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CARDIAC ARRHYTHMIAS
Anatomy of Conduction System

- Superior vena cava
- SA node
- Interatrial septum
- AV node
- Common bundle (His)
- Mitral valve (bicuspid)
- Bundle branches
- Interventricular septum
- Tricuspid valve
- Purkinje fibers
Right Bundle Branch Block
Left Bundle Branch Block
Delta wave
Atrial Fibrillation in a Patient with WPW Syndrome
WPW EKG (Top) and Post RF Ablation (Bottom)
PAC’s with RBBB Aberration
PVC’s
Sinus Tachycardia

Atrial Flutter with 2:1 Conduction

Short RP SVT
Multifocal Atrial Tachycardia with AV Block
Typical Counterclockwise Atrial Flutter
Aberrantly Conducted Atrial Flutter with 1:1 Conduction

Atrial Flutter
Atrial Fibrillation with Complete Heart Block and Escape Rhythm
SVT with no Discernable P-waves = AVNRT
Same Patient after Termination with Adenosine
VT with AV Dissociation
### Table 17.2. QRS Contours Favoring Ventricular Tachycardia

<table>
<thead>
<tr>
<th></th>
<th>Wellens$^{19, 20}$</th>
<th>Gulamhusein$^{25}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_1$</td>
<td>15/15 (100%)</td>
<td>84/86 (98%)</td>
</tr>
<tr>
<td>$V_1$</td>
<td>7/7 (100%)</td>
<td>177/187 (95%)</td>
</tr>
<tr>
<td>$V_6$</td>
<td>27/31 (87%)</td>
<td>189/190 (100%)</td>
</tr>
<tr>
<td>$V_6$</td>
<td>17/17 (100%)</td>
<td>38/40 (94%)</td>
</tr>
</tbody>
</table>

*In each pair of numbers, denominator is number of times contour was encountered; numerator is number of times it was ventricular in origin.*

### Table 17.3. QRS Contours Favoring Ventricular Aberration

<table>
<thead>
<tr>
<th></th>
<th>Wellens$^{19, 20}$</th>
<th>Gulamhusein$^{25}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_1$</td>
<td>38/41 (93%)</td>
<td>55/55 (100%)</td>
</tr>
<tr>
<td>$V_6$</td>
<td>44/47 (94%)</td>
<td>27/27 (100%)</td>
</tr>
</tbody>
</table>
VT with Precordial Concordance (negative / positive)
Brugada Criteria
Polymorphic VT – Torsades de Pointes
Escape Rhythms

Atrial

His

Ventricles

C

Escape Rhythms
Sinus Bradycardia with AV block - Vasovagal
Junctional Escape Rhythm at Termination of SVT – Brady-Tachy syndrome = Sick Sinus Syndrome
First Degree AV Block
Second Degree AV block – Mobitz Type I (Top) and Mobitz Type II (Bottom)
Third Degree AV Block with Escape Rhythm
Thank you!
Question 1
A 65 Year old woman presents to the emergency room with a pre syncopal episode that occurred while she was preparing dinner. She felt lightheaded but had enough warning to brace herself to keep from falling. She has never lost consciousness and the episode resolved within few minutes. Her physical examination was normal. While monitored she had a recurrent episode. Which of the following electrocardiograms would likely warrant admission for pacemaker insertion?
Educational objectives: understand the various degrees of conduction abnormalities and heart block

- Option E - EKG shows clear evidence of complete heart block, with complete dissociation between the atrial and ventricular activity. This finding warrants permanent pacemaker insertion.
- Option A - shows sinus rhythm with marked 1st degree atrioventricular block. This finding is not likely to be related to her symptoms.
- Option B - shows 1.2 seconds pause, it is clearly related to a non-conducted premature atrial beat that does not conduct to the ventricle. It does not represent a pathological block and usually is not symptomatic.
- Option C - shows classic type 1 2nd degree atrioventricular block.
- Option D - shows minimally premature atrial complex that does not conduct to the ventricles. The next PT is a junctional complex and occurs before the subsequent sinus discharge arises. This occurrence does not represent heart block. The sinus P wave is seen immediately after the QRS complex.
References:

Question 2
In which of the following patient would implantation of a permanent pacemaker be appropriate?

A. A 47-year-old man who is taking beta blockers for hypertension and has symptomatic sinus bradycardia with heart rate of 45 beats per minute

B. A 20-year-old college student who has syncope after prolonged standing at band practice and has sinus bradycardia heart rate of 45 beats per minute on evaluation

C. A 57-year-old man with exercise intolerance and an average heart rate of 45/minute and a peak rate of 60/minute on an ambulatory monitor

D. A 75-year-old woman who has transient heart block in the hours after an acute inferior wall MI
Sinus node dysfunction is often the primary diagnosis for implantation of a permanent pacemaker. A persistently slow heart rate and the inability to accelerate the heart rate appropriately are common findings. Pacing is also indicated in patients who have sinus node dysfunction and symptomatic chronotropic incompetence. In patients who have symptomatic iatrogenic bradycardia pacing should be implemented on leave when the implicating drug cannot be discontinue.

Permanent pacemakers have a lesser role in the management of neurocardiogenic syncope and are considered in patients who do not respond to therapy.

Heart block that occurs early after the inferior myocardial wall infarction is common and usually reversible without affecting outcomes.

In a 20-year-old student asymptomatic resting heart rate of 45/min is not an abnormal finding.
References


The patient is a 47-yr-old female who is asymptomatic with the following ECG. What is the bradyarrhythmia?

A. 1st degree AV block
B. Mobitz Type I AV block
C. Sinus rhythm with blocked PACs
D. Mobitz Type II AV block
E. 3rd degree AV block
The findings on this EKG are most consistent with which clinical scenario?

A. Severe chest pain
B. Sick sinus syndrome
C. Lyme carditis
D. Tricyclic overdose
A 54 Y/O W, evaluated in the ER after a syncopal episode resulting in a MVA. H/O recurrent syncope since age 16. Only one syncope between ages 24-53. 3 episodes in the last 2 years. Holter 6 mo ago- 4 sec sinus pause during an episode noted. Increased salt and fluid intake advised. No other past history or meds.

What will help in prevention of an episode in the future.

a. Positive pressure stocking
b. Tilt table testing
c. Dual chamber Pacer
d. Fludrocortisone
e. Midodrine