What do you do if called for an arrhythmia?

Jordan M. Prutkin, MD, MHS
Associate Professor of Medicine
Division of Cardiology/Electrophysiology
Assoc. Director, UW Center for Sports Cardiology
8/8/2019
Disclosures

• None
Goals

- Learn basics of ECG interpretation of arrhythmias
- Determine best management of arrhythmias
- Understand role of anticoagulation around cardioversion
- Recognize different types of bradycardia on ECG
What to do for an arrhythmia...

- Check the patient’s pulse
- Get an ECG
  - Unless there’s no pulse.
  - Then call a code and do ACLS
Approaching an EKG

1. Eyeball
2. Rate
3. Rhythm
4. Axis
5. Intervals
6. P waves
7. QRS
8. ST-T waves
9. Describe
10. Diagnose
What’s the rhythm?
Approach to Arrhythmias

- Do you have calipers?
- Are there P waves?
- Are the P waves and QRS’s regular?
- QRS narrow or wide?
- P>QRS, P=QRS, P<QRS
- Is there a constant relationship between the P waves and QRS complexes (constant PR)?
Tachycardia
<table>
<thead>
<tr>
<th></th>
<th>Regular</th>
<th>Irregular</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Narrow</strong></td>
<td>Sinus Tach</td>
<td>Afib</td>
</tr>
<tr>
<td></td>
<td>AVNRT</td>
<td>MAT</td>
</tr>
<tr>
<td></td>
<td>AVRT</td>
<td>Frequent PACs</td>
</tr>
<tr>
<td></td>
<td>Atrial Tach</td>
<td>Rarely</td>
</tr>
<tr>
<td></td>
<td>Junctional Tach</td>
<td>SVT</td>
</tr>
<tr>
<td></td>
<td>Atrial Flutter</td>
<td>Atrial Flutter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wenckebach</td>
</tr>
<tr>
<td><strong>Wide</strong></td>
<td>Monomorphic VT</td>
<td>Polymorphic VT</td>
</tr>
<tr>
<td></td>
<td>AVRT</td>
<td>VFib</td>
</tr>
<tr>
<td></td>
<td>SVT with:</td>
<td>Afib, MAT, PACs</td>
</tr>
<tr>
<td></td>
<td>BBB</td>
<td>with:</td>
</tr>
<tr>
<td></td>
<td>Bypass pathway</td>
<td>BBB</td>
</tr>
<tr>
<td></td>
<td>Ventricular pacing</td>
<td>Bypass pathway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ventricular pacing</td>
</tr>
</tbody>
</table>
Narrow Complex Tachycardia
Case 1

- 73 year old female admitted with pneumonia, reports acute onset of shortness of breath
Case 1
What does this EKG show?

1. Sinus rhythm
2. Atrial fibrillation
3. Atrial flutter
4. Atrial tachycardia
What does this EKG show?

1. Sinus rhythm
2. Atrial fibrillation
3. Atrial flutter
4. Atrial tachycardia
Case 1
Case 2

- 61 year old male presents to the ED with palpitations
- HR 155bpm, BP 122/76
Case 2
What does this EKG show?

1. Sinus tachycardia
2. Atrial fibrillation
3. Atrial flutter
4. Atrial tachycardia
5. Artifact
What does this EKG show?

1. Sinus tachycardia
2. Atrial fibrillation
3. Atrial flutter
4. Atrial tachycardia
5. Artifact
Case 2

ECG Readings/SSO

I  aVR  II  aVL  III  aVF  V1  V2  V3  V4  V5  V6

25mm/s  10mm/mV  150Hz  7.02  12SL 235  CID: 1

SID: 29232109 EID: 1029 EDT: 10:30 06-JAN-2009 ORDER:
Slower heart rate
Atrial flubber
Management of Afib/flutter

- Is the patient hemodynamically stable?
- If there’s hypotension, acute heart failure, mental status change, ischemia, or angina, then cardiovert
If stable, then what?

