Pregnant Cardiomyopathy

Section 1: Case Summary

Scenario Title:	Pregnant Cardiomyopathy
Keywords:	Pregnant cardiomyopathy
Brief Description of Case:	*{33 year old G2P1 pregnant at 33 weeks. Comes in with shortness of breath. She feels like there is a weight on her chest. She has had a cough for about 3 weeks. She is a smoker. She travelled to Mexico about a month ago. Her legs have been swollen for a few months. She will develop cardiogenic shock, decreased level of consciousness, requiring intubation for airway protection and vasopressor support. Communication with cardiology, radiology, ICU and obstetrics early in the case will be required.* *ECG will show slightly fast A Fib. (rate 110).* *Echo will show cardiomyopathy with LVH, biventricular failure* *Lung u/s will B-lines and a small pleural effusion* *CXR will show a large pericardial silhouette, pulmonary edema}*

Goals and Objectives	
Educational Goal:	To manage respiratory failure and cardiogenic shock in a pregnant patient.
Objectives: (Medical and CRM)	1) Recognize a critically ill pregnant patient in respiratory distress and shock. 2) Work through the differential diagnosis of dyspnea in pregnancy 3) Manage cardiogenic shock in pregnancy 4) Facilitate safe intubation with considerations for a pregnant patient **<u>CRM (crisis resource management) objectives:</u>** 1) Effectively lead a team through the management of a pregnant patient in shock 2) Utilize ED resources (cardiac-monitoring, bedside U/S, pCXR) to guide management 3) Prevent fixation error in a pregnant patient with dyspnea by keeping the differential wide 4) Call consultants early for a pregnant patient in shock

Learners, Setting and Personnel				
Target Learners:	☐ Junior Learners	☒ Senior Learners	☐ Staff	
	☐ Physicians	☐ Nurses	☐ RTs	☐ Inter-professional
	☐ Other Learners:			
Location:	☒ Sim Lab	☐ In Situ	☐ Other:	
	Instructors: 1			

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Recommended Number of Facilitators:	Confederates: 2 (nurse, RT) Sim Techs: 1

Scenario Development	
Date of Development:	March 2020
Scenario Developer(s):	Dr K Patel
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Last Revision Date:	
Revised By:	
Version Number:	1.0

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Section 2A: Initial Patient Information

A. Patient Chart					
Patient Name: Jane Preggo			Age: 33	Gender: F	Weight: 90KG
Presenting complaint: dyspnea					
Temp: 37.9	HR: 110	BP: 166/99	RR: 20	O_2Sat: 90%	FiO_2: room air
Cap glucose: 15.5			GCS: (E V M) 15		
Triage note: Pregnant 33 weeks, SOB for a few weeks. Cough, smoker. No fever. Chest feels "heavy". Travelled to Mexico about one month ago. Child at home sick with URTI.					
Allergies: NKDA					
Past Medical History: Smoker Anxiety			Current Medications: Materna Cigarettes		

Section 2B: Extra Patient Information

A. Further History	
Include any relevant history not included in triage note above. What information will only be given to learners if they ask? Who will provide this information (mannequin's voice, confederate, SP, etc.)? Information only given if asked: Mannequin: Cough for 3 weeks, have to catch my breath all the time. Not really having chest pain but for the past few days there feels like a weight is on my chest. I get really dizzy when I'm on my feet. No fever. No runny nose or sore throat. Toddler at home attends daycare and has had a cold for about a month. No abdominal pain, no pv bleeding. I went to Mexico about a month ago for vacation. I haven't seen my family doctor in a while because he just keeps making me feel guilty for smoking. And this is my second pregnancy so I know how it goes. Can I just go out for a smoke for a few minutes?	
B. Physical Exam	
List any pertinent positive and negative findings	
Cardio: Holosystolic murmur over precordium	Neuro: Alert, irritable, agitated
Resp: Decreased, faint crackles	Head & Neck: short, fat neck

Abdo: Gravid, nontender	MSK/skin: cool extremities, 3+ pitting edema to thighs
Other:	

