PREGNANCY INDUCED (PERIPARTUM) CARDIOMYOPATHY

Teresa B. Durden, MSN, APRN
Acute Care Nurse Practitioner
Prisma Health – Palmetto Heart
Columbia, South Carolina

Disclaimer

- "I have no financial relationships or associations in regards to content of this presentation"

Learning Objectives

- Review statistics and risk factors for Peripartum Cardiomyopathy
- Discuss the diagnostic testing for and management of Peripartum Cardiomyopathy
- Examine a case study presentation of a patients' 20+ year journey of Peripartum/Post Partum cardiomyopathy and Heart Failure

Peripartum Cardiomyopathy

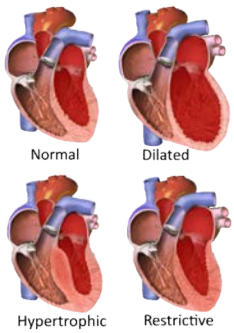
- Development of heart failure toward the end of pregnancy or in the postpartum period.
- Absence of another identifiable cause of the heart failure.
- Left ventricular systolic dysfunction with a left ventricle (LV) ejection fraction nearly always less than 45 percent. The LV may or may not be dilated.

Terminology

- Cardiomyopathy (CM)
- Idiopathic Dilated Cardiomyopathy (IDCM)
- Peripartum Cardiomyopathy (PPCM)
- Ejection Fraction (EF%)
- Heart Failure (HF)
- Implanted Cardiac Defibrillator (ICD)

Types of Cardiomyopathies

- Dilated CM
- Restrictive
- Hypertrophic
- Arrhythmogenic



Incidence & Prevalence of Peripartum Cardiomyopathy

- Mean age 30 years old
- Incidence varies with geography
- 1/2000-4000 live births
- High risk groups

(August 2020, Gunderson 2011)

Risk Factors

- Hypertension
- Obesity
- Diabetes
- Thyroid disorders
- Chronic tachycardia
- Valvular heart disease
  - Mitral Valve Prolapse, Regurgitation
  - Bicuspid Aortic Valve
- Alcohol and drug use
- Malnutrition
- Vitamin deficiencies
- Coronary artery disease
- Autoimmune disorders
- Previous cardiac complications
- Infections/Viruses
- Anemia
- Multiple pregnancies
- Chemotherapy
- Amylodosis
- Idiopathic
- African-American Ethnicity

Pathophysiology

Dilatation of chambers of heart due to increased blood volume

Increase in preload secondary to the increase in red cell mass and blood volume.

Increases in cardiac output by 20% to 30% due to an increase in heart rate and stroke volume by 15% to 25%.

Patient with structural heart disease will develop symptoms generally in first or second trimester

Hemodynamic stress on the heart

Genetic propensity for CM

Genetic predispositions

PPCM and dilated cardiomyopathy (DCM) share genetic predisposition

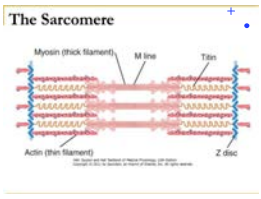
15% of PPCM patients were found to have genetic mutations that have been associated with DCM a lower recovery rate.

Research using PPCM model mice suggests that predisposition genes related to both hypertensive and cardiac disorders via angiogenic imbalance may explain common elements of hypertensive disorders and PPCM.

Kamiya,C. 2016

Genetic studies

- More than 100 genes identified with CM
- Genetic variations present within sarcomeres of myocardium
- 15–20% of patients with peripartum heart failure carry mutations known to induce cardiomyopathies
- Titin, beta-myosin heavy chain, myosin-binding protein C (MYBPC3), lamin A/C or sodium voltage-gated channel alpha subunit 5 (SCN5A).



https://specialty.medicaldialogues.in/esc-guidelines-for-diagnosis-and-management-of-peripartum-cardiomyopathy/

Signs and Symptoms

- Shortness of breath
- Edema
- Hypertensive crisis
- Paroxysmal nocturnal dyspnea
- Orthopnea,
- Dyspnea on exertion.
- Dry cough,
- Palpitations,
- Increase of abdominal girth,
- Lightheadedness, and chest pain.
- Jugular venous distention
  Displaced apical impulse,
- Third heart sound and mitral regurgitation murmurs

Diagnostics

- Echo- Gold Standard, EF <45%
- Labs
  - CBC,CMP, THYROID, LFTS,
  - BNP- pro-BtNP
  - UA- proteinuria
- EKG- look for ischemia, LVH, slow r wave progression
- CXR- enlarged cardiac silhouette, pulmonary edema
- Cardiac MRI- amyloidosis, infiltrative disease, myocarditis
- MUGA Scan – accurate measure of EF%
- Myocardial Biopsy- if no improvement,
- Cardiac Catheterization- only if suspect CAD

