Emergency Cardiac Surgery in Pregnancy and Post-partum Women

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Disclosures

- I have no financial relationships or compensations to disclose

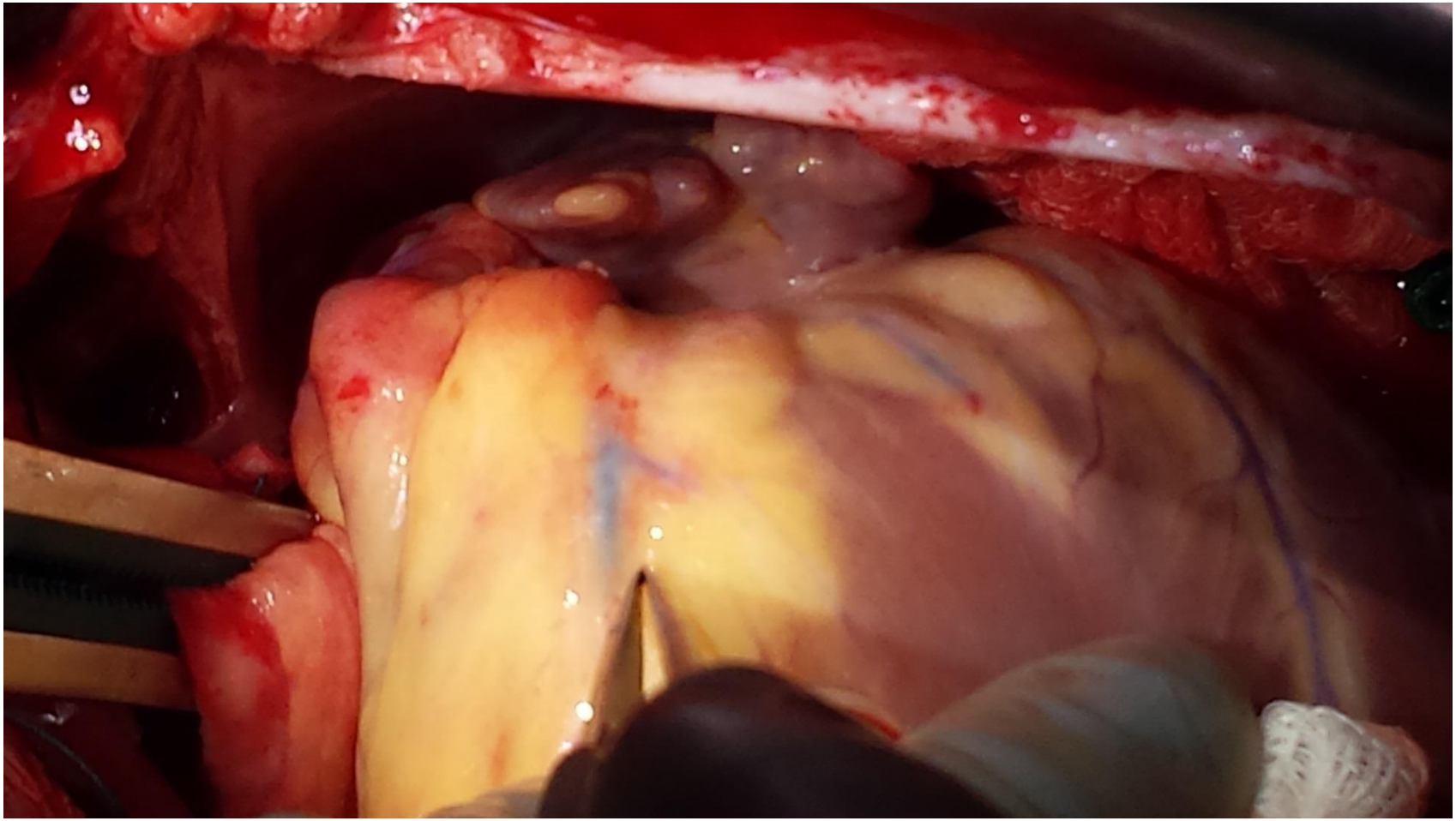
RG

- 31 WF collapsed at home 1 week postpartum (full term healthy baby girl / vaginal birth)
- While nursing developed severe chest pain. Thinking it was heartburn she went to lie down in her room.
- Minutes later husband found her unresponsive, pulseless; initiated CPR and called 911
- EMS confirmed V-fib; cardioverted her once field and again in ED. Recovery of VS- intubated and life-flight to Emory
