Emergency Pacing Pearls

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Outline

◆ Why pace?
◆ How to pace
  – Transcutaneous
  – Transvenous
◆ What could possibly go wrong?
◆ Transport considerations
Have You Ever Paced A Patient?

A. Yes
B. No
C. I watched

Why Pace?

- Symptomatic bradycardia
- Overdrive/suppress arrhythmias
- Others?
2 Kinds of Temporary Pacing

- Transvenous
- Transcutaneous

Balloon-tipped transvenous wire
Insertion Sites

- Internal Jugular Vein
- Subclavian Vein
- External Jugular Vein
- Brachial Vein
- Femoral Vein

Transcutaneous

- Pacing Pads
- Conduct through skin
Have You Ever Paced Transvenously?

A. Yes
B. No
C. I watched

Transvenous Pacing
Cable Connectors

- Connector pins on the lead(s) must be fully inserted in the patient connector block
- Observe polarity
  - Distal = negative
  - Proximal = positive
- Finger tighten only – no tools!

Cable to Device Connections

Cable clicks in place

Make sure device is OFF
Emergency Connections

Temporary use only -
Leads do not lock in place

Medtronic Temporary Pacemakers

5388 5392
Model 5388 Dual Chamber Temporary Pacemaker

1. Pace/Sense LEDs
2. Lock/Unlock Key
3. Lock Indicators
4. Rate Dial
5. Atrial Output Dial
6. Ventricular Output Dial
7. Menu Parameter Dial
8. Parameter Selection Key
9. Menu Selection Key
10. Pause Key
11. Power On Key
12. Power Off Key
13. Emergency/Asynchronous Pacing Key
14. Lower Screen
15. Ventricular Output Graphics
16. Atrial Output Graphics
17. Upper Screen
18. Rate Graphics
19. Setup Indicators
20. DDI Indicator
21. Low Battery Indicator
22. Setup Labels

Model 5392 Dual Chamber Temporary Pacemaker

1. DOO/Emergency key
2. On/Off key
3. Pacing and sensing status bar indicators
4. Rate dial
5. A (Atrial) Output dial
6. V (Ventricular) Output dial
7. Lock/Unlock key
8. Enter key
9. Selection indicator
10. Up/Down arrow keys
11. Menu Parameter dial
12. Pause key
13. Lower screen
14. Lock indicator
15. Pacing Mode indicator
16. Battery indicator
17. V (Ventricular) Output scale
18. A (Atrial) Output scale
19. Rate scale
20. Upper screen
Off / On Keys

Values at Power-On

Dual Chamber Pace/Sense
- RATE 80 ppm
- UPPER RATE 110 ppm

Push once

Push twice

Push once
Emergency Key

Emergency Pacing Values

- RATE: Current Rate
- A OUTPUT: MAX
- V OUTPUT: MAX
- PACING: ASYNC
- NO SENSING!

Use caution when setting the device to asynchronous modes.

Always available – Single key press enters Emergency mode.

Medtronic
### NBG Codes

<table>
<thead>
<tr>
<th>1st Letter</th>
<th>Chamber(s) Paced</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>atrium</td>
</tr>
<tr>
<td>V</td>
<td>ventricle</td>
</tr>
<tr>
<td>D</td>
<td>dual (both atrium and ventricle)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd Letter</th>
<th>Chamber(s) Sensed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>atrium</td>
</tr>
<tr>
<td>V</td>
<td>ventricle</td>
</tr>
<tr>
<td>D</td>
<td>dual</td>
</tr>
<tr>
<td>O</td>
<td>none</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd Letter</th>
<th>Response to Sensing</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>inhibit (Demand mode)</td>
</tr>
<tr>
<td>T</td>
<td>triggered</td>
</tr>
<tr>
<td>D</td>
<td>dual</td>
</tr>
<tr>
<td>O</td>
<td>none (Asynch)</td>
</tr>
</tbody>
</table>

#### Diagram:
- **Chamber paced**: V
- **Chamber sensed**: V
- **Action or response to a sensed event**: I
### The NASPE/BPEG Generic (NBG) Code