EKG - LVH

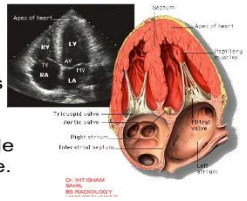
- Sokolov-Lyon Criteria for Left Ventricular Hypertrophy
- S wave in V1 + R wave in lead V5 or V6 > 3.5 mV (35 mm on standard ECG)
  OR
  R wave in V5 or V6 > 2.6 mV (26 mm on standard ECG)
- Body habitus will influence EKG
  - Obesity
  - Anorexia
  - COPD

CXR

- Cardiomegaly
- Vascular congestion/pulmonary edema
- Effusions

Apical 4-Chamber View (A4CH View)

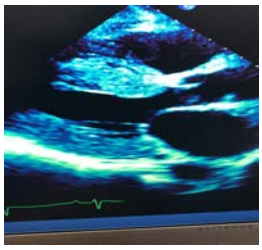
- **Transducer position:** apex of the heart.
- **Marker dot direction:** points towards left shoulder.
- **Structures seen:**
  - right and left ventricle
  - right and left atrium
  - mitral, tricuspid valves
  - IA and IV septum
  - left ventricular apex
  - lateral wall left ventricle
  - free wall right ventricle.



Normal Echo – 4 chamber view

Normal Echo

Non ischemic Cardiomyopathy



NICM Echo

https://www.youtube.com/watch?v=ZlrBJkwrzuU

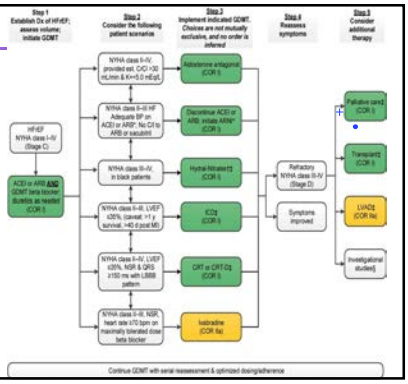
Physical Exam

General Medical Exam
Height/Weight/ BMI
Vital signs
- common to have increased BP and pulse rate
- permissible hypertension up to 150/100

Lungs
Heart sounds – Murmurs common in pregnancy with increase in circulating blood volume
JVD
Lower Extremity Edema

Treatment

- Guideline Directed Management and Therapy of CHF
- Decrease pre-load
- BP management
- Exercise and weight management



Medications and Pregnancy and PPCM

- ACE-I and ARBs contraindicated during pregnancy, can be used post partum if not breast feeding
- Beta blockers (B-1 selective) with monitoring cannot use while breast feeding
- Hydralazine, Nitroglycerine
- Low dose diuretics – HCTZ, Furosemide
- Digoxin
- Anticoagulation – only in events of known thrombus and based on trimester

Medications for hypertension in Pregnancy

Labetolol	Methyldopa	Nifedipine	Hydralazine
• Alpha-beta blocker • 100mg twice daily up to 800mg twice daily • Max doses 2400mg/day	• Centrally acting alpha – agonist • 250mg two to three times daily • Max doses 3000mg/day • Sedation common	• Calcium Channel Blocker • 30-60mg extended release once daily • Max dose 120mg/day • Avoid in low EF • DO NOT GIVE SL	• Vasodilator • 10mg 4 times day, usually 50 to 100mg 2-4 times day • Max dose 200mg • Generally used in combination

Screening and Monitoring During pregnancy and Post Partum

- Prenatal Visits
- Home BP /weight monitoring
- Baseline labs
- Family History
- Symptoms of Pre-eclampsia and heart failure
- Baseline EKG
- Baseline Echo(?)

Counseling

- Previous and future pregnancies
- Genetic testing
- Risk/Benefit ratios
- Breast Feeding vs bottle feeding
- Higher risk for future CM

Case Study

57 year old AA female “Mary”

Age 37-

2 months post partum – normal vaginal delivery

SOB with exertion,

LE edema

ECHO EF 25%

History

- Asthma
- Hypertension
- GERD
- Obesity
- OSA – mild REM related
- Breast Cancer s/p Right Mastectomy 2007 and reconstruction
- Tamoxifen x 5 years
- 2016 Right renal mass – s/p ablation

Echo

- 2000 – EF 20% (post partum)
- 2001 – EF 61% by MUGA scan
- 2002 – EF 60%
- 2007 – EF 45% - mild PAH, Mild LAE
- 2008 – EF 30% - decline ICD
- 2010 – EF 55%
- 2012 – EF 45-50%
- 2013 – EF < 20%
- 2014 – EF 35% - Discuss ICD
- 2015 –EF 35%
- 2016- EF 36-40%
- 2018 – EF 25%
  - Event monitor afib/flutter/2nd degree HB
- Jan 2019 – EF 25% - NSVT
  - ICD placement

Ischemic Evaluations

- 2000 – normal left heart cath, no CAD
- 2010 – normal nuclear stress test
- 2018 RLC – mild CAD, PAH, LAE

Medications

- Coreg (carvedilol) 25mg twice daily
- Entresto (sacubitril and valsartan)– 49/51 twice daily
- Bumex (bumetanide injection)
- Aldactone (spironolactone)
- Corlanor (ivabradine)
- ASA
- Asthma medications

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- Echo images used by permission Terry A. Grainger, MD, Prisma Health Midlands, Cardiology

Questions: