



Surgical Management of Aortic and Vascular Complications in Pregnancy and Postpartum

Sara L. Zettervall MD, MPH

Assistant Professor of Surgery
University of Washington
Seattle, WA



Disclosures



- Scientific Advising/Clinical Trial Support
 - W.L. Gore
 - Cook Medical
 - Terumo Aortic
 - Phillips



Background



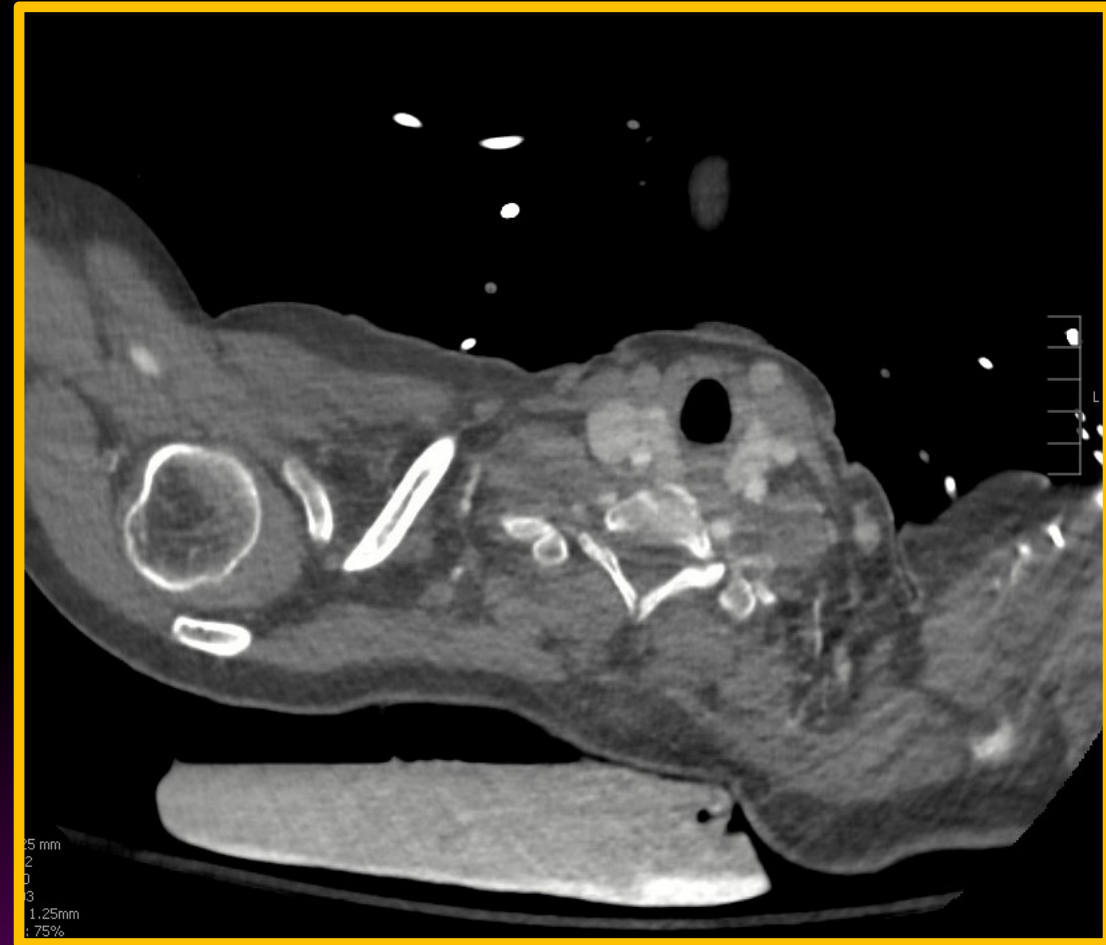
- Vascular Complications in pregnancy are a challenging dilemma for evidence based practice
 - Limited data to guide care
 - Rely on expert opinion and small case series
- Fortunately, rare disease state
 - But as a result, most patients unaware of their diagnosis prior to pregnancy



Case: SJ



- 30 yo F sp C-Section for fetal positioning
- Returned to the ED 11 days later with chest/back pain
- Previously healthy G2P2
 - No family history of aortic disease or sudden cardiac death





Background

- Cardiovascular disease – leading cause of maternal mortality in US
 - Unfortunately increasing in US
 - Particularly in regions with decreased access to termination for women with underlying cardiovascular conditions
- Physiologic State of Pregnancy
 - Peaks in 3rd trimester (50%) and post-partum (33%)
 - Increased tissue fragility
 - Complicates labor and delivery
 - Poses risk for vascular events and wound complications