<table>
<thead>
<tr>
<th>Position</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>Chamber(s) Paced</td>
<td>Chamber(s) Sensed</td>
<td>Response to Sensing</td>
<td>Programmability, rate modulation</td>
<td>Antiarrhythmia Function(s)</td>
</tr>
<tr>
<td>Letters Used</td>
<td>O-None</td>
<td>O-None</td>
<td>O-None</td>
<td>O-None</td>
<td>O-None</td>
</tr>
<tr>
<td></td>
<td>A-Atrium</td>
<td>A-Atrium</td>
<td>T-Triggered</td>
<td>P-Simple Programmable</td>
<td>P-Pacing (antitachyarrhythmia)</td>
</tr>
<tr>
<td></td>
<td>V-Venticle</td>
<td>V-Venticle</td>
<td>I-Inhibited</td>
<td>M-Multi-Programmable</td>
<td>S-Shock</td>
</tr>
<tr>
<td></td>
<td>D-Dual (A+V)</td>
<td>D-Dual (A+V)</td>
<td>D-Dual (T+I)</td>
<td>C-Communicating</td>
<td>D-Dual (P+S)</td>
</tr>
<tr>
<td>Manufacturer’s Designation Only</td>
<td>S- Single (A or V)</td>
<td>S- Single (A or V)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Temporary Pacing Parameters

- Pacing rate (heart rate)
- Output/stimulation threshold
- Sensitivity
The output dial regulates the current or movement of electrons.
Output ➔ Capture

Depolarization of cardiac muscle following an electrical stimulus

Stimulation Threshold

The minimum output pulse needed to consistently capture the heart

3 mA  2 mA  1 mA
Sensitivity

The degree that the pacing system “sees” or senses signals, controlled by the sensitivity setting which is graduated in millivolts (mV)

Sensitivity (mV)

The lower the setting, the more sensitive the pacemaker is to intracardiac signals
Rate and Output Adjustments
Single or Dual Chamber Pacing With Only 3 Dials!

- **Rate Dial**
- **Atrial Output Dial**
- **Ventricular Output Dial**

Max rate 200bpm (for peds)

For Single Chamber pacing, turn OFF Atrial output

### Lower Screen Menus

**Menu 1: Pacing Parameters**

- **A Sensitivity**: 0.5 mV
- **V Sensitivity**: 2.0 mV
- **A-V Interval**: 170 ms
- **A Tracking**: ON
Transcutaneous

- Set Rate
- Set Output

Have You Ever Transcutaneously Paced?

A. Yes
B. No
C. I watched

92%
0%
8%
Practice

VVI Demand/Inhibited

- Pacemaker senses intrinsic depolarization
- Paces the heart when the patient’s own rate becomes slower than the pacemaker
Oversensing

Inhibition of the pacemaker by events pacemaker should ignore, e.g. EMI, T-waves and myopotentials

Possible Causes
• Fractured/dislodged lead
• Environmental interference
• T-wave oversensing
• Faulty cable connections

Corrective Measures
• Replace/reposition lead
• Eliminate interference
• Sensing test/decrease sensitivity
• Check connections
Things to Know Before Transporting a Transvenous Pacer

1. When and why was it inserted?
2. What is the underlying rhythm?
3. Is the patient hemodynamically dependent on the pacer? (i.e., unstable?)
4. What are the current settings?
   - mA (output)
   - Rate
   - sensitivity
   - Mode

The End
Battery Replacement

1. Make sure the drawer clicks shut

2. 15 seconds of pacing provided while changing 9V battery (note: battery polarity is reversible)

Battery Replacement

3. 30 seconds of pacing provided while changing battery (note: battery polarity is reversible)
Electromagnetic Interference (EMI)

Radiated or conducted energy – either electrical or magnetic – which can interfere with the function of the pacemaker in the Demand mode.

Fusion/Pseudofusion Beats

Intrinsic Beat  Paced Beat
Fusion Beat  Pseudofusion Beat