Management of the Troublesome PVC

J. Peter Weiss MD, MSc
Intermountain Heart Rhythm Specialists
Why Might PVCs Merit Treatment?

• Symptoms
  – Palpitations
  – Chest Pain
  – Light Headed

• Symptoms
  – Fatigue
  – Exercise Intolerance
What Causes The Symptoms?

- The EKG says the heart rate is 70 BPM
- The Pulse says heart rate is 35 BPM
First Evidence of Premature Ventricular Complex-Induced Cardiomyopathy: A Potentially Reversible Cause of Heart Failure
Chugh et al., J Cardiovasc Electrophysiol. 2000 Mar;11(3):328-9
Putative mechanisms of premature ventricular contraction (PVC)-induced cardiomyopathy.

- Alterations in intracellular calcium and membrane ionic currents
- Hemodynamic impairment
- Alterations in heart rate dynamics
- Myocardial and peripheral vascular autonomic dysregulation
- Tachycardia-induced cardiomyopathy
- PVC-induced cardiomyopathy
- Ventricular dyssynchrony
- Increased oxygen consumption

Yong-Mei Cha et al. Circ Arrhythm Electrophysiol. 2012;5:229-236
Neurohormonal, Structural, and Functional Recovery Pattern After Premature Ventricular Complex Ablation Is Independent of Structural Heart Disease Status in Patients With Depressed Left Ventricular Ejection Fraction: A Prospective Multicenter Study

How many PVCs are too many?

ROC curve cut-off = 22% PVCs

Pts referred for PVC ablation at IMC
EHRA/HRS Expert Consensus on Catheter Ablation of Ventricular Arrhythmias

Developed in partnership with the European Heart Rhythm Association (EHRA), a Registered Branch of the European Society of Cardiology (ESC), and the Heart Rhythm Society (HRS); in collaboration with the American College of Cardiology (ACC) and the American Heart Association (AHA)

Catheter ablation of VT is recommended:

1. for symptomatic sustained monomorphic VT (SMVT), including VT terminated by an ICD, that recurs despite antiarrhythmic drug therapy or when antiarrhythmic drugs are not tolerated or not desired;

2. for control of incessant SMVT or VT storm that is not due to a transient reversible cause;

3. for patients with frequent PVCs, NSVTs, or VT that is presumed to cause ventricular dysfunction;
“Basic” Workup

• Event Monitor to Diagnose, 24 Hour Holter/Full Disclosure Event monitor to Quantify
• 12 Lead EKG for morphology
• Look for reversible causes:
  – Thyroid, electrolytes, anemia, heavy use of caffeine/stimulants
• Determine risk: Treadmill Stress Echo
  – Treadmill to evaluate suppression vs. exacerbation
  – Echo to evaluate for structural abnormality and ischemic disease
Medical Treatment of PVCs

• 1St Choice: Beta-blockers
  – 50-75% may show improvement

• 2ND Choice: Calcium channel blockers
  – 25-50% may show improvement
  – Especially useful for LV fascicular PVCs/VT

• Other anti-arrhythmic medications may be effective (Sotalol, Flecainide, Amiodarone)

Rarely are medications completely effective
Many patients have significant side effects
How to tell if you are your mom’s favorite
Normal Heart

Right Ventricular Outflow Tract (54%)

Left post/anterior fascicles

Left Ventricular Outflow Tract (32%)

Callans DJ. JACC 1997; 29:1023-7
Mr. A

- 62yo man with prior AF ablation now with 46% PVCs on 24 hour holter
- Fatigue, lack of exercise tolerance
- Measured pulse often in the 30s
- EF 44% on echo, LV enlargement
- No evidence of CAD on Nuc Scanning
The PVCs

- ECG suggests possible epicardial vs. aortic root origin
- Procedure planned with primary epicardial access prior to anticoagulation for LV/Aortic root mapping.
Percutaneous Access to Pericardium
Percutaneous Access to Pericardium
3-D Electroanatomic Map

Earliest Epicardial Site
3-D Electroanatomic Map

Pericardial Space

Right Ventricle
3-D Electroanatomic Map
Putting It All Together
8 Weeks Follow-Up

• Symptoms vastly improved
• Repeat 24 hour holter shows 354 PVCs (0.4%)
• Repeat Echo shows EF 54%
New Technologies: Remote Magnetic Navigation and other Robotics

• “Floppy” catheter may help navigate complex anatomy and improve safety
• Ability to navigate with increased accuracy
• Full integration with 3-D mapping allows for decreased x-ray exposure
• Over 600 Cases done with the system at IMC
RMT Flexibility/Manoueverability
RMT Flexibility/Maneuverability
Referral for Consideration of Catheter Ablation of PVCs

**Indication:**
- Symptomatic patients that have failed, are intolerant to, or do not wish to take anti-arrhythmic medication
- PVC related cardiomyopathy

**High Success (80-90%):**
- narrow (2-4 mm) and easily accessible site(s) of origin

**Low Complications: (≤ 1%):**
- septal site(s) of origin, stable catheter positioning, and new technologies improve safety - minimize chances of perforation

Now considered First-Line Therapy for Persistent Symptoms or PVC/VT Mediated Cardiomyopathy