Missing beats

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<table>
<thead>
<tr>
<th>Patient description</th>
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<td><strong>BMI</strong>: 28.13kg/m²</td>
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**Diagnosis**:
- **Atrial Fibrillation**
- **Heart Failure**

**Medications**:
- **Amiodarone**
- **Aspirin**
- **Propafenone**

**Relevant Tests**:
- **ECG**
- **CTI**
- **MRI**

**Next Steps**:
- Prepare for **Maze Procedure**
- Discuss with **DCS** team about **DDT**
- **Echocardiogram**

**Follow-Up**:
- Monitor **catheterization labs**
- Review **vasoactive medications**

**Note**: Adjustments made to **cath lab** for **ECG** and **MRI**.
IPG programming

### Permanent Parameters Report

#### Atrial Lead
- **Amplitude**: 2.250 V
- **Pulse Width**: 0.40 ms
- **Sensitivity**: 0.50 mV
- **Sensing Assurance**: On
- **Pace Polarity**: Bipolar
- **Sense Polarity**: Bipolar
- **Lead Monitor**: Monitor Only
- **Maximum Impedance**: 4,000 ohms
- **Minimum Impedance**: 200 ohms
- **Monitor Sensitivity**: 8
- **Capture Management**: Adaptive
- **Amplitude Margin**: 2x
- **Min. Adapted Amplitude**: 2,000 V
- **Capture Test Frequency**: Day at ...
- **Capture Test Time**: 1:00 AM
- **Acute Phase**: Off
- **Acute Phase Complete**: 01/11/08
- **V. Sensing During Search**: Adaptive

#### Ventricular Lead
- **Amplitude**: 2,500 V
- **Pulse Width**: 0.46 ms
- **Sensitivity**: 2.20 mV
- **Sensing Assurance**: On
- **Pace Polarity**: Bipolar
- **Sense Polarity**: Bipolar
- **Lead Monitor**: Monitor Only
- **Maximum Impedance**: 4,000 ohms
- **Minimum Impedance**: 200 ohms
- **Monitor Sensitivity**: 8
- **Capture Management**: Adaptive
- **Amplitude Margin**: 2x
- **Min. Adapted Amplitude**: > 400 V
- **Capture Test Frequency**: Day at Rest
- **Acute Phase**: Off
- **Acute Phase Complete**: 01/21/08
- **V. Sensing During Search**: Adaptive

#### Refractory/Blanking
- **PVARP**: Auto
- **Minimum PVARP**: 250 ms
- **PVAR**: 160 ms
- **Ventricular Refractory**: 220 ms
- **Ventricular Rate**: 175 bpm
- **Pacing Rate**: 95 bpm
- **PVARP**: Auto

#### Rate Response
- **Optimization**: On
- **Exclusion Response**: 3
- **ADLR Percent**: 2.0%
- **Activity Threshold**: Medium/Low
- **Activity Acceleration**: 30 sec
- **Activity Deceleration**: Exercise
- **High Rate Percent**: 0.2%
- **ADL Rate Setpoint**: 9
- **Upper Sensor Rate Setpoint**: 24
Holter Testing
What’s that ???
More ....
Missing beats
Last snapshot for now... do you have any idea?
The hint is ...to think
First what’s the rhythm?

But ... that’s one Long AV Delay!!!
More hints

• The Pacemaker is Medtronic ADAPTA DR ...

• Basic pathology leading to IPG implantation was SSS

• And the mode is ....

• Managed Ventricular Pacing = MVP
Managing Ventricular Pacing - Clinical Need

- Optimal left ventricular pumping function requires a normal electrical activation sequence derived from the synchronized participation of the distal components of the specialized conduction system (the main bundle branches and their ramifications)\(^1-3\)

- Majority of patients (~77%) with SND, including those with CHF, have intact AV conduction and narrow QRS duration (normal ventricular activation)\(^6\)

- Conventional RV apical pacing mimics LBBB, results in prolonged QRS durations and ventricular desynchronization, and has adverse effects on ventricular structure and function\(^6,7\)

- “Forced” ventricular desynchronization due to RV apical pacing, may increase risk of atrial fibrillation, heart failure, and death\(^1,4-6\)
MOST Sub-Study\(^6\): Cumulative %V-Pacing May be a Predictor of AF

- Risk of AF increased linearly with cumulative %V-pacing, up to ~80-85% in both DDDR and VVIR groups
- Risk of AF is increased by 1% for each 1% increase in Cumulative %VP in DDDR group

Dashed lines represent 95% confidence boundaries.

MVP

Case 1: Beat-to-beat AV conduction checks; Unacceptable AV ratio (AV block)

Case 3: Conduction restored?

AAI/R → DDD/R → Conduction restored?
So... it's AAI mode with slow AV node conduction.
AAI ..No AV Delay ... just waiting for VS after AP/AS
the interval may be the lower rate interval or sensor
rate interval (AAI/R).
That’s way the rate may go down to half lower rate

![ECG Diagram]

1000ms AP 1000ms AP
VS VS VS
Slow conduction
Up to half lower rate
A-A pacing interval=1000MS
if there is block → DDD after 1 min
conduction check
no conduction stay in DDD

Conduction check
No conduction
AP + Backup VP
After 80 ms
• Now this is all ...DDD after 1 min if one conduction check (AP-VS) went well \(\rightarrow\) MVP.
  • 1 Block and backup VP
  • after that the conduction is OK so.. Stay in MVP Mode.
And more that now we understand ...
Summary

• MVP is often misinterpreted as pacemaker malfunction on holter monitoring (LOC or oversensing)
• Just taking caliper and measure the A-A interval and knowing the lower rate will help to understand if there is 1:1 conduction
• Hints to MVP:
  - Long AV Delay more then 600ms → MVP
  - Short AV (80MS) with VP BACKUP → MVP