Spontaneous Coronary Artery Dissection: Time to Improve Our Systems of Care

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Conflicts of Interest

• Research Funding
  • SCAD Research Inc, Scottsdale, AZ
  • Minneapolis Heart Institute Foundation, Minneapolis, MN
Spontaneous Coronary Artery Dissections

• Case Study

• Diagnosis

• Acute Management

• Long Term Management / Follow-up
Case: 64 year old woman with chest pain

- Sudden onset of severe sharp mid chest pain radiating to her left arm
- Past Medical History:
  - Mixed atherosclerotic and embolic CAD
  - Vasospasm
- Medications
  - Atorvastatin
  - Aspirin
  - Ranolazine
  - Amlodipine
- Vitals: BP 120/90, P 63, T 36.1C, SpO2 97%
- Exam: Unremarkable
- Labs: BMP, CBC normal, Troponin positive at 0.1 mcg/L
- Admitted for NSTEMI with standard treatment
SCAD of the Proximal to Mid LAD
What is SCAD?

- Separation of coronary artery intima from media (dissection) by hematoma resulting in coronary lumen obstruction

Demographics

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SCAD Presentation

Diagnosis by Angiogram

SCAD Revascularization Rate By Year at MHI
Multimodality Imaging Enhances SCAD Diagnosis

- Optical Coherence Tomography / Intravascular Ultrasound to Confirm Dissection
  - Improved spatial resolution
  - Only recommend if diagnosis is unclear due to dissection risk
- CT Coronary Angiography
  - Exclude significant atherosclerotic disease
  - Useful to visualize proximal dissections
- Cardiac MRI
  - Diagnose and confirm location of myocardial infarction
Cardiac MRI in Diagnosis of SCAD

- 60 year old woman without significant medical history had NSTEMI with troponin to 12
- Angiogram with “normal coronary arteries”
- cMRI transmural infraction of the basal to mid interventricular septum with wall motion abnormality
Diagnosis of SCAD

• Diagnosis can be challenging

• Coronary Angiography primary modality for diagnosis

• Multimodality Imaging can augment coronary angiography
Acute Management

• Spontaneous healing 70-90%
  • Predominantly NSTEMI

• Often healed by 1 month

• Repeat angiography only based on clinical symptoms

SCAD Revascularization

- Technically Challenging
- Technical failure: 25-36%
- Suboptimal results: 25%
- Emergency CABG 9-12%

Iatrogenic Dissection

- 3.4% of SCAD Patients vs <0.2% general population
- Increased Risk
  - Radial approach
  - Deep catheter intubation

False Lumen Stenting


Dissection Propagation

Late Hematoma Resorption with Stent Malapposition

9 days after PCI for mLAD SCAD

2 days later after 2nd PCI

460 µm gap

270 µm gap

Progression in New Vessels During Index Admission

- 5-20% of patients will have early progression of disease
- 2.6-8.5% will fail conservative treatment
- Hospitalized minimum 48 hours, up to 5 day can be justified

Non-Coronary Dissections

Spontaneous Superior Mesenteric Artery Dissection

Iatrogenic Femoral Artery Dissection
PCI Is NOT Protective From Recurrent SCAD

Revascularization Complications at MHI

- Repeat Revascularization: 15 (25.9%)
- Stent Related Complications:
  - PCI extending dissection: 8 (15.4%)
  - Final TIMI <3: 8 (15.4%)
  - Residual stenosis >70%: 4 (7.7%)
  - Stent Thrombosis: 2 (3.4%)
  - Restenosis: 5 (8.6%)
  - Residual Stenosis: 2 (3.4%)
  - Stent Mal-apposition: 1 (1.7%)
- SCAD Recurrence requiring PCI with stenting: 5 (8.6%)
- Multiple Interventions: 2 patients (3.4%)
Coronary Artery Bypass Grafting

- Considered Left Main or Proximal Dissections
- High Early Rates of Revascularization
  - 20 patients, 32 of 34 intended targets revascularized
- High Rates of Late Graft Failure
  - 11/16 graft failures in 11 of 20 patients imaged during follow-up
- Not protective from recurrent SCAD

Summary Acute Management

Management of acute spontaneous coronary artery dissection (SCAD)

- Clinically stable, no high-risk anatomy
  - Conservative therapy
  - Monitor as inpatient 3-5 days

- Clinically stable with left main or severe proximal 2-vessel dissection
  - Consider CABG
  - Conservative Rx may be reasonable (not studied)

- Active/ongoing ischemia or hemodynamic instability
  - Consider PCI if feasible
  - OR
  - Urgent CABG (based on technical considerations and local expertise)
Medical Therapy

