Pacemaker Troubleshooting

Claire Regan MSc
Advanced Practitioner
UHSM
1.

This is an ECG of an AAI pacemaker.
1.

- What has happened?
  - Patient has developed Atrial Fibrillation.

- What can be done to resolve the problem?
  - Treat AF with drugs, try to restore Sinus Rhythm.
  - Cardiovert back into Sinus Rhythm.
  - Upgrade to mode switch DDD at replacement.
2. This is an ECG of a DDD pacemaker.
2. What has happened?
Patient has Electromyopotential Inhibition. (Ventricular oversensing).
What reprogramming can be done to resolve the problem?
Decrease ventricular sensitivity (increase number) until problem no longer present.
Check with upper arm manoeuvres.
Perform R wave amplitude sensing test.
This is an ECG of a DDD pacemaker.
What has happened?
Pacemaker Mediated Tachycardia – sudden onset on loss of atrial capture.
What reprogramming can be done to resolve the problem?
PMT Options ‘On’.
Shorten A-V delay and lengthen atrial refractory period.
This is an ECG of an AAI pacemaker.
4.

What has happened?
Intermittent atrial undersensing.

What reprogramming can be done to resolve the problem?
Increase atrial sensitivity (decrease the number).
4.

Problem resolved!
This is an ECG of a VVI pacemaker.
5.

- What has happened?
  - Intermittent failure to ventricular capture at 7.5 volts. Also intermittent ventricular undersensing.

- What can be done to resolve the problem?
  - Ventricular lead reposition.
6.

This is an EGM of a DDD pacemaker.
6.

What does it show?

Atrial Flutter.
This is an EGM of a DDD pacemaker.
What does this EGM show?

Far-field sensing (‘T’ wave).

What reprogramming can be done to resolve this problem?

Increase PVAB from 100ms to 140ms.
Programmed parameters from a VVIR pacemaker.

**Sensor Indicated Rate Histogram**

<table>
<thead>
<tr>
<th>Mode</th>
<th>VVIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor</td>
<td>On</td>
</tr>
<tr>
<td>Base Rate</td>
<td>70</td>
</tr>
<tr>
<td>Max Sensor Rate</td>
<td>160</td>
</tr>
<tr>
<td>Threshold</td>
<td>Auto (±2.0)</td>
</tr>
<tr>
<td>Measured Average Sensor</td>
<td>2.2</td>
</tr>
<tr>
<td>Slope</td>
<td>11</td>
</tr>
<tr>
<td>Reaction Time</td>
<td>Fast</td>
</tr>
<tr>
<td>Recovery Time</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Note: The above values were obtained when the histogram was interrogated.

<table>
<thead>
<tr>
<th>Bin Number</th>
<th>Range (min⁻¹)</th>
<th>Time</th>
<th>Sample Counts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>45 - &lt; 60</td>
<td>00 00h 00m 0s</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>60 - &lt; 75</td>
<td>00 23h 39m 38s</td>
<td>15,982,429</td>
</tr>
<tr>
<td>3</td>
<td>75 - &lt; 90</td>
<td>00 24h 42m 22s</td>
<td>741</td>
</tr>
<tr>
<td>4</td>
<td>90 - &lt; 105</td>
<td>00 24h 42m 22s</td>
<td>71</td>
</tr>
<tr>
<td>5</td>
<td>105 - &lt; 120</td>
<td>00 00h 00m 0s</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>120 - &lt; 135</td>
<td>00 00h 00m 0s</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>135 - &lt; 150</td>
<td>00 00h 00m 0s</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>150 - &lt; 165</td>
<td>00 00h 00m 0s</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>165 - 187</td>
<td>00 00h 00m 0s</td>
<td>0</td>
</tr>
</tbody>
</table>

Total: 15,983,241

Date Read: 23 Apr 2003 02:40
Total Time Sampled: 369d 23h 34m 42s
Date Last Cleared: 18 Apr 2002 03:05
What does this diagnostic data show?
- Poor rate response.

What reprogramming can be done to resolve the problem (dependant upon patient if they are SOBOE?)
- Lower the rate response threshold if breathless at beginning of activity or increase the slope if breathless after some activity.
This is an ECG of a VVI pacemaker.
9.

- What is the problem?
  - Intermittent ventricular undersensing.
- What reprogramming can be done to resolve the problem?
  - Increase ventricular sensitivity (decrease the number).
10.

This is an ECG of an AAI pacemaker.
What is the problem?
Atrial undersensing.
What test should be performed?
Perform P wave amplitude sensitivity test.
What reprogramming could be performed to resolve the problem.
Increase atrial sensitivity (decrease the number).
This is an ECG of an AAI pacemaker.
11.

What is the problem?
- Far-field sensing.
- Ventricular event sensed by atrial channel.

What reprogramming could be performed to resolve the problem?
- Decrease sensitivity.
- Try increasing blanking period.
12. This is an EGM of a DDD pacemaker.
12.

- What does this show?
- Atrial tachycardia which is far-field sensed – inappropriate mode switch.
- What reprogramming could be performed to resolve the problem?
- None if patient asymptomatic.
- Or atrial sensitivity could be decreased.
This is an EGM of a DDD pacemaker.
13.

- What does this show?
  - Inappropriate mode switch for far-field sensing.

- What reprogramming could be performed to resolve the problem?
  - Decrease the atrial sensitivity - if appropriate – could undersense AF.
  - Increase blanking period – again this can undersense AF.
14. This is an ECG of a DDD pacemaker.
14.

- What does the ECG show?
  - A-V pacing with ventricular fusion.
- What reprogramming could be performed to resolve the problem?
  - Increase the A-V and P-V delays.
  - Program automatic A-V delay increment parameter ‘on’.
References


