Case Report

Anaesthetic Management for Caesarean Delivery Patient with Obstructed Superior Vena Cava by Mediastinal Mass

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Maternal anatomical and physiological changes occur during pregnancy, particularly with cardiovascular and respiratory systems. Pregnant women with large mediastinal mass additionally have an increased risk of cardiopulmonary compromise. We report a 31-year-old patient at 30 weeks of gestation with a large anterior mediastinal tumour with superior vena cava obstruction. Her presenting symptom was progressive and severe dyspnea due to the large mediastinal mass. An ultrasound-guided biopsy was performed and the pathologic result was Hodgkin's lymphoma. Termination of pregnancy and delivery of the neonate were performed using a Caesarean delivery under spinal anesthesia in the sitting position. The perioperative anaesthetic management was successful without any serious complications, and the postoperative outcomes were very impressive.

Keywords: *Anesthesia, Mediastinal mass, Hodgkin lymphoma, Spinal, Caesarean section*

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A large mediastinal mass creates anaesthetic challenges because of cardiopulmonary compromise. When dyspnea and superior vena cava obstruction from the mass arise during the third trimester of pregnancy, the challenges are multiplied. We present a 31-year-old woman at 30 weeks of gestation with a large anterior mediastinal tumour with invasion to the superior vena cava (SVC). The patient had a Caesarean delivery under spinal anesthesia with a good outcome. This report demonstrates the perioperative anaesthetic management and the post-operative outcomes for this complicated case.

The patient reviewed the case report and gave written permission for the authors to publish the report. The corresponding author has participated in the care of the patient described in the case report.

Case Report

A 31-year-old Thai woman gravida 1 para 0, at 30 weeks of gestation came to the emergency department (ED) presenting acute dyspnea and dry cough for 6 hours. Two days before the visit, she had had a productive cough, shortness of breath and expiratory wheezing without fever. She had been treated as an outpatient with inhaled salbutamol and systemic corticosteroids. However, she still had progressive dyspnea, persistent coughs and developed orthopnea. The patient had previously been healthy before and during the pregnancy with the exception of atopic dermatitis and allergic rhinitis that exacerbated occasionally without history of asthma or after taking medication. Her antenatal care was normal. A physical examination showed vital signs: blood pressure of 110/60 mmHg, heart rate of 110 beats per minute, respiratory rate of 20 breaths per minute, and body temperature of 36.6°C. Her body weight was 68 kilograms and height was 163 centimetres. She had mild facial swelling without puffy eyelids and visible dilated superficial veins at the anterior chest wall. The neck vein could not be evaluated due to neck swelling without leg edema. She also had wheezing in both lungs with fair air entry and visible intercostal retraction. Her chest x-ray was investigated at the ED (Fig. 1).

She was hospitalized to treat her symptoms

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and workup on the mediastinal mass. A magnetic resonance imaging of the chest was done (Fig. 2). The results revealed an infiltrative mass along the right anterior mediastinum with cystic component and internal separation at the left anterior mediastinum. Mass effect and adjacent structural invasion were found at the brachiocephalic vein, superior vena cava, right upper lobe bronchus, trachea, carina, right main bronchus, heart, ascending aorta, brachiocephalic artery and the right pulmonary artery. An ultrasound-guided percutaneous tissue biopsy was performed with a local injection of 2% lidocaine at the same time without any complications. Finally, the pathologic result was Hodgkin's lymphoma (HL).

Based on the clinical data and examination, the initial diagnosis was mediastinal tumour with SVC obstruction. Supportive treatment with oxygen supplement, intravascular fluid and steroids were given. She was responsive to steroids after 2 days, her symptoms improved, and she could lie down in the supine position.

Management of the case was discussed in a multidisciplinary conference involving pulmonologists, cardiothoracic surgeons, obstetricians, anaesthesiologists and hemato-oncologists. The treatment goal was maternal and child life-saving. After we discussed the options with the team, we informed the patient and her family and discussed the results. Subsequently, a Caesarean section was performed not only for termination of pregnancy but also for live delivery of a child before chemotherapy or mediastinal surgery on the patient.