- Emergent LHC found acute coronary dissection (ACD) in Left Main, LAD, proximal diagonal, and both obtuse marginal vessels
- Intra Aortic Balloon Pump placed for support (EF 25-30% by LV gram), troponin was 155
- Cardiothoracic Surgery Consulted for evaluation- continued CP despite IABP and Inotropic support

RG

- 2 previous pregnancies without any complications
- Vaginal delivery 1 week prior to presentation, was discharged home
- Smoker 1 ppd including while pregnant
- No other chronic medical problems
- No home meds or allergies
- After evaluation by CTS; taken to the OR for emergent on pump CABG x2

RG



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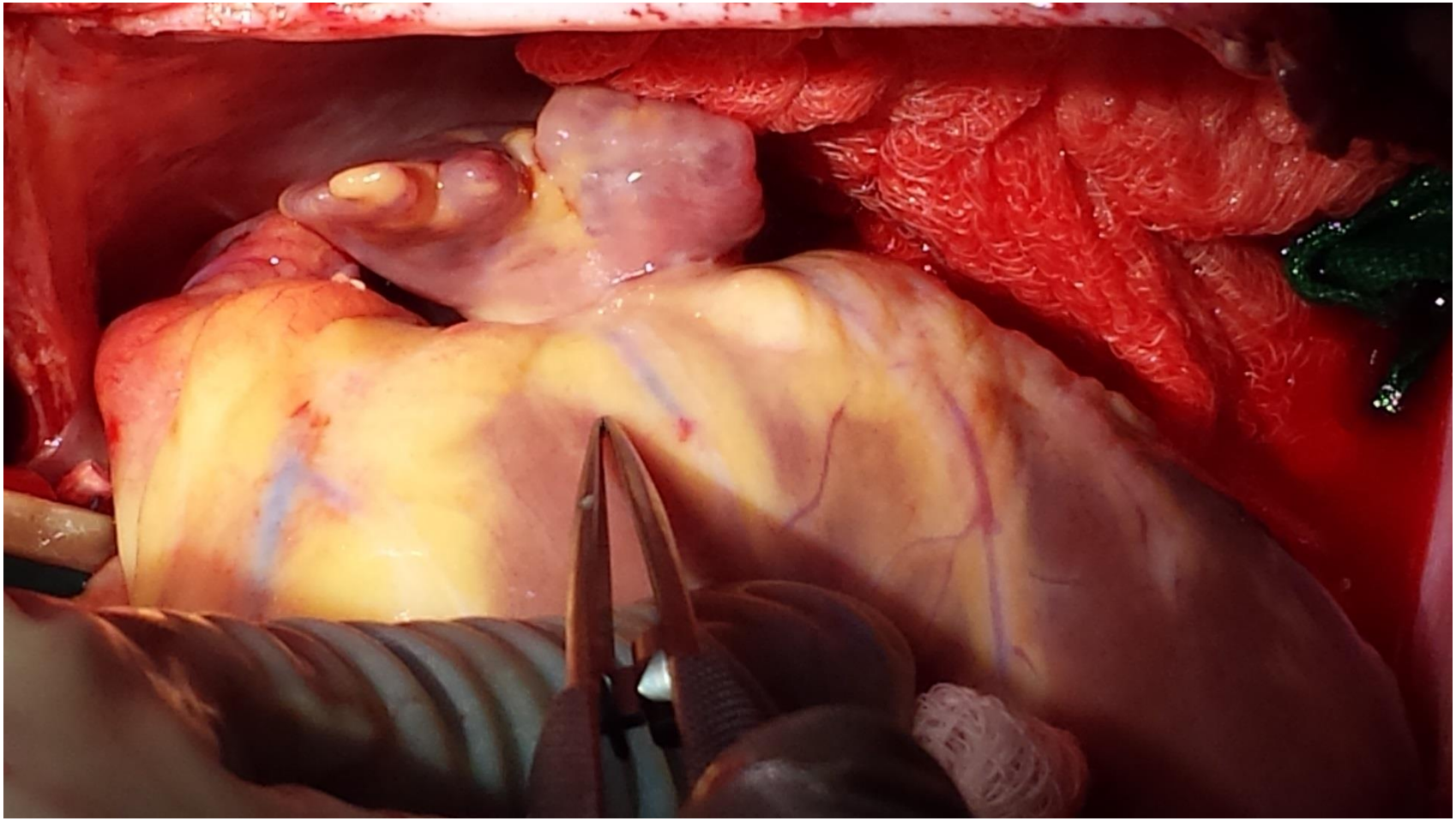

