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Dyspnea in Pregnancy: A Case Report of a Third Trimester Mediastinal Mass in Pregnancy

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Patient: Female, 34
Final Diagnosis: Primary mediastinal b cell lymphoma
Symptoms: Cough • shortness of breath
Medication: —
Clinical Procedure: Cesarean delivery
Specialty: Obstetrics and Gynecology

Objective: Rare co-existence of disease or pathology
Background: Dyspnea in pregnancy is common and attributable to a variety of etiologies including normal physiology. The obstetric provider is challenged with distinguishing between physiologic versus pathologic dyspnea.
Case Report: A 31-year-old G2 P1001 female at 34 weeks gestation presented with dyspnea, tachycardia, and inability to lie supine. Imaging revealed a large heterogeneous anterior mediastinal mass (14.8×11.5 cm). Multidisciplinary coordinated care led to diagnosis of B cell lymphoma, delivery via cesarean section under regional anesthesia in steep Trendelenberg position, followed by chemotherapy postpartum.
Conclusions: Dyspnea in pregnancy is common but might represent underlying pathology. While an obstetrician is knowledgeable of physiologic pregnancy changes, he or she should remain vigilant for underlying pathologic causes of dyspnea, including malignancy. Anterior mediastinal masses propose unique anesthetic challenges including respiratory impairment and cardiopulmonary collapse requiring collaborative care and planning.

MeSH Keywords: Dyspnea • Lymphoma, B-Cell • Pregnancy Complications, Neoplastic

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Background

Dyspnea is a common occurrence in pregnancy, which can be physiologic or pathologic in nature. Pregnant women undergo early increases in minute ventilation during the first trimester, which maintains throughout pregnancy [1]. Obstetrical providers are charged with making the distinction between normal changes, exacerbation of a chronic respiratory condition, and new pathology. Only scattered reports of primary mediastinal B-cell lymphoma in pregnancy have been published with varying presentation and trimesters of diagnosis [2–5]. Further, a large anterior mediastinal mass presents unique anesthetic challenges due to substantial risk for respiratory impairment and cardiovascular collapse. Our case highlights the importance of knowledge of physiologic changes in pregnancy, the necessity for multidisciplinary approach to malignancy in pregnancy, and the unique challenges anterior mediastinal masses present for anesthesia. The patient has provided written consent for publication of this report.

Case Report

A 31-year-old G2P1001 female at 34 weeks presented as a transfer to our hospital due to shortness of breath and back pain. She reported shortness of breath over the last 1 to 2 months, unimproved by a course of azithromycin. Upon arrival, she complained of worsening shortness of breath and inability to lie supine. When questioned, she endorsed difficulty swallowing pills and a persistent, dry cough. She had no interval improvement despite antibiotics for presumed upper respiratory infection. Her past medical history was unremarkable. Vital signs included temperature 36.8°C (98.2°F), heart rate 109 beats per minute, blood pressure 122/73 mmHg, respiratory rate 22 breaths per minute, and 96% O₂ saturation on room air. Physical examination revealed a gravid female in visible respiratory distress, unable to lie supine, and with absent breath sounds in her left chest. She had palpable supraclavicular lymph nodes, a gravid, soft, nontender uterus, and normal extremities. Fetal heart tracing was category I, without contractions. Ultrasound revealed the fetus in breech presentation. An electrocardiogram confirmed only sinus tachycardia. Other imaging was performed (Figures 1, 2) demonstrating a large heterogeneous anterior mediastinal mass (14.8×11.5 cm) with internal cystic changes versus necrosis and multiple enhancing left pleural nodules. The mass extended superiorly to the right paratracheal area exerting mass effect on the trachea, right thyroid lobe, left mainstem bronchus, and left lung bronchi. Also, a large left pleural effusion with near collapse of the left lung was noted and the heart was shifted to the right with a moderate pericardial effusion. The left main pulmonary artery was compressed by the mass and there was no evidence for pulmonary embolus. She was admitted to Labor and Delivery

