What are the Current Pacemaker and ICD Indications?

Jeffrey S. Osborn, M.D., C.C.D.S.
March 5, 2016
Intermountain Heart Rhythm Specialists

- **Physicians**
  - Jared Bunch, M.D.
  - Brian G. Crandall, M.D.
  - Michael Cutler, D.O., Ph.D.
  - John D. Day, M.D.
  - Chuck Mallender, M.D.
  - Jeffrey S. Osborn, M.D.
  - J. Peter Weiss, M.D.

- **Advanced Practitioners (PA’s)**
  - Dave Johnson, Andrew Hansen, Tiina Thorley, Catherine Nelson
DOCTORS

What my friends think I do

What my Mom thinks I do

What society thinks I do

What the government thinks I do

What I think I do

What I really do
Our Perception of Success is:

- You gotta have **RHYTHM** to make music
- **ALL** about Saving **LIVES**, One heart beat at a time
- Better a Box in a **Patient** than a Patient in a **Box**.
Classifications of Bradyarrhythmias

- There are two types of bradyarrhythmias
  - Those related to problems with impulse formation
  - Those related to problems with impulse conduction
Common Pacing Indications

- The AHA and ACC have defined the indications for pacing based on the underlying arrhythmia.
- At its simplest patients with the following conditions are commonly indicated for a pacemaker:
  - Symptomatic bradycardia
  - Sinus Node Disease (SND), or Sick Sinus Syndrome
  - Complete Heart Block
  - Chronotropic Incompetence

Classification of Bradyarrhythmias

- Problems with Impulse Formation
  - Sinus Arrest
  - Sinus Bradycardia
  - Chronotropic Incompetence
  - Brady/Tachy syndrome
Bradycardia Classifications

- Problems with Impulse Conduction
  - Exit Block
  - First Degree AV block
  - Second Degree AV block
    - Mobitz Type 1 – Wenckebach
    - Mobitz Type 2
  - Third Degree AV block – Complete heart block
  - Bifasicular/Trifasicular block
Common Pacing Indications

- The AHA and ACC have defined the indications for pacing based on the underlying arrhythmia.
- At its simplest, patients with the following conditions are commonly indicated for a pacemaker:
  - Symptomatic bradycardia
  - Sinus Node Disease (SND), or Sick Sinus Syndrome
  - Complete Heart Block or High grade AV Block
  - Chronotropic Incompetence
  - Common denominator is “SYMPTOMATIC”

I'm addicted to placebos. I could quit, but it wouldn't matter.

(Steven Wright)
Implantable Cardioverter Defibrillator (ICD)

- Defibrillation therapy for SCA
- Painless termination of most arrhythmias with antitachycardia pacing (ATP)
- Reduced unnecessary right ventricular pacing
- Comprehensive diagnostic information for more insightful patient assessment
- Automatic intrathoracic impedance (fluid) monitoring
ICDs for SCA Secondary Prevention
Summary of Class I Guidelines

- SCA due to VF or hemodynamically unstable sustained VT
- Structural heart disease and spontaneous VT
- Syncope of undetermined origin and VT or VF induced at EP study
- Nonsustained VT due to prior MI, LVEF < 40%, and VT or VF induced at EP study

Epstein AE. Circulation 2008;117:e350-e408.
ICDs for SCA Primary Prevention

Summary of Class I Guidelines

- NYHA Class II or III, prior MI (40 days post), LVEF ≤ 35%
- NYHA Class II or III, non-ischemic DCM, LVEF ≤ 35%
- NYHA Class I, prior MI (40 days post), LVEF ≤ 30%

### Major Clinical Studies Supporting ICD/CRT-D Guidelines

<table>
<thead>
<tr>
<th>Secondary Prevention</th>
<th>Primary Prevention</th>
<th>Primary Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT/VF</td>
<td>HF</td>
<td>CAD/MI</td>
</tr>
<tr>
<td>• AVID</td>
<td>• SCD-HeFT</td>
<td>• MUSTT</td>
</tr>
<tr>
<td>• CIDS</td>
<td>• COMPANION</td>
<td>• MADIT-II</td>
</tr>
<tr>
<td>• CASH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Yogi Bera said:

“In theory, there is no difference between theory and practice……………… in practice, there is.”
Percentage of Eligible Patients Receiving ICD Therapy

Does patient have history of cardiac arrest, VF, or symptomatic VT?

