is a life-threatening condition that requires urgent assessment and therapy. Anatomically, AD is divided into two types (A and B) by the Stanford classification. Type A involves the ascending aorta while type B does not. In pregnancy, type A AD is more common than type B [5,7]. Acute type A AD that occurs during pregnancy can lead to sudden death if not treated early and appropriately. Indeed, without treatment, the mortality rate significantly increases by approximately 1%–3% per hour after onset and reaches 70% and 80% at 1 and 2 weeks, respectively [8,9]. Therefore, early diagnosis is very important in the management of acute AD in the gestational period. Family physicians should be on high alert when a pregnant patient reports chest pain and should educate these patients about the need to see a physician even when symptoms such as chest pain are vague. For instance, in the present case, the patient experienced chest pain for 2 days and was taking painkillers. She went to the hospital only when the symptom worsened. The delay in treatment was extremely dangerous.

Treatment methods should be based on gestational age and type of dissection. While the surgical indication for acute type A AD is absolutely clear, as surgery prevents associated life-threatening events such as acute tamponade, aortic rupture, cerebral ischaemia, or myocardial infarction [2], the surgical treatment for type B dissection is elective, based on clinical or radiological features. For pregnant women with type A AD in the 32nd week of gestation, caesarean section can be conducted prior to aortic repair [10]. With advances in neonatal care, the care for premature babies has become favourable and safe. However, good coordination between specialists is required to achieve efficiency and surgical success. Although this is a report of just a single case, it is still significant because of the rarity of AD in pregnancy.

4. Conclusions

Although AD in pregnancy is relatively rare, physicians should be on high alert for the condition when a pregnant woman reports chest pain. Early diagnosis and adequate treatment in addition to regular multidisciplinary care by the initial emergency physicians, cardiovascular surgeons, anaesthesiologists, intensivists, obstetricians, and neonatologists are crucial to achieve favourable results.

Contributors

Tran Quyet Tien was the main surgeon and main author, conducted the literature review, and reviewed and revised the manuscript.

Ho Tat Bang collected the data, wrote the initial manuscript, reviewed the literature, and revised the manuscript.

Both authors approved the version of the paper submitted.

Conflict of interest

The authors declare that they have no conflict of interest regarding the publication of this case report.

Funding

No specific grant from funding agencies in the public, commercial, or not-for-profit sectors supported the publication of this case report.

Consent

Written informed consent was obtained from the patient for the publication of this case report.

Provenance and Peer Review

This case report was peer reviewed.

Acknowledgements

We thank our colleagues from Cho Ray Hospital and Hung Vuong Obstetrics & Gynaecology Hospital in Ho Chi Minh City who provided insight and expertise in taking care of this patient. We would like to show our gratitude to Dr. Nguyen Huu Duc (Cardiologist, Quang Tri General Hospital) and Dr. Phan Trung Tieu (Obstetrician, Tu Du Hospital) for comments and revisions that greatly improved the manuscript.

We would like to thank ELSEVIER Language Editing services for English language editing.

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