Vasculopathy of IHD in Women

- Lifetime hormonal fluxes (puberty, pregnancy, peripartum, menopause)
- Peripartum vascular remodeling
- HTN disorders of pregnancy
- Gestational DM
- Delivering a thin baby
- PCOS
- Post menopausal hormone therapy
- Coronary/aortic root dissection
Incident MI and CHD Deaths by Age and Sex

Pregnancy: A Sex-Specific CVD Risk Factor

Physiology of Normal Pregnancy

• ↑ Blood volume, cardiac output (30-40%)
• Stroke volume and HR increase
• ↓ SVR in 2nd trimester
• ↓ BP
• Hypercoagulability (4-5X ↑ VTE rate)
• Insulin resistance
• Immune modulation/down-regulation
Pregnancy: “Metabolic Stress Test” that Predicts Development of Future CVD

- Preeclamptic pregnancy:
  - 3.8X more likely to develop DM
  - 11.6X more likely to develop HTN
- Gestational Diabetes:
  - Up to 70% develop Type 2 DM < 5 yrs

Source: Magnussen 2009, Kim 2002

Pregnancy-Associated MI (PAMI)

- Rare: ~6/100,000 (3-4 X age matched controls)
- Mortality high (>7% maternal, >5% fetal)
- Spontaneous coronary dissection (SCAD) a significant factor (35-45%); Athero (20-30%); Thrombus (~20%)
- Age: 30-fold ↑MI risk age >40 vs. <20 yrs
- Conventional CVD risks common:
  - HTN (15%), smoking (45%), DM (11%) infection, preeclampsia,
  - Black women’s ↑risk due to ↑RF’s (not race)

Case 2

• 37 year old female, healthy, runner, no risk factors
• 1 hr heavy central chest discomfort, diaphoresis, nausea and vomiting
• Normal exam, Normal ECG
• Troponin T: 0.03, 0.09, 0.06
### SCAD Challenges
- NOT atherosclerosis!
- Average age 42 yrs. (P-SCAD ~ 36 yrs)
- Few/no CVD risk factors
- ~80% women, ~10-20% of women peripartum
- Importance/difficulty diagnosing SCAD
  - Index of suspicion often lacking
  - Angiographic uncertainty
  - Excess complications with PCI
- Cause(s), associated conditions, recurrence rates
- Uncertainties of post-SCAD management

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*Case 3: Diagnosis?*

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*Coronary Artery Dissection/Intramural Hematoma*
Mayo Clinic SCAD Registry

- Angiographic diagnostic confirmation
- Female - 82% (n=415)
- 41 w/P-SCAD- 38 postpartum, 3 pregnant
- Mean age 42.6 yrs vs. P-SCAD, 36 yrs
- STEMI 50%, VF 10%
- LAD~ 75%, LM, 20%, multivessel 25-30%
- Low prevalence of atherosclerotic risk factors (p<0.001 vs matched ACS controls)

42 year old Female
Out of Hospital Ventricular Fibrillation

ACC/AHA/ESC Guidelines:
- Antiplatelets
- Stent
- Statin
Mayo Clinic SCAD Retrospective 1979-2011

- Lower rate of PCI technical success
  - SCAD-PCI 62%
  - Acute Coronary Syndrome-PCI 92% (p<0.001)
- Dissection healing without intervention, >60%

Dissection Propagation with PCI

Conservatively Managed with healing

Acute Follow-up
Extracoronary Vasculopathy & FMD in SCAD
- FMD: incidental finding in 50% femoral angios
- Definitely associated, probably causal
- FMD in >50%, EVA in >70% (CTA screening) ~35% in PAMI-SCAD
- Vascular abnormalities:
  - Fibromuscular dysplasia
  - Dissection
  - Aneurysm
  - Dilatation
  - Tortuosity
  - Undulating aorta

Tweed, Prasad et al.,
SCAD Recurrence: No Modifiable Risk Factors or Preventive Strategies

- Survival > atherosclerotic ACS but...
- 10 year recurrence rate: 21% overall (all women)
- Median time to 2nd episode: 2.8 yrs (3 days-12 yrs)
- Rehab is safe and beneficial
- Predictors & 2nd prevention: uncertain
- Female sex, pregnancy, FMD, statin use
- Coronary morphology/tortuosity a risk marker?

Preventing ACS in Young Women

- Will see more due to:
  - SCAD (awareness, intravascular imaging)
  - Athero (age, parity, CVD risks)
- No SCAD modifiable risks, 1st or 2nd prevention
- FMD: associated/causal factor for SCAD
- ACS etiology: Important because SCAD mgmt differs from ACS guidelines (e.g., high rates of procedural complications, statin use)
- Unique issues: medical Rx, reproductive planning, heavy menses, depression & anxiety, cardiac rehabilitation