Cardiovascular and hemodynamic changes:

- Increase in:
 - Heart rate
 - Blood volume.
 - Cardiac output.
 - Left ventricular mass
 - End-diastolic dimensions

Hormonal

- Increase in:
 - Estrogen
 - Progesterone
 - Relaxin

*Courtesy of Dr. Rana Afifi



Vascular Complications



- **Acute Dissection**
 - Can occur throughout pregnancy and post-partum period
 - Majority in 3rd and 4th trimester (12 weeks post-partum)
 - Rare: 0.3% (29 patients in IRAD), <<<1% of all pregnancies
 - 45% Type A, 55% Type B
 - 70% had aortopathy (50% diagnosed after dissection)
 - 50% in post-partum period (Mean 12 days post-partum)
 - Significant Impact on Mortality
 - Maternal: up to 16%
 - Fetal: Up to 40%



Vascular Complications

- Chronic Dissection
 - Increased risk for rapid expansion – increased surveillance necessary
- Visceral Aneurysm
 - Splenic aneurysm most common (<1% pregnancies)
 - Account for >50% of splenic aneurysm ruptures
 - Carries very high mortality
 - Fetal >90%, Maternal >50%



Vascular Complications



- PE/DVT
 - Prothrombotic state of pregnancy leads to 5x risk for thromboembolism (<1% pregnancies, 9% of maternal mortality)
- Trauma/Intimate Partner Violence - 10% of pregnancies
 - Leading cause of non-obstetric death during pregnancy
 - Treatment depends on injury



Imaging and Evaluation

- Approach depends on setting
 - Elective environment/Surveillance: Avoidance of radiation preferable
 - Aneurysm/Dissection: Complete aortic imaging each trimester and post-partum
 - MRI recommended over CT for surveillance to reduce radiation to fetus
 - Duplex if appropriate (visualization decreases as pregnancy progresses)
 - Emergency setting/symptomatic
 - CTA gold standard if question of progression or acute aortic/visceral emergency
 - Inadequate or delayed imaging hinders diagnosis and management and carries more risk than that of radiation exposure to mother and fetus



Management: Aortic Dissection

- Acute Type A
 - First Trimester: Urgent open repair +/- fetal monitoring and/or termination
 - Third Trimester: Emergent C-Section immediately followed by open repair
 - 24-28 weeks: Shared decision making balancing maternal and fetal risk
- Acute Type B
 - Medical Management recommended unless dissection is complicated
 - Endovascular preferred to open whenever possible
 - Presume patient has aortopathy and therefore real risk of retrograde type A
 - Treatment multidisciplinary, collaboration with cardiac surgery, be ready to rescue
- No RCTs and very limited data to guide recommendations
 - As a result, many women with dissection or aortopathy undergo C-Section regardless of size to allow for planned delivery



Management: Aneurysmal Disease

- Chronic Dissection/Aneurysm
 - Medical management unless progressive dilation
 - Decision to intervene individualized based on diameter, anatomic of repair, trimester, mutation
- AHA Guidelines for Labor and Delivery
 - Chronic Dissection – C-Section
 - Aortopathy (no dissection)
 - Aorta <4.0cm: vaginal delivery
 - Aorta > 4.5: C-Section
 - Shared Decision making for 4.0-4.5cm
- Visceral Aneurysms
 - Treatment regardless of symptoms/rupture
 - Catheter directed embolization (unless very distal – splenectomy)



Management: Thromboembolism

- Venous Thromboembolism
 - Medication 1st Line: DAPT, warfarin contraindicated
 - Heparin/Lovenox through at least 6 weeks post-partum
 - PE with HD compromise:
 - Royal College of OG: thrombolytics vs thrombectomy (1.7% rate of fetal mortality)
 - American Society of Hematology: thrombolytics
 - DVT: American Society of Hematology: medication only due to insufficient evidence
- Case series of successful of thrombolytics and thrombectomy – very little data
 - Multidisciplinary care with shared decision making



Multidisciplinary Team

- Most important aspect of care of women with vascular complications is Multidisciplinary approach with SHARED decision making
 - Supported by guidelines
- Team Approach
 - Providers
 - Maternal Fetal Medicine
 - Vascular/Cardiac Surgery
 - Cardiology
 - Genetics
 - Care is delivered in center with adequate resources
 - Ability to obtain immediate complex cardiovascular, anesthetic, obstetric, and neonatal care as well as multidisciplinary ICU management