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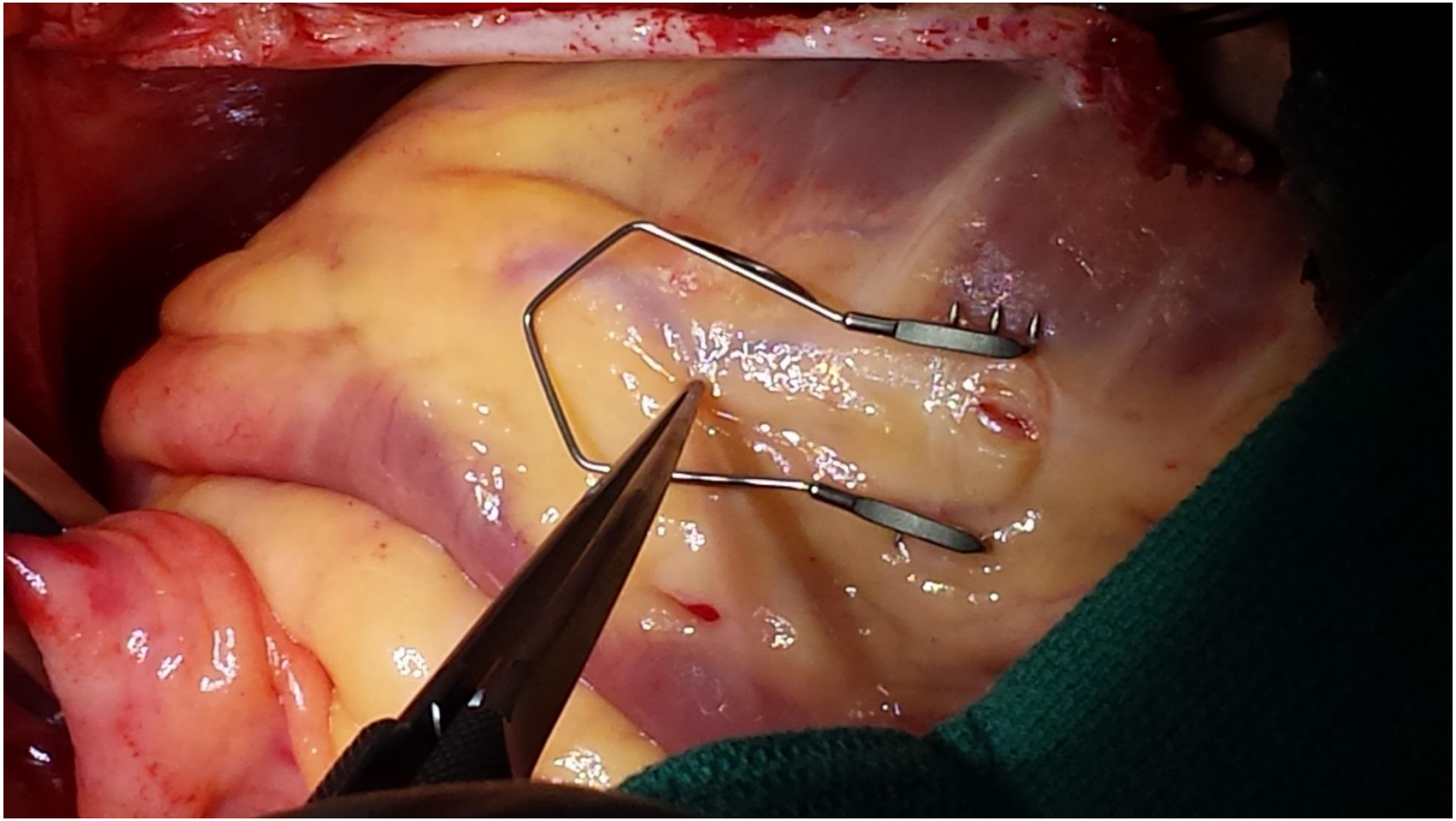