Fig. 1 The chest x-ray of a 31-year-old pregnant woman showed the trachea slightly shifted to the left side, and a large soft tissue mass along the right lower paratracheal and right cardiac border, and left upper paracardiac border.

The patient was evaluated for preoperative assessment including vital signs and airways. Her vital signs were stable and room-air oxygen saturation of 96%. She could lie down in the supine position without hoarseness or swallowing difficulty. Airway assessment showed facial edema, trachea slightly shifted to the left, thyromental distance more than 6 cm, overbite teeth, and Mallampati class I. No cardiac murmur was found but there were occasional wheezings in both lungs. Blood components of 10 units of packed red cells, 10 units of fresh frozen plasma and 10 unit of platelet were prepared. The cardiopulmonary bypass was on standby during the surgery.

A large-bore venous catheter was inserted into the right leg. Preload fluid 500 ml was done before performing anesthesia. Spinal anesthesia was performed with a 27G Quincke spinal needle at the 3rd to 4th lumbar level in the sitting position, produced with 0.5% hyperbaric bupivacaine solution plus 0.2 mg intrathecal morphine solution up total volume to 2.2 ml. A 4th thoracic level of anesthesia was administered bilaterally without any complications such as hypotension or bradycardia. Low transverse uterine incision was performed. The Caesarean section was successfully done without any complications. A 1,860-gram healthy male baby was delivered with Apgar score of 9 at 1 minute and 10 at 5 minutes. He was admitted to NICU because of a low birth weight and being preterm. Blood loss was 600 ml and total fluid was 1,200 ml. Postoperatively, the patient was observed in PACU without any complications. She and her baby were discharged 2 weeks later when the baby's weight reached 2,000 grams.

Discussion

Mediastinal mass during pregnancy is a diagnostic, therapeutic and moral challenge requiring a multidisciplinary team approach[1]. HL is diagnosed in approximately 1: 1,000 to 1: 6,000 of pregnancies[2] and in pregnant women is typically diagnosed at the same disease stage as in non-pregnant counterparts.