- No randomized trials
- Based on expert opinion
Anticoagulation and Antiplatelet Therapy

- **Heparin - Discontinue**
  - Theoretical risk worsening dissection

- **Aspirin - Continue**
  - Minimum 1 year, possibly indefinitely

- **Dual Antiplatelet Therapy**
  - Published series predominantly use clopidogrel
  - Follow standard recommendations for PCI
  - Unclear benefit or duration in use for conservative management
  - Consider 1-3 months in conservatively treated patients
Life Long Beta- Blocker Therapy
Treat Hypertension

- Ace-I / ARB
  - LV systolic dysfunction
  - Fibromuscular dysplasia
- Calcium Channel Blockers
  - Anti-anginal

Statin Therapy

- Tweet et al in a series of 87 patients found higher recurrence rate with statin use.

- Saw et al in series of 327 patients found no association with SCAD recurrence and statin use.

- Recommended for primary prevention.

Antianginal Therapy

• Chest pain after SCAD is common
  • MHI: 50% of non-revasuclarized and 70% of revascularized patients had ED and / or hospital admissions for chest pain
  • Exertional and Non-exertional
  • Mental Stress
    • Anxiety and depression in ~40% of patients following SCAD
  • Menstrual cycle

• Treatment
  • Short and long acting nitrates
  • Calcium channel Blockers
  • Ranolazine
  • Treat associated anxiety and depression
Medial Therapy - Summary

• Discontinue heparin
• Aspirin and beta blocker therapy life long
• Dual antiplatelet individualize recommendation
• ACE-I or ARBs for hypertension or LV systolic dysfunction
• Statins if meet criteria for primary prevention
• Antianginal therapy for post-SCAD chest pain
All SCAD Patients Should Be Referred for Cardiac Rehabilitation

- Starting goals exercise
  - BP max 130/80
  - HR 50-70% of heart rate reserve
  - Free weights: 2-12lbs to start
    - Working up to 20lbs women
    - Working up to 50lbs men
    - Low resistance and high repetition

- Avoid
  - Strain / Valsalva maneuvers
  - High intensity activities
  - High contact sports
  - Pushing to exhaustion
  - Extreme temperatures
  - Abrupt increases in physical activity

Heart Failure

• All SCAD Patients should have LV EF assessment prior to discharge
• LV EF <50 %
  • Saw et al series of 327 pts: 21.8% at presentation with decreased EF
  • MHI: 19% of non-revascularized and 44% of revascularized patients with decreased EF

• Heart Failure Requiring Advanced Therapies at MHI
  • 2 Heart Transplants
  • 1 Left Ventricular Assist Device
Overall Survival Excellent

Recurrence is Common

Pregnancy Associated SCAD

• 1.81 SCAD events per 100,000 pregnancies
• Common etiology of MI among pregnant and post-partum women
• 4% of MHI SCAD Patients
• Higher complication rate
• Acute management same as non-pregnancy SCAD
• Less likely to be associated with Fibromuscular Dysplasia
Pregnancy and Hormone Counseling with SCAD

- **Pregnancy Counseling**
  - Recommend against pregnancy, but data limited support recommendation
  - Preconception counseling if someone desires pregnancy (MHI Cardio-Pregnancy Program)

- **Hormone Therapy**
  - Non-hormonal contraceptives (IUD with progestin preferred)
  - Avoid Hormone Replacement Therapy

- **Medications Contraindicated in pregnancy**
  - Statins
  - Atenolol
  - Ace-Inhibitors

Fibromuscular Dysplasia

- Non-inflammatory non-atherosclerotic disorder that leads to arterial stenosis of small to medium sized vessels
- Aneurysm, tortuosity, and dissections of small to medium sized vessels common

Renal Artery  | Carotid Arteries  | Femoral Artery  | Coronary Artery

Fibromuscular Dysplasia Management

• Aspirin 81mg daily for life for thrombosis prevention
• Blood pressure management
  • Ace-I / ARBs for renovascular involvement
  • Beta Blockers for SCAD
  • Beta Blockers, calcium channel blockers, ARBs for Migraines
• Migraines
  • Avoid triptans / vasoconstrictive medications
• Smoking Cessation

Conclusions

• Diagnosis can be challenging
  • Be aware of prior misdiagnosis
  • Multimodality Imaging

• Acute Management
  • Keep inpatient for minimum 2-3 days
  • Aspirin / Beta Blockers / Clopidogrel
  • Look for Fibromuscular Dysplasia

• Long Term Management
  • Continue Beta Blockers
  • Manage Blood Pressure
  • Pregnancy / Hormone Therapy Counseling
  • Refer to Cardiac Rehabilitation
Thank You.

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