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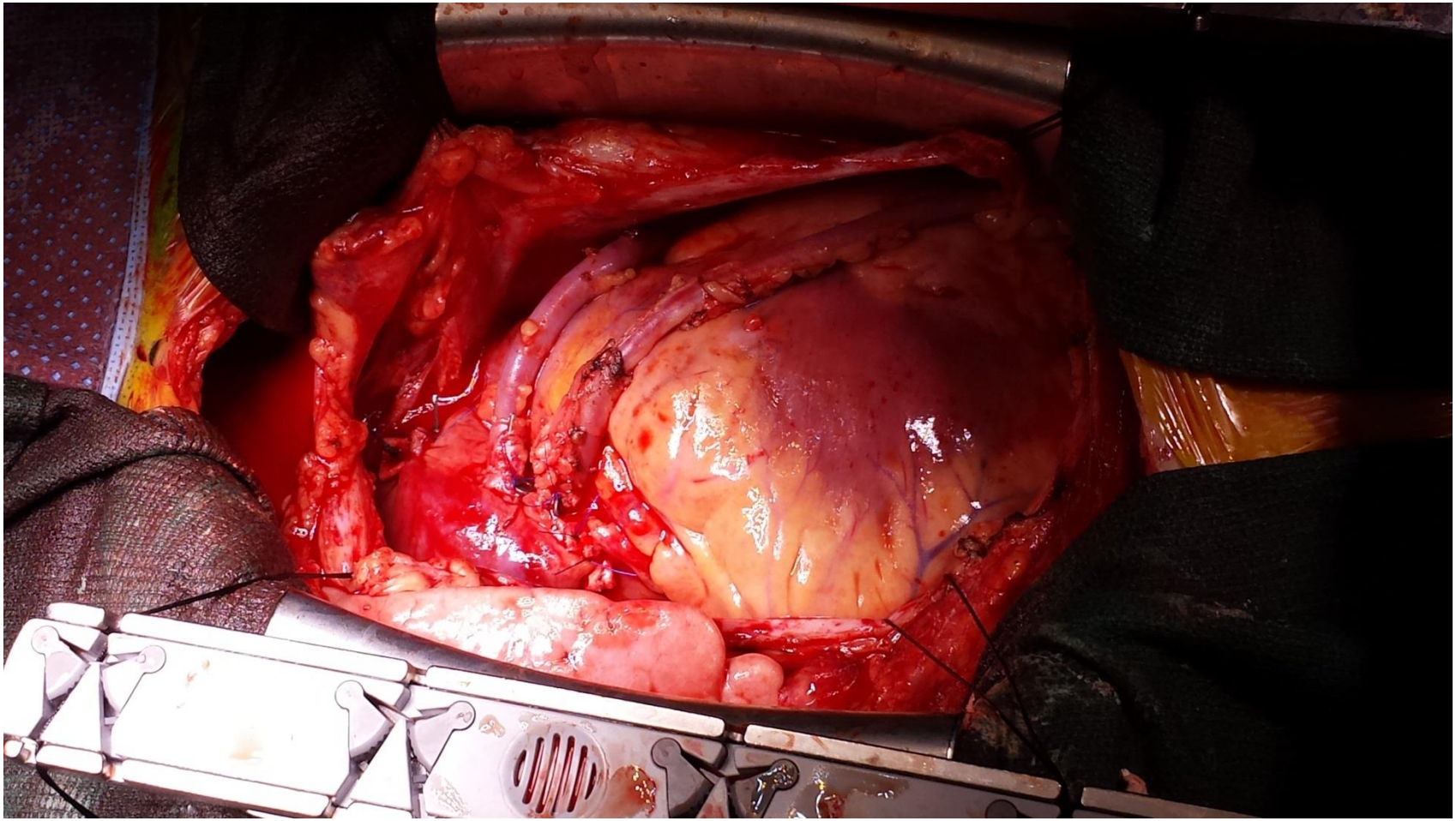