Long-term

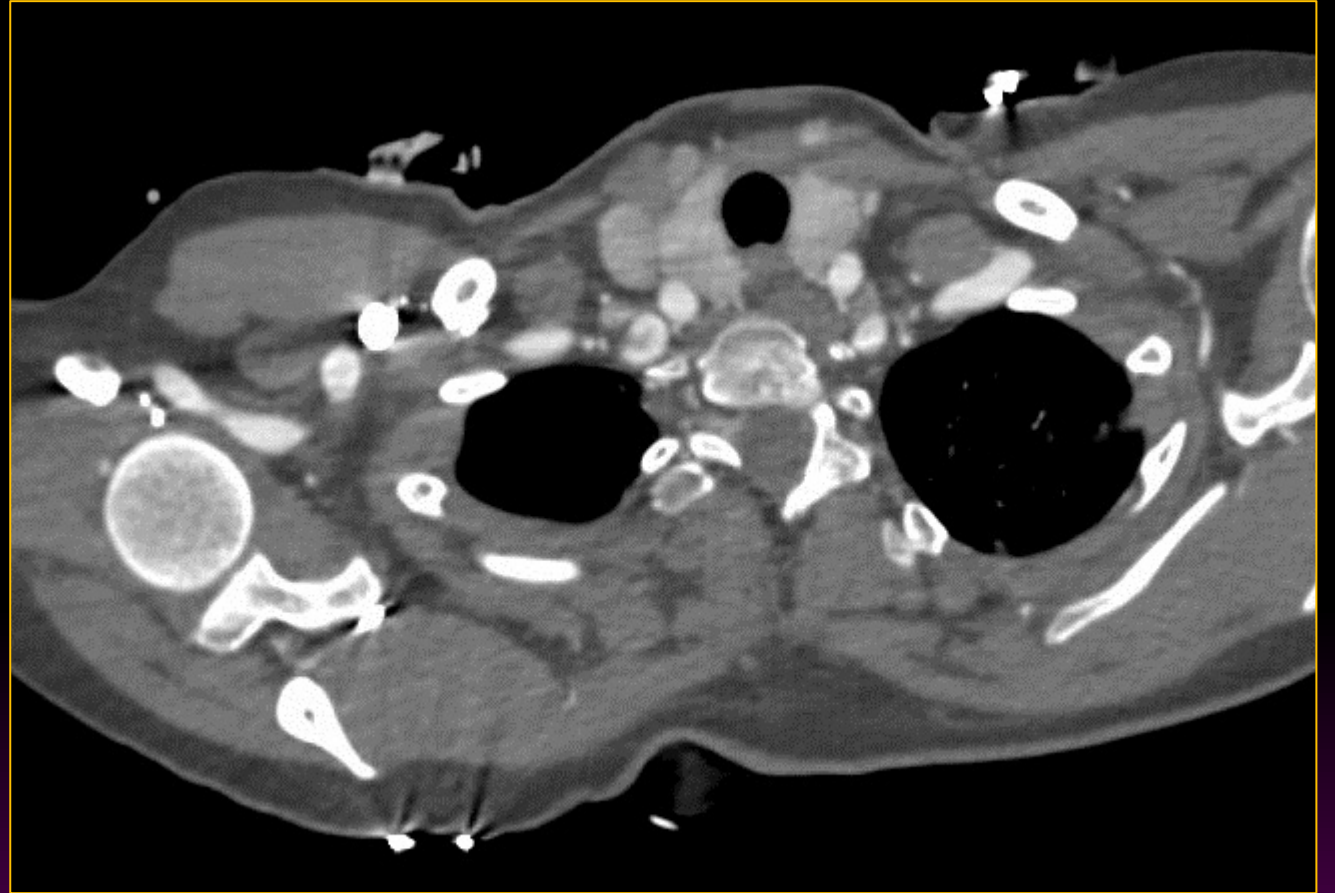
- In US care for women after delivery is often very minimal with 1 post-operative MFM visit even for high risk patients with complicated pregnancies
 - Emphasizes the need for ongoing multidisciplinary care for mother
- Changing team
 - Vascular surgery and cardiology are most critical since patients have long lives ahead
 - Establish surveillance and medication regimens critical
 - Imaging and medication changes



Case: SJ



- Admitted with appropriate medical management, genetic testing ordered, case review at MTAP
- HD 2 developed abdominal pain and sudden bump in creatinine