YES
- Consult EP

NO
- NYHA Class II or III CHF
  - Is patient on optimal medical therapy?
    - NO
      - Optimize therapies or consult CHF specialist
    - YES
      - Determine EF
        - EF > 35%
          - Consult EP for possible ICD
          - Consult EP (MADIT II Criteria)
          - Ischemic
            - 40 days post MI
            - 3 months post revascularization
            - Consult EP for possible ICD
          - Nonischemic
            - 3-9 months post diagnosis
            - Consult EP for possible ICD
        - EF ≤ 35%
          - Consult EP for possible CRT-D

IHRS Practice Guideline

1. Consider referral to HF Specialist or HF Program.
2. Repeat diagnostics with change of symptoms AND consider annual testing.

IHRS Clinical Practice Guideline

Note: Pathway only begins after optimal medical therapy & coronary evaluation/intervention as appropriate
A new category of implantable defibrillators

Transvenous (TV) ICDs

- Provides effective defibrillation for ventricular tachyarrhythmias
- Provides Brady pacing
- Provides ATP for patients with incessant monomorphic VT
- Provides atrial diagnostics
- Familiar implant technique

The S-ICD System

- Low risk of systemic infection
- Preserves venous access
- Avoids risks associated with endovascular lead extraction
- Fluoroscopy not required
Ideal SubCutaneous Device Placement
Without a doubt about it, the best pie chart I have ever eaten......

ScienceDump
September 9, 2014

World’s Most Accurate Pie Chart

Pie I have eaten
Pie I have not yet eaten

2 Likes
Cardiac Resynchronization Therapy Defibrillator (CRT-D)

- Biventricular pacing therapy for heart failure
- Defibrillation therapy for SCA
- Automatic intrathoracic impedance (fluid) monitoring
- Painless termination of most arrhythmias with antitachycardia pacing (ATP)
- Comprehensive diagnostic information for more insightful patient assessment
1. Patients with LVEF $\leq 35\%$, LBBB, a QRS duration $\geq 0.15$ seconds, and sinus rhythm, cardiac resynchronization therapy (CRT) with or without an ICD is indicated for the treatment of NYHA Class II, III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. Class I, Evidence A, Evidence B for QRS 120-149

2. Patients with LVEF $\leq 35\%$, LBBB, a QRS duration $\geq 0.12$ seconds, and AF, CRT with or without an ICD is reasonable for the treatment of NYHA Class III or ambulatory Class IV heart failure symptoms on optimal recommended medical therapy. Class IIa, Evidence B

3. Patients with LVEF $\leq 35\%$ with NYHA Class III or ambulatory Class IV symptoms who are receiving optimal recommended medical therapy and who have frequent dependence on ventricular pacing, CRT is reasonable. Class IIa, Evidence C

FDA Approved Expanded CRT-P and CRT-D Indications, April 2014

- CRT-P or CRT-D now indicated with the following:
  - NYHA Class I, II, or III
  - LVEF < or = 50%
  - AV Block with an anticipated high percentage of ventricular pacing that cannot be managed with programming
  - On stable, optimal heart failure meds as possible with heart block
What Does AV Block Mean?

- Third degree AV Block
- Symptomatic or asymptomatic second degree AV Block
- First degree AV block with symptoms like pacemaker syndrome
- Documented Wenckebach or PR interval > 300 msec when paced at 100 bpm (can be done at implant)
Case Example

- The patient is a 79 year old man with hypertension. He had an MI in 2004 and underwent CABG. He was found to have a LVEF of 25% that improved to 45% on medical treatment with metoprolol and lisinopril. Over the past few months he has had increasing fatigue that he attributes to advancing age. He also has intermittent episodes of lightheadedness. Despite his fatigue he remains active and goes on long walks on a near daily basis.
Case Example

His internist obtains an echocardiogram which shows his LVEF to be unchanged at 45%. No other severe abnormalities are seen. Myocardial perfusion scan imaging shows no evidence of ischemia. Holter monitor shows sinus rhythm with frequent episodes of Mobitz I second degree AV block and a maximum heart rate of 86. TSH is normal.
Question: Which of the following is the most important treatment at this point?

- A. CRT-D implantation
- B. Observation with continued metoprolol and lisinopril
- C. Dual chamber pacemaker insertion
- D. Start a rigorous exercise program
- E. CRT-P implantation
Ladies, you know it's true.

5 DEADLY TERMS USED BY A WOMAN

1) **FINE**: This is the word women use to end an argument when she knows she is right and you need to shut-up.
2) **NOTHING**: means something & you need to be worried.
3) **GO AHEAD**: this is a dare, not permission, do not do it.
4) **WHATEVER**: A woman’s way of saying screw you.
5) **THAT’S OKAY**: She is thinking long and hard on how and when you will pay for your mistake.

**BONUS WORD**: WOW!
This is not a compliment. She’s amazed that one person could be so stupid.