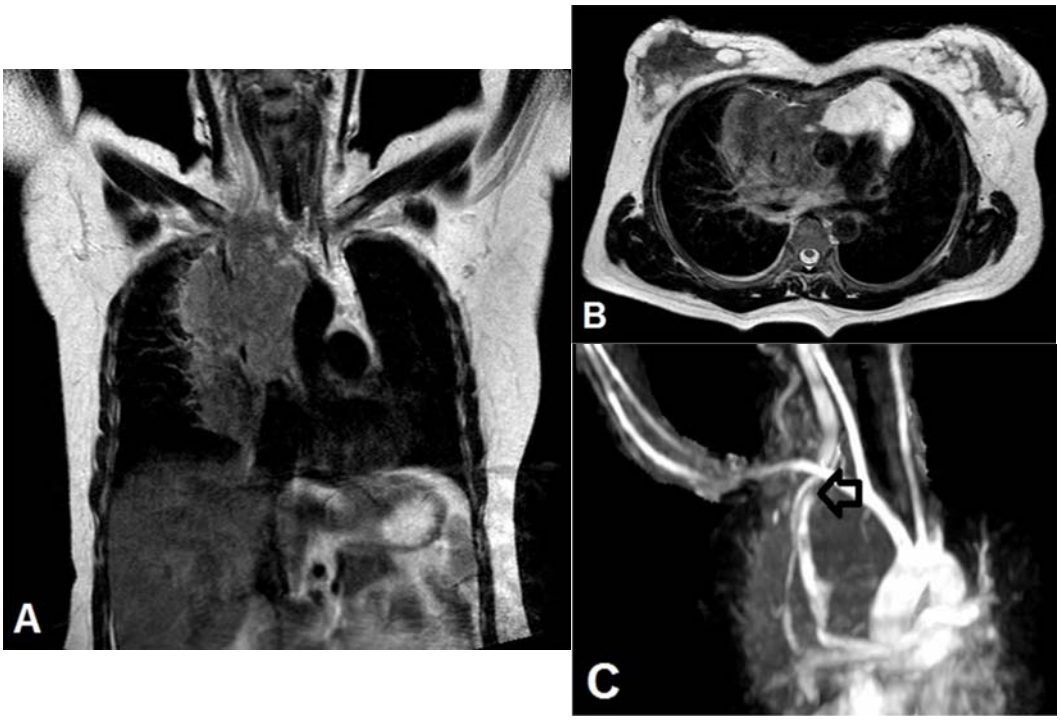

Fig. 2 The magnetic resonance imaging (MRI) was investigated for the patient. (A and B) T2 weighted images in the MRI showed a huge mass along the right anterior mediastinum with invasion to the superior vena cava (SVC), bronchi, brachiocephalic veins and arteries and right pulmonary artery. (C) The MRI found partial occlusion and distortion of the SVC with venous collateral circulation (arrow).

Moreover, the outcome in women who are diagnosed during pregnancy does not appear to be worse than those in the age-matched non-pregnant patients.[3].

Perioperative steroids are used to decrease upper airway edema due to the tumour compression. Steroids are very useful in decreasing the inflammatory response to tumour invasion and also in decreasing the edema around the tumour, especially for lymphoma[4,5].

The flow-volume loop monitoring in a preoperative period is commonly ordered as part of the pre-operative assessment for patients with a mediastinal mass. Specifically, an increased mid-expiratory plateau when changing from the upright to the supine position is thought to be the pathognomonic finding for a variable intrathoracic airway obstruction and an indicator of patients who are at risk of airway collapse during the induction of anesthesia[6]. The usefulness of flow-volume loops in the assessment of patients with mediastinal mass is well established in standard anesthesia texts and on anaesthesiology specialty board exams. In clinical practice, however, flow-volume loops do not add any useful information beyond what is obtained from the chest imaging[7].

A Caesarean section was chosen over vaginal delivery as it avoided an increase in maternal intra-abdominal and intrathoracic pressure during contractions. However, vaginal instrumental delivery with induction and augmentation of labour under epidural anaesthesia is an option for a patient who cannot tolerate high intra-abdominal pressure such as cerebral aneurysm, severe mitral or tricuspid valve insufficiency or pulmonary hypertension[8]. A Caesarean section was the best choice for our team because the dyspnoeic patient could not tolerate the lengthy process of a vaginal delivery. The cervix was also not favourable for induction.

Pregnancy itself places the patient at risk for difficult airway and hypoxia. Pregnancy also increases the risk of aspiration[9,10]. If general anaesthesia is chosen, the rapid sequence induction with cricoid pressure should be performed for intubation.

The risk of life-threatening or fatal airway obstruction or cardiovascular collapse during induction of anaesthesia in patients with large anterior mediastinal masses has been recognized since the 1970s[11]. The

anaesthetic consideration for patients with an anterior mediastinal mass varies with the individual anatomy, pathology and the proposed surgical procedure[7]. The functional residual capacity reduction due to pregnancy, loss of muscle tone due to general anaesthesia, and further loss of lung volume from the mediastinal tumour causes less effectiveness of preoxygenation and is prone to airway collapse. Given the potential risks for airway problems resulting from general anaesthesia, a regional anesthesia was selected for our patient.

Many would argue against a subarachnoid block due to the unpredictable degree of hypotension and level of block, especially in a patient who could not tolerate recumbency[12]. Therefore, continuous epidural anaesthesia is a good choice. An epidural catheter or small incremental dose continuous spinal technique allows more gradual onset of block and makes it easier to treat maternal sympathetic block[13,14]. In our case, we concluded that epidural block was one of our choices but that spinal block was easier to perform due to its familiarity and manageability for the anaesthesiologist and because of back swelling in the patient, thus spinal anaesthesia was performed without hypotension event.

