Pregnancy in Patients with a History of Spontaneous Coronary Artery Dissection (SCAD)

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The 4th International Congress on Cardiac Problems in Pregnancy
February 29th, 2016
Overview

• Basics of spontaneous coronary artery dissection (SCAD)
• Postpartum SCAD
• Pregnancy following SCAD
Spontaneous coronary artery dissection (SCAD)

- Acute coronary syndrome without atherosclerosis
- Intramural hematoma +/- intimal disruption
- Diagnosed via:
  - Coronary angiography
  - IVUS
  - OCT

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Cross Section

Longitudinal Section

Adventitia

Media

Intima

Direction of blood flow

Normal Coronary Artery

Intimal tear

A

B

Coronary artery

Blood clot

Partial obstruction

C

True lumen

False lumen

Clot & flap completely occluding artery
39 yo G6P4 Woman

- 5 days postpartum
  - Chest pain
  - ECG negative at urgent care
- 8 days postpartum
  - Recurrent CP
  - ECG negative, CT PE negative
- 13 days postpartum
  - Severe 10/10 CP
  - EMS called, v fib arrest
  - Resuscitated
Recurrent CP
Cardiac MRI
Case 2: 42 yo F with V. Fib Arrest
Optical coherence tomography (OCT)
Intramural hematoma on OCT
Conservatively managed, Healing on follow-up
SCAD

- Reported prevalence 0.07-1.1%
- Prevalence likely higher due to ↑ awareness and improved diagnostic techniques

- Cause of MI in 10-30% F <50 yo
- Likely most common etiology of MI during or shortly after pregnancy
- ~18% of SCAD is peripartum

Tweet et al. Circ 2012
Vanzetto et al. Cardiothorac Surg 2009
Mortensen et al. Cardiovasc Interv 2009
Saw et al. Can Jour of Cardiol 2014
Elkayam et al. Circ 2014
SCAD Baseline Characteristics

• Mostly female
• Young (mean 42-52 yrs)
• Minimal CAD risk factors

• Potential risk factors: fibromuscular dysplasia, postpartum/pregnancy, extreme emotion or exercise, connective tissue disease, coronary tortuosity, family history

Tweet et al., Circulation 2012
Saw et al, Circ Cardiovasc Interv 2014
Long-Term Outcomes
Major Adverse Cardiac Events

Major Adverse Cardiac Events (MACE) = Death, Recurrent SCAD, MI, CHF

Survival free of MACE (%)

Years after index event

No. at risk

87 64 56 48 39 32 27 26 18 14 11
SCAD Angiographic Subtypes

- Type 1: Staining in the arterial wall
- Type 2: Diffuse narrowing
- Type 3: Mimics atherosclerosis
When Patients Band Together
Using Social Networks To Spur Research for Rare Diseases; Mayo Clinic Signs On

By RON WINSLOW

When Katherine Leon began feeling crushing chest pain six weeks after the birth of her second child, doctors were perplexed about what was causing her symptoms.

Ms. Leon was then 38 years old and healthy, and doctors didn’t believe she was having a heart attack. She saw her physician and made two visits to the emergency room. Finally, doctors decided to perform an X-ray angiogram to check for arterial blockages. What they found was so serious, she was whisked to the operating room within 30 minutes for bypass surgery.

The diagnosis: Ms. Leon had spontaneous coronary artery dissection, or SCAD, a mysterious condition in which the internal layer of an artery separates from the outer wall, creating a fissure where blood clots can form and potentially block blood flow. SCAD is so rare that little research has been done into what causes it, who is at risk and what treatments are most effective. It mainly affects women and can be fatal.

How They Did It

Ms. Leon, now 45, survived her ordeal, but fears it may occur again, although data don’t exist to know whether certain people may be prone to the condition. Like many people with rare diseases, the Alexandria, Va., resident set out to connect via an online network with other SCAD survivors, one as far away as New Zealand. What distinguishes this group of patients, however, is that they succeeded in persuading researchers at a major medical center to launch a research program to learn more about SCAD.

Tuesday, results of a pilot study conducted by researchers at the Mayo Clinic are being published online by the Journal Mayo Clinic Proceedings. The study, which involved 12 SCAD patients from the message board, found that it is feasible to collect data and medical records from patients with different doctors and from far-flung locales. The study is a precursor to a much larger trial the clinic
Mayo Clinic SCAD Registry & DNA Biorepository
North America
Mayo Clinic SCAD Registry & DNA Biorepository World

>500 Confirmed SCAD Patients
Overview

Faculty
Contact
About
For Participants
For Medical Professionals
Projects
Clinical Trials
News
Publications
Videos
Resources

The Mayo Clinic Spontaneous Coronary Artery Dissection (SCAD) Research Program is part of an innovative multidisciplinary collaborative research and clinical practice initiative formed in 2010. The goal of the program is to advance the understanding of the underlying causes and risk factors for SCAD and develop solutions for optimal diagnosis, treatment and prevention.