Section 3: Technical Requirements/Room Vision

A. Patient
☒ Mannequin *(specify type and whether infant/child/adult)* **GRAVID**
☐ Standardized Patient
☐ Task Trainer
☐ Hybrid
B. Special Equipment Required
C. Required Medications
Ketamine Etomidate Succinylcholine Rocuronium Nitroglycerin (patch and IV) Furosemide Norepinephrine Phenylephrine Dobutamine dopamine heparin
D. Moulage
Pregnant belly
E. Monitors at Case Onset
☒ Patient on monitor with vitals displayed ☐ Patient not yet on monitor
F. Patient Reactions and Exam
Include any relevant physical exam findings that require mannequin programming or cues from patient (e.g. – abnormal breath sounds, moaning when RUQ palpated, etc.) May be helpful to frame in ABCDE format. A – normal voice, no stridor, hoarseness or wheezing B – tachypnea, shallow breaths, faint crackles throughout C – systolic ejection murmur D – initially alert and responsive, becomes less responsive and only moans as BP drops E – gravid abdomen

Section 4: Confederates and Standardized Patients

Confederate and Standardized Patient Roles and Scripts	
Role	*Description of role, expected behavior, and key moments to intervene/prompt learners. Include any script required (including conveying patient information if patient is unable)*
Confederate	Irritable and anxious patient. Start off loud (obnoxious) and become progressively quieter
Nurse	Alert ERP when patient becomes drowsier

Section 5: Scenario Progression

Scenario States, Modifiers and Triggers				
Patient State/Vitals	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State		Facilitator Notes
1. Baseline State Rhythm: AFib HR: 110 BP: 166/99 RR: 28 O_2SAT: 92% T: 37.9°C GCS: 15 FHR 140	Patient is alert, mildly tachypneic especially when talking	<u>Expected Learner Actions</u> ☐ IVx2/O2 ☐ order pCXR, labs (trop, coags, G&S, septic panel), ECG ☐ Hx and Px ☐ fetal doppler on bedside U/S ☐POCUS ☐ interpret CXR and ECG ☐ State Ddx	<u>Modifiers</u> -No O2 placed >> O2 drops to 85% -if not stating Ddx, RN to ask "*what do you think is going on here? Does she have a PE?*" <u>Triggers</u> *For progression to next state* -Either all actions met or 5 minutes passes	
2. Resp failure Rhythm: AFib w/ PVCs HR: 115 BP: 90/55 RR: 32 O_2SAT: 85% on 2LNP T: 37.9°C GCS: 14	Patient becomes more tachypneic/crackly, O2 decreases, appears more tired	<u>Expected Learner Actions</u> ☐ provide O2 by FM, call RT for BiPAP, reposition in LLD to increase venous return ☐ bedside U/S (cardiac, lung: Recognizes abnormal LV function and pulmonary edema) ☐ get 2 IVs if not already done ☐ Call for help (anesthesia, cardio, ICU, obstetrics for urgent C/S) ☐ give gentle fluid bolus for hypotension	<u>Modifiers</u> -If not already stated, RN to ask *"what do you think is going on here? Does she have a PE?"* -RN notes increasing resp distress if BiPAP not started "*She's working harder to breathe…can we do something else? Should I call RT?"* -once BiPAP started, O2 sats improve to 95%, but patient starts vomiting after a few minutes -profound hypotension if rate control agent used	

		☐ summarize clinical status and prepare for intubation ☐ intubate - choose cardiostable meds, recognize difficult intubation scenario ☐start vasopressors to support intubation ☐post-intubation care – CXR, sedation, NG tube	-transient improvement in BP if fluid bolus given but then resp distress worsens <u>Triggers</u> -intubation >> worsening hypotension	
3. Shock Rhythm: AFib w/PVCs HR: 115 BP: 70/40 RR: 40 with apneic periods O_2SAT: 80% on 2LNP T: 37.9^{o}C GCS: 10	Hypotension worsens after intubation,	<u>Expected Learner Actions</u> ☐ Discuss pressors/inotropes (dobutamine, phenylephrine, norepi epinephrine) ☐ Call ICU and Cardio if not already done ☐ set up for CVC and art line ☐ Repeat POCUS shows worsening LV function	<u>Modifiers</u> -if no inotropic support started, RN to ask "*what do you think is going on here? Is it really a PE or something else?*" -no change if tPA given -Cardiac arrest if intubation and inotropic support not started within 5 minutes (=end of scenario) <u>Triggers</u> -Inotropic support started = BP improves to 110/70 >> -if no inotropic support within 5 minutes, cardiac arrest >> end scenario	

4. Improvement		Expected Learner Actions ☐ Repeat U/S after inotropic support started ☐ post-intubation care ☐call ICU if not already done ☐consideration for ECMO	Modifiers Triggers -ICU and cardio arrive	