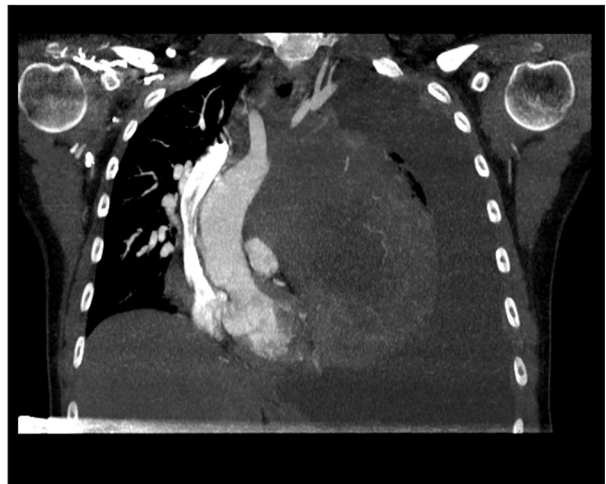


Figure 1. Computed tomography scan revealing large anterior mediastinal mass with mass effect. Left pleural effusion demonstrated.

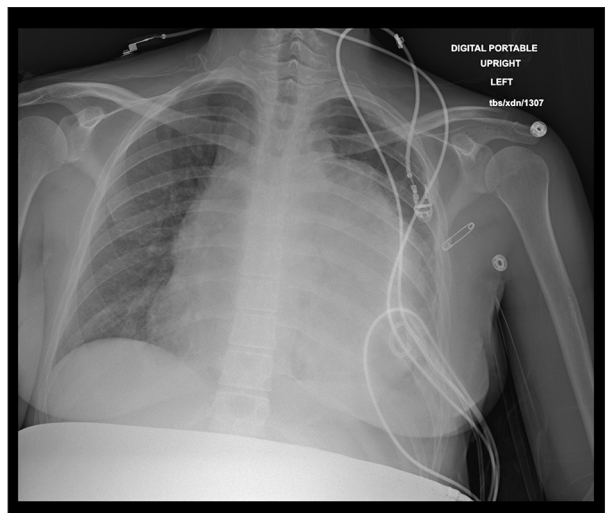


Figure 2. Plain chest radiograph showing large mediastinal mass.

Unit for continuous fetal monitoring. Betamethasone was administered for fetal lung maturity and she underwent an interventional radiologic guided biopsy and thoracentesis with placement of a left pleural drain. Pathology confirmed large B cell lymphoma. Sub specialists in hematology/oncology, pulmonology, cardiothoracic surgery, anesthesia, neonatology, and maternal-fetal medicine were consulted. A diagnosis of primary mediastinal B cell lymphoma was made. Oncology initiated steroids in an attempt to decrease the size of the tumor. A multidisciplinary team meeting was held to discuss the mode of delivery due to fetus in a breech presentation, timing of delivery, initiation of cancer treatment, and mode of anesthesia. It was concluded that general anesthesia was not an option due to concern for circulatory collapse and airway obstruction. A few days following hospital admission, a slow initiation of epidural anesthesia to a T6 level and cesarean delivery was

performed successfully, with the bed maintained in steep reverse Trendelenberg (>30-degree angle) and cardiothoracic surgery at bedside. She delivered a 6-pound vigorous male with Apgars 6 and 8, who required a 14-day stay in the Neonatal Intensive Care Unit (NICU). She was transferred to the medical intensive care unit (MICU) given the concern for postpartum fluid shifts and exceedingly poor airway. Her postpartum course included a pericardial window, right chest tube placement, bone marrow biopsy, and initiation of chemotherapy with great tolerance. The patient is now one year from diagnosis and a few months from a year out from chemotherapy. She is currently in remission and back to working as a teacher.

Discussion

Evaluation of dyspnea

Many respiratory changes occur during pregnancy to meet the increased metabolic demand of the mother and fetus. The prominent changes include widened chest wall and upward diaphragm displacement to accommodate the enlarging uterus, reduced functional residual capacity, increased minute ventilation, and chronic respiratory alkalosis [6]. Cardiovascular changes include increased cardiac output and decreased systemic vascular resistance leading to increased stroke volume [6]. Knowledge of these basic changes in pregnancy helps providers distinguish common from rare causes of dyspnea. Dyspnea in pregnancy is a common complaint found in up to 70% of women in the third trimester. However, persistent and worsening dyspnea requires thorough investigation, and physiologic dyspnea should remain a diagnosis of exclusion. After thorough investigation, our patient was diagnosed with a large mediastinal mass. While not a diagnosis found on our original differential at initial evaluation, routine imaging and diagnostic studies revealed an obvious abnormality.