RG

- Extubated POD#1, IABP removed on POD#2
- Weaned off inotropes by POD#3
- Repeat Echo showed EF 45%
- Discharged Home on POD#6
  - ASA, statin, plavix, low dose BB
- Seen in clinic 3 weeks after discharge- mother and baby doing well

Emergent Cardiac Surgery in Pregnant and Postpartum Women

- Lack of data about pregnant and postpartum women undergoing emergent cardiac surgery
  - Few case reports of isolated CABGs for spontaneous acute coronary artery dissection (SCAD)
- Postpartum cardiomyopathy is a well documented entity- may result in LVAD or heart transplant, but rarely “emergent” in nature
- True cardiac surgical emergencies are rare in the general population, much less in this specific patient population.

Emory University Experience

- Emory Division of Cardiothoracic Surgery 13 year experience from 2002-2015
- Society Thoracic Surgery (STS) database queried for all cardiac surgery cases involving women under age of 40 at Emory (443 cases)
- Cases reviewed in the Emory EMR
  - Pregnancy or postpartum status not a field on STS database
  - Identified pregnant or postpartum (less than 6 weeks post delivery) status
- Identified 19 women who underwent 20 emergency cardiac surgery operations
  - Separated into 3 groups- based on stage of pregnancy
  - Gravid (non-viable), Gravid (>24wks), postpartum (out to 8 weeks)
  - Excluded dilated cardiomyopathy leading to heart failure
- Strategies used to manage these patients were identified and reviewed

Pre-Operative Characteristics

	All (n=20)	Group-1: Postpartum n=11 (55%)	Group-2: Gravid viable n=6 (30%)	Group-3: Gravid non-viable n=3 (15%)
Age	31.4±6.2	34±3.13	28±6.51	28.7±11.4
Race				
-White	11 (55%)	5 (45.5%)	5 (83.3%)	1 (33.3%)
-Black / African American	8 (40%)	5 (45.5%)	1 (16.7%)	2 (66.7%)
-Hispanic	1 (5%)	1 (9.1%)	0	0
Hypertension	8 (40%)	5 (45.5%)	1 (16.7%)	2 (66.7%)
Chronic Lung Disease	1 (5%)	1 (9.1%)	0	0
Last Creatinine Level	0.74 ± 0.24	0.8±0.24	0.6±0.23	0.8±0.28
Diabetes	0	0	0	0
Dyslipidemia	4 (20%)	3 (27.3%)	1 (16.7%)	0
Smoker	6 (30%)	9 (18.2%)	3 (50%)	1 (33.3%)
Smoker-# Pk/Yrs	1.3 ± 3.67	1.36±4.52	1.67±3.14	0.33±0.58
Family History of Premature CAD	1 (5%)	1 (9.1%)	0	0
Previous Cardiac Surgery	3 (15%)	1 (9.1%)	1 (16.7%)	1 (33.3%)

- Gravid non-viable women all presented at <15 weeks gestation
- Gravid viable women presented on average at 33.8 weeks pregnant (26 – 36 week range)
- Postpartum patients presented on average 2.9 weeks after delivery (1 day – 6 weeks)

Presentations/Pathology

	All (n=20)	Postpartum n=11 (55%)	Gravid viable n=6 (30%)	Gravid non-viable n=3 (15%)
ACS- Acute Coronary Dissection	9 (45%)	8 (72.7%)	1 (16.7%)	0
Acute Type A Aortic Dissection	4 (20%)	2 (18.2%)	1 (16.7%)	1 (33.3%)
Pulmonary Embolism	3 (15%)	1 (9.1%)	1 (16.7%)	1 (33.3%)
Severe Mitral Stenosis	2 (10%)	0	1 (16.7%)	1 (33.3%)
Pericardial Effusion	1 (5%)	0	1 (16.7%)	0
Severe Aortic Insufficiency from native aortic valve endocarditis	1 (5%)	0	1 (16.7%)	0

