



Anesthesia and the Decompensated Obstetric Patient

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Learning Objectives:

- Describe the prevalence of heart disease among pregnant and postpartum women
- Discuss mWHO pregnancy risk classification for women with preexisting CV disease
- Highlight the importance of the Pregnancy Heart Team

Introduction:

Both diagnosed and undiagnosed heart disease remains the leading cause of severe maternal morbidity and mortality (SMM) in the developed world. Although disproportionately represented in minority groups, heart disease spans all races and age groups and affects as many as 4% of all pregnancies in the United States. By using tools such as the *Modified WHO Pregnancy Risk Classification for Women with Preexisting Cardiovascular Disease*, providers who care for women can employ early screening strategies to identify and risk stratify women according to their risk of SMM. For those at highest risk, of SMM, the WHO provides resources and recommendations to help guide clinicians in their care plan. For those with the highest risk, the WHO recommends the creation *The Pregnancy Heart Team*. The Pregnancy Heart Team is a multidisciplinary team and includes providers from all expected levels of care for both the mother and newborn- including OB, OB Anesthesia, Cardiology, Internal Medicine, Maternal Fetal Medicine, Neonatology. Etc.

Case Presentation:

Admission:

The patient is a 30yr old G2P1 with a history of HFrEF (EF 35%, NYHA III), who present to the ED with NYHA IV symptoms. Her history was significant for six previous Mis and a chronically occluded LAD. Physical exam was notable for volume overload with labs demonstrating significantly elevated troponin and BNP. She was subsequently admitted to the antepartum ward for management of acute decompensated heart failure.

Medical History:

- HFrEF EF 35%, MI x 6 with placement of 3 drug eluting stents, cHTN, Morbid Obesity, Depression

OB History:

- CS x1 for NRFHTs during labor

Medications:

- Amlodipine 5mg, Aspirin 81mg, Clopidogrel 75mg, Metoprolol 100mg BID, Isosorbide Dinitrate 20mg BID, Hydralazine 25mg BID, Nitroglycerin PRN

TTE:

- **Severe left atrial enlargement and left ventricular dilation**, Otherwise normal chambers. LV wall thickness is normal. **Severely depressed left ventricular systolic function, estimated LVEF 23% by biplane Simpson's rule**. There is **apical akinesis, lateral wall, apical septum and apical, mid anterior wall akinesis with severe hypokinesis of basal anterior wall..** Normal RV systolic function. Normal valvular structures and function. Trace MR, PR and TR. PASP and CVP are normal. No pericardial effusion is seen

Modified WHO Pregnancy Risk Classification for Women with Preexisting Cardiovascular Disease

- mWHO Risk Class IV
- Due to her severe ventricular dysfunction (EF <30%)
 - Pregnancy contraindicated
 - Induced abortion discussion
 - Extremely high risk of maternal mortality or severe morbidity
 - >27% maternal cardiac event rate
- Recommendation for Pregnancy Heart Team
 - All providers involved in patient's hospital care
 - OB, PCM, MFM, IM, OB Anesthesia, Cardiology

Assembly of Pregnancy Heart Team

On hospital day one it was noted that in addition to an acute worsening of her LVEF (now 20%), she had developed superimposed pre-eclampsia with severe features. A pregnancy heart team (obstetrics, anesthesia, MFM, neonatology, and cardiology) was assembled and met for care planning. Given her clinical status, the team recommended proceeding with an urgent, repeat C-section. With heightened concern for an intrapartum/immediate postpartum cardiac event, the support of cardiothoracic anesthesia and the ECMO team were requested.

Intra-operative Course:

Though a slowly dosed epidural would have been ideal, her recent Clopidigrel use was an absolute contraindication for neuraxial anesthesia and necessitated a general anesthetic. To facilitate patient comfort during line placement and to minimize fetal harm, a Remifentanil infusion was used for anxiolysis. Pre-induction lines included an arterial line as well as both venous and arterial femoral access to allow for the emergent transition to VA ECMO.

A hemodynamically stable induction was obtained using both Remifentanil and Epinephrine infusions along with carefully titrated Propofol boluses. As soon as her eyelid reflex was absent, Succinylcholine was administered to facilitate immediate RSI conditions. Following intubation, a MAC catheter was placed to allow for emergency resuscitation and the delivery of vasoactive medications. A TEE was placed which was notable for an LVEF of 15-20% and global hypokinesis to the LAD and LCx territory. Anesthesia was maintained using volatile anesthetic- with Rocuronium for paralysis. Additionally, the Epinephrine infusion was continued for inotropic support. The obstetricians were careful to avoid large blood loss and both Carboprost and Tranexamic Acid we administered during the case.

The patient tolerated the case well, with her overall baseline cardiovascular status maintained throughout. She was extubated in the OR and brought to the ICU for close hemodynamic monitoring and recovery.

Post-operative:

She had an uncomplicated postop course and was transferred to the cardiology floor for further optimization .Her infant had an uneventful NICU course, and she was discharged on POD5.

Discussion:

Prevalence of Heart Disease among pregnant and post-partum women

- Of the approximate 4 million pregnancies in the US each year, between 1-4% are affected by cardiovascular disease and the prevalence is rising
- The trend is likely rising from acquired heart disease with the most recent data suggesting that up to 26% of U.S. pregnancy-related deaths stem from heart disease
- **Risk Factors**
 - **Race/Ethnicity:** Non-Hispanic black women are disproportionately represented with a 3.4x higher risk of dying from a cardiovascular disease-related pregnancy complication compared with non-Hispanic white women
 - **Age:** Women over 40 years of age have a 30x higher risk of heart disease-related maternal death women under age 20.
 - **Hypertension:** The incidence of developing CHF and incurring a perinatal MI is13x and 8x higher respectively in those who experience hypertensive disorders of pregnancy than those in healthy pregnancies
 - **Obesity:** Obesity is an independent risk factor for maternal death from a cardiac cause. This risk is further elevated for those with moderate to severe OSA.

Early antepartum risk factor identification and modification

- Frequent outpatient visits
 - Surveillance and optimization by PCM and OB

Comprehensive inter-pregnancy care plan for women with heart disease

- Ensuring delivery at appropriate level hospital
- Assembly of Pregnancy Heart Team

Modified WHO Pregnancy Risk Classification for Women with Preexisting Cardiovascular Disease

- Special considerations for mWHO Cls III and IV

Conclusion:

This case highlights the significance of a ‘Pregnancy Heart Team’ as advocated by ACOG for a patient with a mWHO risk class of 4. Pregnancy is an absolute contraindication in patients like this due to the extremely high risk of Severe Maternal Morbidity and Mortality (SMM). Extensive preparation at an appropriate level hospital is needed to lower the risk of a catastrophic outcome for both the mother and the fetus. As the incidence of SMM cases increase, we hope that this case can be used as a template for both future education and collaboration.

References:

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