Diagnosis

Initial diagnosis of a mediastinal mass in pregnancy is difficult to establish due to similarities of presenting signs and symptoms that mimic normal pregnancy [7], as well as the desire to avoid unnecessary radiographic imaging during pregnancy [8]. Anterior mediastinal masses compete with underlying vital structures including the heart, major vessels and airways, and can lead to obstruction of these airways, as well as main pulmonary arteries, atria, and superior vena cava. In the case of our patient, her diagnosis occurred a few months after the onset of symptoms, highlighting the importance of continued workup in cases of persistent dyspnea. In caring for these patients, a multidisciplinary and individualized approach is necessary. Data regarding management of lymphoma in pregnancy are conflicting and based on lymphoma histologic subtype as

well as gestational age with regards to recommended order of procedures/treatment [5]. Management decisions are often impacted by the trimester of diagnosis and the disease burden. In our patient case, she was late in the third trimester, but with breech presentation and a large mediastinal mass with intricate association with cardiac structures.

Delivery challenges

Patients with mediastinal masses are at risk for respiratory impairment and circulatory collapse when general anesthesia is induced [9]. A mediastinal mass can cause different types of intrathoracic compromise including compression of the tracheobronchial tree, compression of the pulmonary artery and heart, and superior vena cava obstruction [9]. When these risks are paired with delivery, a unique challenge occurs. General anesthesia poses risk in these patients due to its ability to exacerbate intrinsic airway compression by 3 means. 1) It reduces lung volume and tracheobronchial diameter decreases according to lung volume. 2) Bronchial smooth muscle relaxes, which allows more compressibility of larger airways. 3) Paralysis eliminates diaphragm movement during spontaneous ventilation leading to eliminating the transpleural pressure gradient [10]. Circulatory collapse ensues due to the combination of reduced venous return, venodilation secondary to anesthesia, and elevated intrathoracic pressures due to positive pressure ventilation [11]. Multidisciplinary discussion and review of the literature [12] led to recognition of risks for airway obstruction with concern for failure to ventilate despite successful intubation. Given the intimate location of the mass and maternal aorta, emergent removal of the mass was not possible. Delivery scenarios discussed included external cephalic version and induction versus cesarean; however, the need to avoid general anesthesia was paramount due to the mass effect leading to possible compression of her pulmonary artery. Therefore, anesthesia was achieved by epidural to a T6 level. Due to the lack of options for emergent anesthesia, no continuous fetal monitoring was performed during epidural placement. Patients with mediastinal masses should have a chest radiograph and computed tomography (CT) scan prior to any procedure [11], because these images aid in showing the site and severity of the airway compromise. Furthermore, patients with vascular compression symptoms or pericardial effusion should undergo echocardiogram to assess cardiac, systemic, or pulmonary vascular compression [11].

Hematologic malignancy in pregnancy

Our case also serves to remind providers about the impact cancer diagnosis can have on clinical decision-making and patient care, highlighting the necessity for a multidisciplinary approach to caring for these patients. Malignancy complicates 0.1% of normal pregnancies and is thought to increase

due to delayed child bearing. Coexisting cancer in pregnancy brings complexity to treatment recommendations and plans for delivery [13]. In general, treatment strategies for cancer in pregnancy should not differ significantly from regimens in non-pregnant patients. Primary mediastinal B cell lymphoma (PMBCL) is a subtype of diffuse large B cell lymphoma. It is notable for being a bulky mediastinal tumor and typically presents with compressive symptoms [15].