- Largest cohort was postpartum women presenting with Acute Coronary Syndrome (ASC) secondary to Spontaneous Coronary Artery Dissection (SCAD)
- Both severe mitral stenosis were in women with remote mitral valve replacements now with prosthetic valve dysfunction
- Three patients had IABPs placed prior surgery

Management

- Management of all patients was carried out with a multidisciplinary team including: cardiology, cardiac surgery, critical care and obstetrics/gynecology
- Gravid non-viable women counselled about the eminent threat to their life, risk to fetus and underwent surgery
- Gravid viable women were managed with a 3 team approach
  - Patients taken to CV operating room and placed under general anesthesia
  - High risk OB/GYN performed C-sections to deliver infants, obtain hemostasis and closed abdominal wound
  - Neonatology in an adjoining OR room created a remote NICU room for resuscitation and management of the infant
  - Cardiac surgery team in operating room immediately ready to assume operative care of mother and performed operation as needed, using standard heparin doses, cannulation and cooling as indicated
- Postpartum women were managed as standard adult cardiac surgery patients

Operations Performed

	All (n=20)	Postpartum n=11 (55%)	Gravid viable n=6 (30%)	Gravid non-viable n=3 (15%)
Coronary Artery Bypass Grafting	9 (45%)	8 (72.7%)	1 (16.7%)	0
Ascending Aortic/Total arch Replacement	4 (20%)	2 (18.2%)	1 (16.7%)	1 (33.3%)
Pulmonary Embolectomy	3 (15%)	1 (9.1%)	1 (16.7%)	1 (33.3%)
Mitral Valve Replacement	2 (10%)	0	1 (16.7%)	1 (33.3%)
Pericardial Window	1 (5%)	0	1 (16.7%)	0
Aortic Valve Replacement with Aortic Root Enlargement	1 (5%)	0	1 (16.7%)	0

CABG most common operation performed

- Average number of bypass performed was 2.0 (Range 1-3)
- Five (55%) done without the use of Cardiopulmonary Bypass (off-pump)
- LIMA-LAD used in 8 cases

One case included a complex aorta repair- Bentall with valve replacement, coronary re-implants, total aortic arch replacement with re-implantation of innominate, left carotid and left subclavian arteries

Outcomes

- No operative or 30-day mortalities for any patients
- All 5 infants delivered via cesarean section without complications and alive at discharge
- All 3 women with non-viable fetuses progressed to spontaneous abortions following cardiac surgery with systemic heparinization
- Morbidities included 2 cases of prolonged ventilation (>24 hrs) and 1 case of post operative pneumonia
- No return to the OR for bleeding, however one patient was readmitted and taken to OR for a pericardial window on POD#14, due to pericardial effusion
- No post operative acute renal failure, wound infections, MI, CVA or arrhythmias

Conclusions

- Presentations needing emergent cardiac surgery in pregnant and postpartum women are varied but include ACS, Type A Aortic dissection, pulmonary embolism and acute valve pathology
- Management includes surgical intervention with a multidisciplinary approach for the woman and infant
- Post operative outcomes are excellent
- Detecting surgical pathology in otherwise young healthy women can be challenging
- Importance of accurate diagnosis and prompt surgical consultation

Further Areas of Study

- Pregnancy/postpartum status as variable in the STS data base
  - Allow for more robust collection of data
  - Create larger cohorts to better understand risk factors and screening guidelines
- Better understand physiological changes associated with pregnancy that leads to cardiac pathology
- Convert non-viable to viable fetus by “waiting it out” ?
  - No patient in this series was near 24 weeks, but potential for delay operation to maintain pregnancy? At what risk to the mother

Thank You

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- Assistance of Dr. Chris Peircecchi, Emory Division of Cardiothoracic Surgery

Questions ?


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