Cardiopulmonary bypass (CPB) standby is not an appropriate way during an induction of anaesthesia[7]. Because once airway or cardiovascular collapse has occurred, it will require at least 5-10 minutes to cannulate and establish adequate circulation and oxygenation[15]. Moreover, during a pregnancy, there is also an aortocaval compression that obstructs venous return from the lower extremities. Accessing the femoral vein is difficult in a semi sitting position, and the catheter will easily kink[8]. Nevertheless, the CPB via femoral vessels cannulations prior to induction of anaesthesia has been safely performed in an adult patient[16]. In our patient, we chose the regional anaesthesia in order to keep the patient's patent airway but we also had cardiopulmonary bypass on standby in case of an emergency.

Owing to SVC obstruction causing the venous blockade in upper extremities, the intravenous (IV) catheter should be placed in the lower extremity. Placing IV line in the upper extremity is contraindicated in long and unpredictable circulation time as blood returned from the upper body can be interrupted by SVC obstruction[17,18]. Accessing IV catheter should be at least two large bore IV lines because the patient has compromised venous return, poor toleration with blood loss. The fluid volume replacement should be rapid but should also avoid fluid overload.

Conclusion

An interdisciplinary team approach for perioperative evaluation and management in the pregnancy with a mediastinal mass is very important. General anaesthesia should be avoided. Conversely, spinal anesthesia was an alternative choice for this patient. Caution was needed to avoid an eruption of a new onset of hypotension caused by acute decrease of systemic vascular resistance and a decrease in cardiac output.

What is already known about this topic?

Mediastinal mass in pregnancy is a rare neoplasm. It is the challenge of anesthesia to manage and it requires a multidisciplinary team.

What this study adds?

It suggests that spinal anesthesia can be an alternative choice for anesthesia in Cesarean delivery. In addition, there were no previous reports of pregnancy with mediastinal mass in Thailand prior to this case.

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Potential conflict of interest

None.

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รายงานการการระงับความรู้สึกในผู้ป่วยผ่าตัดคลอดที่มีก้อนในช่องอกและกดหลอดเลือดดำซุพีเรีย เวนา คาวา

แวนด้า ภัทรธรรม, ธีรดา จันทร์ดี, ณรงค์กร ซ้ายโพธิ์กลาง

การตั้งครรภ์มีการเปลี่ยนแปลงทั้งทางกายภาคและสรีรวิทยาโดยเฉพาะทางระบบหายใจและระบบไหลเวียนโลหิต ผู้ป่วยหญิงตั้งครรภ์ที่มีก้อนขนาดใหญ่ที่ช่องอกเพิ่มโอกาสที่จะเกิดระบบหายใจและระบบไหลเวียนล้มเหลวได้ง่าย รายงานนี้บรรยายถึงผู้หญิงอายุ 31 ปีตั้งครรภ์แรก ขณะอายุครรภ์ 30 สัปดาห์ เริ่มมีอาการเหนื่อยมากขึ้น หลังจากการตรวจเพิ่มเติมพบก้อนขนาดใหญ่ที่ทรวงอก จากการวินิจฉัยพบว่าเป็นมะเร็งต่อมน้ำเหลือง ดังนั้นจึงทำการสิ้นสุดการตั้งครรภ์และนำเด็กออก เพื่อความปลอดภัยทั้งมารดาและบุตร ภายใต้การระงับความรู้สึกเฉพาะส่วนเข้าที่ไขสันหลัง (spinal anesthesia) ในท่านั่ง โดยตลอดการเข้ารับการระงับความรู้สึกไม่มีภาวะแทรกซ้อนใดๆ และอาการผู้ป่วยดีขึ้นตามลำดับ