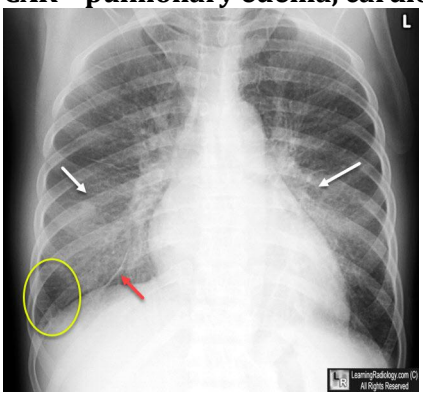
Appendix A: Laboratory Results

<u>CBC</u> WBC 18 Hgb 95 Plt 410 <u>Lytes</u> Na 138 K 4.0 Cl 110 HCO_3 16 AG Urea 8 Cr 110 Glucose 15.5 CRP 120 <u>Extended Lytes</u> Ca Mg PO_4 Albumin TSH <u>VBG</u> pH 7.29 pCO_2 40 pO_2 69 HCO_3 16 Lactate 3.1	<u>Cardiac/Coags</u> hsTrop = 8,000 D-dimer >4000 BNP 2200 INR 1.1 aPTT <u>Biliary</u> AST ALT GGT ALP Bili Lipase <u>Tox</u> EtOH ASA Tylenol Dig level Osmols <u>Other</u> B-HCG

Appendix B: ECGs, X-rays, Ultrasounds and Pictures

Paste in any auxiliary files required for running the session. Don't forget to include their source so you can find them later!

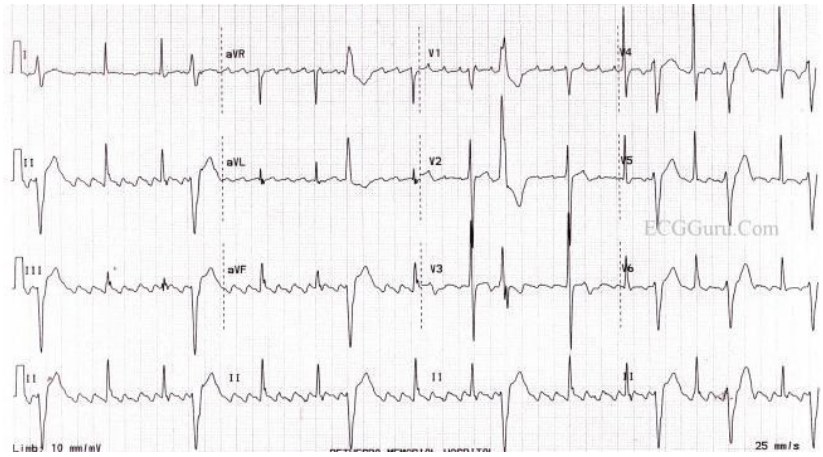
CXR – pulmonary edema, cardiomegaly:



There is bilateral, central airspace disease (white arrows), fluid in the inferior accessory fissure (red arrow) and Kerley B lines (yellow oval), all signs of congestive heart failure.

http://learningradiology.com/archives2007/COW%20267-Pulmonary%20edema-CHF/pulmedemacorrect.html

ECG – AFlutter with PVCs:



https://www.ecgguru.com/ecg/atrial-flutter-pvcs

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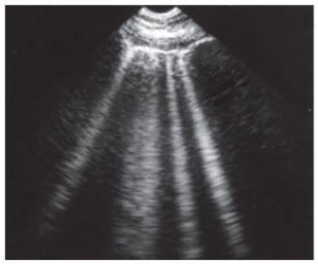
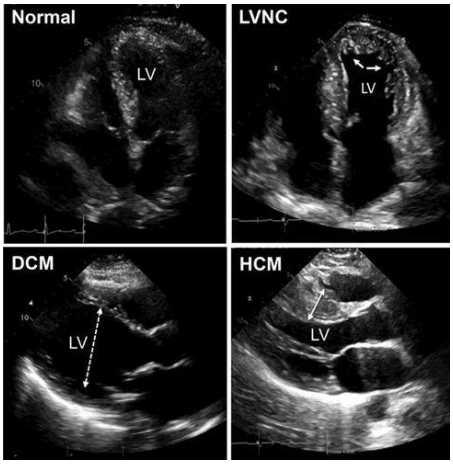
U/S – lung:


B-lines

https://youtu.be/Fyc9CB_ncsU (EM Ottawa Lung POCUS in suspected CHF)

https://images.squarespace-cdn.com/content/v1/58118909e3df282037abfad7/1509272201952-XXNHNWJNMKTV3AO656CE/ke17ZwdGBToddI8pDm48kJbosy0LGK_KqcAZRQ_Qph1Zw-zPPgdn4jUwVcJE1ZvWQUxwkmyExglNqGp0IvTJZUJFbgE-7XRK3dMEBRBhUpzkC6kmM1CbNgeHQVxASNv0wiXikHv274BIFe4LR7nd1rKmAka4uxYMJ9FupazBoaU/ezgif.com-optimize+%281%29.gif?format=750w
(Pleural effusion with B-lines)

Echo – LV systolic dysfunction:



https://www.123sonography.com/ebook/echocardiographic-features-dilated-cardiomyopathy

https://images.squarespace-cdn.com/content/v1/58118909e3df282037abfad7/1515766835031-L4YNIG3SFHBJWO1A18TG/ke17ZwdGBToddI8pDm48kEzD4uNHZYDJ-SNCBroMLhpZw-zPPgdn4jUwVcJE1ZvWEtT5uBSRWt4vQZAgTJucoTqqXjS3CfNDSuuf31e0tVExFnP11JVRI9qTfQx-q7Xp6D-iKfqYoG7LtcB3JUGxghur-lC0WofN0YB1wFg-ZW0/ezgif.com-optimize+%2822%29.gif?format=500w
(severely reduced EF

Appendix C: Facilitator Cheat Sheet & Debriefing Tips

Include key errors to watch for and common challenges with the case. List issues expected to be part of the debriefing discussion. Supplemental information regarding any relevant pathophysiology, guidelines, or management information that may be reviewed during debriefing should be provided for facilitators to have as a reference.

Common challenges:

-fixating on diagnosis of PE
-getting distracted by AFlutter
-hesitancy in choosing meds in the late-gravid patient
-knowing who to consult and when (ICU, Cardiology/Cardiac Surgery, Obs/Gyne all play a role early in management of unstable patient)

Issues:

-intubation of the pregnant patient >> recognize this as a difficult intubation due to maternal size, increased breast size, reduced FRC, higher O2/,metabolic needs, increased edema of upper airway soft tissues, increased risk of aspiration, etc. Intubator should have backup support and a plan for failed airway, provide manual uterine displacement or tilt, use the RAMP-up position, don't give lots of high positive pressure breaths during preoxygenation,
-maternal hypoxia IS harmful to the fetus, but hyperoxia is NOT
-post-intubation care >> includes analgesia as maternal catecholamine release can worsen uteroplacental flow
-when do arrythmias really need to be treated? (not in this case!)

Peripartum cardiomyopathy:

-rare, occurs in the absence of prior heart disease
-symptoms often mimic usual pregnancy symptoms = pitfall is delay in diagnosis
-presents 3rd trimester or early post-partum period
-usually dilated type with LV systolic dysfunction (EF <45%); EF<30% requires anticoagulation (nonurgent)
-risk-factors: black ethnicity, hypertension, advanced maternal age, multiple gestation pregnancy, pre-eclampsia, HTN, DM2, obesity
-most recover but a minority require mechanical support (LVAD) or transplantation
-C-section should be considered in cases of acute heart failure
-Management has to ensure fetal safety >> it is safe to give nitroglycerin, furosemide, beta-blockers, digoxin, hydralazine, heparin/LMWH, phenylephrine, epinephrine, dobutamine, ALL induction agents and NMBs. Avoid ACEIs/ARBs and warfarin. DOACs have not been studied in pregnancy and should thus be avoided. Phenylephrine can worsen maternal cardiac output but a few pushes are probably ok and it's used in obstetrical anesthesia already. Ketamine can cause uterine contractions in early pregnancy but is generally ok in late pregnancy.
-**outcomes may be worse with dobutamine and ECMO should be considered early
-Early delivery or termination of pregnancy should be considered in case of hemodynamic instability. Stable patients are delivered vaginally unless there are obstetric reasons for a cesarean section. Postpartum risk of decompensation should be anticipated.

References

1. Peripartum cardiomyopathy. *BMJ 2019;364:k5287*
2. https://emcrit.org/ibcc/chf/
3. https://www.uptodate.com/contents/acquired-heart-disease-and-pregnancy?source=related_link
4. Peripartum Cardiomyopathy: *JACC* State-of-the-Art Review. *J Am Coll Cardiol* 2020;75:207-221.