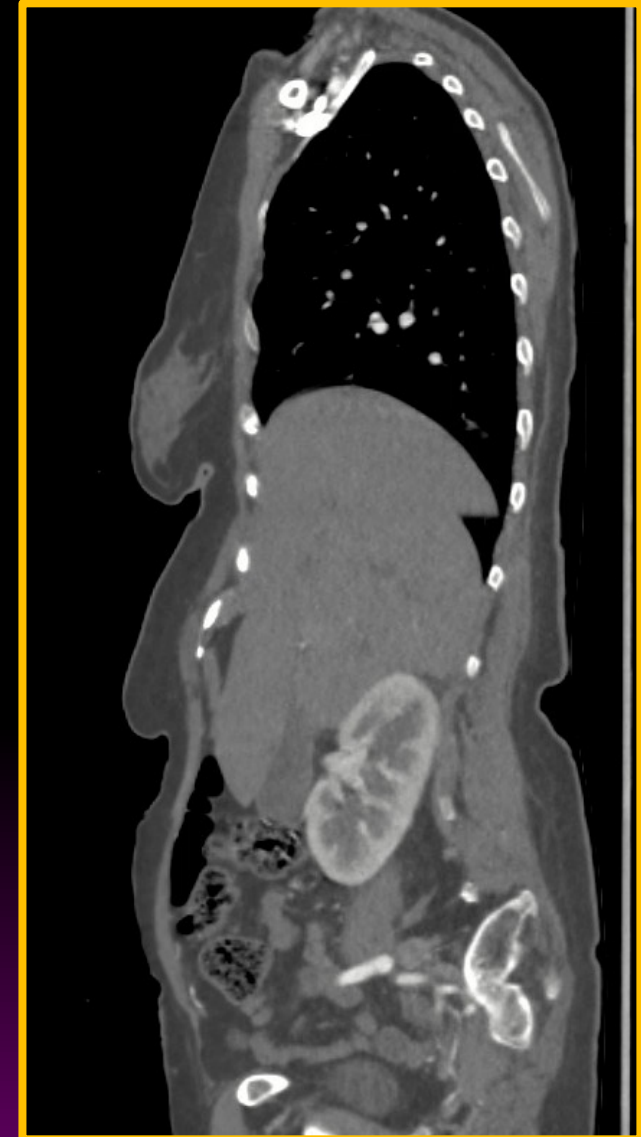




Case Example



- Taken to OR emergently
 - Cook dissection stent followed by
 - Zone 2 Arch + FET
- Uncomplicated course
- Follow-up (1.5 year out)
 - Genetic Testing: LDS
 - TEVAR extension
 - Getting Open TAAA next week





Conclusions

- Vascular Complications in pregnancy are a challenging, but may have lifelong impacts on the health of entire families
 - Multidisciplinary approach before, during, and most importantly **AFTER** pregnancy are critical for the health of the woman, baby, and families
- More research is desperately need to better understand how to prevent complications, care for these patients, and understanding natural history in this unique population

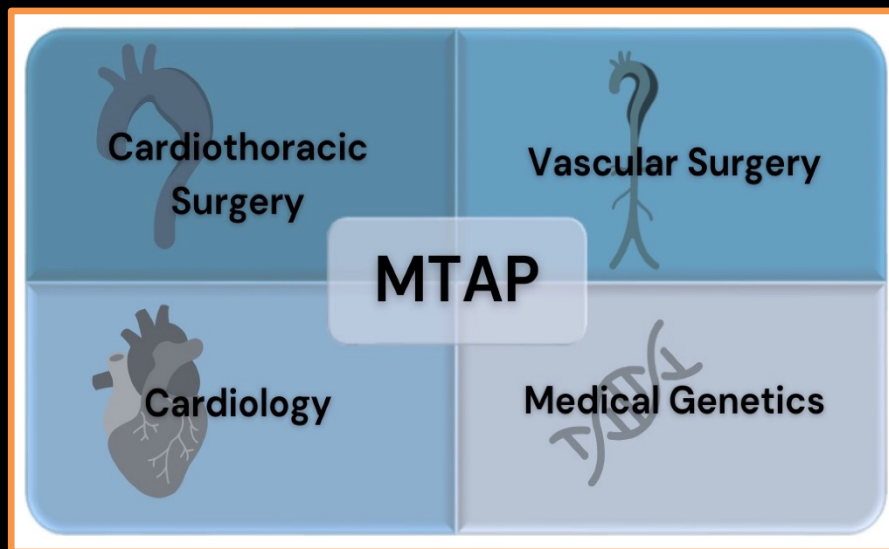


Conclusions

- Outcomes are worst when care is delayed or standards of care sidestepped due to fear surrounding risk of work-up, evaluation, and treatment during pregnancy.
- Guiding Principal: Health of mother needs to be prioritized
 - Without good perfusion to mother – fetus cannot thrive



Thank you!



<https://sites.uw.edu/uwmtap>

University of Washington Multidisciplinary Aortic Program