PMBCL rarely presents in pregnancy and typically manifests in the second trimester [15]. PMBCL management is chemotherapy with rituximab, cyclophosphamide, doxorubicin, vincristine, prednisone, and radiation, achieving cure rates greater than 82% [15]. Due to the rare occurrence during pregnancy, literature is scant for case reports and treatment recommendations during pregnancy. Some case reports describe treatment with chemotherapy with R-CHOP initiated during pregnancy. Perez et al. reported a 22-year-old female diagnosed with PMBCL at 12 weeks of gestation. She was started on chemotherapy with R-CHOP starting at 13 weeks of gestation. She received treatments every 3 weeks. She underwent induction of labor at 34 weeks and delivered a vigorous infant. Her child at 1 year of age was without developmental delay or physical abnormalities [15]. Khalid et al. reported diagnosis at 22 weeks of gestation, with treatment with chemotherapy starting at 25 weeks of gestation. In this case, the patient completed 5 cycles of R-CHOP and delivered following active labor at 37 weeks of gestation. Follow-up positron emission tomography (PET) scan noted increased size in the mediastinal mass. She was treated with rituxan, ifofasimide, carboplatin, and etoposide for 3 weeks followed by a stem cell transplantation [16]. Similar to our case, Shulman reported chemotherapy initiated following delivery after diagnosis made during pregnancy. He noted a 33-year-old female patient at 30 weeks of gestation, who was diagnosed with PMBCL, underwent delivery followed by R-CHOP treatment postpartum [17]. The decision to proceed with delivery prior to treatment was unclear in this case.

O'Gara et al. noted a 28-year-old female presenting 2 days postpartum with cardiac failure that was subsequently diagnosed with PMBCL and underwent R-CHOP treatment [18].

Perez and Khalid demonstrated the safety of chemotherapy initiation for PMBCL diagnosed in the late first and second trimester [15,16]. In a Russian study, Mangasarova et al. reported 8 cases of PMBCL in pregnancy that underwent chemotherapy during second and third trimesters. Four women were treated with etoposide, doxorubicin, cyclophosphamide, vincristine, prednisone, and bleomycin and 3 were treated with rituximab and dose adjusted etoposide, vincristine, doxorubicin, cyclophosphamide, and prednisone. High dose chemotherapy and radiation were given to 7 women. The newborns of those treated with rituximab developed pneumonia [19]. These studies help

demonstrate the safety of treatment with chemotherapy during pregnancy; however, not all diagnoses are made with sufficient time for treatment. The decision becomes more complex when pregnancy is approaching late preterm or term. Sehmi et al. reported a case of a 37-year-old female at 38 weeks of gestation presenting with vague complaints of syncope, headache, and epigastric pain. Her diagnosis was unclear. She underwent induction with successful delivery. She presented postpartum with complaints of dyspnea and dysphagia and was diagnosed with PMBCL, and treated with R-CHOP [20]. Fiascone et al. reported a case of a 35-year-old female diagnosed with PMBCL at 29 weeks of gestation who completed 2 cycles of R-CHOP treatment prior to induction of labor [21].

With scant case reports of PMBCL in pregnancy and those available having a wide range of gestational ages at diagnosis, there is no clear consensus of best management and timing of chemotherapy when diagnosis occurs during late preterm or term gestation. In our patient's case, malignancy was diagnosed at late preterm with severe symptoms, leaving the delivery to treatment interval to be short. With the completion of betamethasone for fetal lung maturity a few days following admission, many consultants provided insight into our patient's care and led to the final decision of delivery followed by initiation of cancer treatment. Predelivery radiation was considered with aim to reduce tumor size; however, given concerns for tumor lysis syndrome during pregnancy and considerations for suboptimal, reduced dose, postpartum radiation was elected.

Collaborative care

Each colleague consulted in this case provided unique knowledge toward the plan of care for our patient and without this approach; the outcome might have been different. A very crucial part of this discussion came from our anesthesia colleagues due to the significant challenges in delivering anesthesia and how that would impact mode of delivery. Oncologists raised the point of not having to reduce chemotherapy and radiation dose if delivery occurred versus initiation therapy with reduced dose and continuing the pregnancy. Due to gestational age and ability to complete antenatal steroids, delivery occurred, and treatment was initiated quickly during her postpartum period. Our patient's course highlights the gravity of these types of situations and the need to approach these with many different teams on board.

Conclusions

In conclusion, we report a case of newly diagnosed primary B cell lymphoma during pregnancy after presenting with dyspnea. Awareness of physiologic versus pathologic dyspnea in pregnancy is vital in these situations. This case proved a

challenging one to our entire team with unique challenges to our anesthesia colleagues that we were not aware of prior to this case.

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Conflict of interest

None.