The Mayo Clinic SCAD Research Program takes a novel approach to patient-initiated rare disease research, utilizing registries, comprehensive review of participant data, genetic analyses, advanced medical imaging and other collaborative studies. The research is based on a novel database registry and a DNA and plasma biobank. This approach, involving research colleagues from across Mayo and at select organizations, has already had an impact.
SCAD Acute Management
Retrospective review (N = 189)

- Treated with balloon and/or stent(s):
  - Failure to cross lesion (7/23)
  - Final loss of flow (8/23)
  - Residual stenosis >30% (8/23)

- Conservative therapy:
  - Uneventful hospital course
  - 73% of 59 with repeat CA showed healing
  - 9 (10%) early SCAD progression requiring stent or bypass surgery (mean 4 days, 2-7)

Tweet et al., Circ Cardiovasc Interv 2014
Comparison of Long-Term Outcomes According to Initial Treatment Strategy and Presenting Vessel Flow

**Target Vessel Revascularization**

- **Revascularization vs Conservative Management**
  - Conservative
  - Revascularization
  - **P=0.06**

**Target Vessel Revascularization**

- **PF-PCI vs PF-Con**
  - PF-Con
  - PF-PCI
  - **P=0.20**

**Recurrent SCAD**

- **Revascularization vs Conservative Management**
  - Revascularization
  - Conservative
  - **P=0.70**

**Recurrent SCAD**

- **PF-PCI vs PF-Con**
  - PF-PCI
  - PF-Con
  - **P=0.68**

*Tweet et al., Circ Cardiovasc Interv, 2014*
Proposed Algorithm for Acute Management of Initial SCAD

- Acute SCAD on angiography
  - No
    - OCT/IVUS: False lumen or intramural hematoma?
      - Yes
        - TIMI flow assessment
          - TIMI 0-1 or clinically unstable
            - Revascularize with inpatient monitoring for 5-7 days, consider CABG in high volume surgical centers
          - TIMI 2-3 and clinically stable
            - Conservative management with inpatient monitoring for 5-7 days
  - Yes

Tweet et al., Circ Cardiovasc Interv, 2014
SCAD Coronary Tortuosity

- 246 Mayo Clinic SCAD Registry patients vs 313 controls
- Mean age 45 yrs
- 96% women

Eleid et al., Circ Cardiovasc Interv 2014
Prevalence of SCAD Coronary Tortuosity

P<0.0001 for all

- SCAD (N=246)
- Controls (N=313)

Eleid et al., Circ Cardiovasc Interv 2014
SCAD Coronary Tortuosity

- Recurrent SCAD (n=40) occurred within segments of tortuosity in 80%

- High recurrence risk if severe tortuosity

- Arterial abnormalities and FMD associated with corkscrew and multivessel symmetrical tortuosity (P<0.05 for both)

Eleid et al., Circ Cardiovasc Interv 2014
SCAD and Vascular Abnormalities

- 115 Mayo Clinic SCAD outpatients

Overall Vascular Abnormalities 66%
Overall FMD 45%

- Dissection
- Aneurysm
- Dilatation
- Tortuosity
- Undulating aorta

Prasad et al., Am J Cardiol, 2015
SCAD and Connective Tissue Disease (CTD)

- 116 Mayo Clinic SCAD pts evaluated in Genetics Clinic
  - 41% with FMD
  - 59 underwent genetic testing
    - 3 (5.1%) diagnosed with CTD
      - Marfan and Vascular Ehlers-Danlos

Henkin et al., Heart, 2016
SCAD in the Family

• 5 familial cases among 412 patient enrollees
  • Mother-Daughter
  • Identical twin sisters
  • Sisters
  • Aunt-niece
  • First cousin pairs

• Implicates both recessive and dominant modes of inheritance

• Ongoing Mayo DNA biorepository

Goel et al., JAMA Intern Med, 2015
Peripartum SCAD, N=41

Number of SCAD patients

Weeks Pregnant

<28
28-32
33-36
37-40
1-4
5-8
9-12
3-6 mos
7-12 mos

Weeks Postpartum

Months following Pregnancy

Delivery

= first week postpartum

Tweet et al., AHA
Peripartum SCAD

Tweet et al., AHA
Pregnancy after SCAD

• Of 363 women, 8 pregnant after SCAD
• Mean age at time of MI 36±3 yrs
• Elapsed time to pregnancy was 18±9 mos
• 3/8 initially given a diagnosis of coronary vasospasm

Tweet et al., Ann Intern Med 2015
Pregnancy after SCAD

• 6 pregnancies resulted in live birth
  • 3 vaginal deliveries
  • 3 cesarean sections
    • Placenta previa and antepartum hemorrhage
• 2 miscarriages at 9 and 15 wks

Tweet et al., Ann Intern Med 2015
Pregnancy after SCAD

• Follow-up median 36 mos
• 7 women without complications
• 1 woman with STEMI at 9 weeks postpartum
  • Unsuccessful PCI->CABG for left main SCAD

Tweet et al., Ann Intern Med 2015
D&C = dilation and curettage; FMD = fibromuscular dysplasia; FT= fertility treatment history; G = Gravida; NSVD = normal spontaneous vaginal delivery; mos = months; MCT=mixed connective tissue disease; MS = multiple sclerosis; P = para; SCAD = spontaneous coronary artery dissection; SM=systemic mastocytosis; TIA=transient ischemic attack; VD = vaginal delivery
Pregnancy after SCAD

- Advised to avoid pregnancy
- Advised against systemic hormonal contraception
- Should a patient decide to pursue pregnancy, recommend care by cardiology and maternal fetal medicine team

Tweet et al., Ann Intern Med 2015
Other Considerations

- Recommend cardiac rehab
- Assess for anxiety and depression
Thank you!
Questions & Discussion
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