- Most spontaneously convert within 24 hours
- Do you need to do anything then?
  - If rapid or mildly/moderately symptomatic, yes.
  - Asymptomatic, HR <110 bpm
  - Otherwise, maybe not.
- Don’t check a troponin in the absence of ACS symptoms
Rate control

- **IV**
  - Diltiazem 5-20mg IV, then 5-20mg/hr
  - Metoprolol 5mg IV Q5min x 3

- **PO**
  - Diltiazem
  - Verapamil
  - Metoprolol
  - Atenolol
  - Digoxin?
Rhythm Control

- Amiodarone 150mg IV, then 0.5-1 mg/min gtt
  - Should really have a central line

- Flecainide
- Propafenone
- Ibutilide  \[\text{Call cardiology}\]
Anticoagulation/DCCV for AF

- Increased risk of stroke after DCCV
- If >48 hours, need 3 weeks of anticoagulation or TEE
- If >48 hours and emergent DCCV, give heparin bolus, then anticoagulate for at least 4 weeks
- If <48 hours, you may not need anticoagulation
  - But if highest risk, you might (i.e., mitral stenosis, high CHA2DS2-VASc, HCM)
Sinus tachycardia

- 30 year old admitted with SOB
- HR 175bpm
Causes of sinus tach

- Fever
- Infection/Sepsis
- Volume depletion
- Hypotension/shock
- Anemia
- Anxiety
- Pulmonary embolism
- MI
- Heart failure
- COPD
- Hypoxia
- Hyperthyroid
- Pheochromocytoma
- Stimulants/Illicit substances
Treatment for Sinus Tach

- In general, don’t treat heart rate
- Treat underlying cause
- Exception for acute MI, use beta-blockers
Case 3

- 63 year old male is admitted with chest pain to 5NE
- While waiting for a stress test, he reports abrupt onset of palpitations and mild chest discomfort to his nurse.
- Pulse 150, blood pressure 132/88
Case 3-Presenting EKG
What do you do?

1. Cry?
2. Call your senior resident/fellow?
3. Give metoprolol?
4. Give adenosine?
5. All of the above?
What do you do?

1. Cry?
2. Call your senior resident/fellow?
3. Give metoprolol?
4. Give adenosine?
5. All of the above?
Case 3-Presenting EKG
Case 4-Adenosine
SVT
Adenosine
SVT treatment

- Vagal maneuvers - Valsalva, carotid massage
- Adenosine
  - 6mg, 12mg, central line if possible
- Beta-blockers/Ca channel blockers
  - Can use even if WPW known on baseline ECG
  - But watch out if AVRT converts to Afib
- DCCV
Case 4-Two patients, same diagnosis
What is the diagnosis?

1. Artifact
2. Atrial flutter
3. Atrial tachycardia
4. Ventricular tachycardia
What is the diagnosis?

1. Artifact
2. Atrial flutter
3. Atrial tachycardia
4. Ventricular tachycardia
Wide Complex Tachycardia
Case 5

- 35 year old male with a history of nonischemic cardiomyopathy
- Presents with palpitations
Case 5

20-JAN-1971 (35 yr)  
Male  Caucasian  
Room: SSE  
Loc: 39

Vent. rate: 114 BPM  
PR interval: * ms  
QRS duration: 152 ms  
QT/QTc: 380/523 ms  
P-R-T axes: * -72 102

ECG REASON:  
ENCTR:  

I  aVR  V1  V4
II  aVL  V2  V5
III  aVF  V3  V6
V5
What is the diagnosis?

1. Atrial fibrillation
2. Atrial flutter
3. Sinus Tachycardia
4. Ventricular Tachycardia
What is the diagnosis?

1. Atrial fibrillation
2. Atrial flutter
3. Sinus Tachycardia
4. Ventricular Tachycardia
Case 5

20-JAN-1971 (35 yr)  
Male  Caucasian

Room: SSE
Loc: 39

ECG REASON:  ENCTR:  

I  aVR  V1  V4
II  aVL  V2  V5
III  aVF  V3  V6
II  
V5

Technician:  Test ind:
Fusion beat
VT-Concordance
Paroxysmal RVOT VT
What to do?

- If hemodynamically unstable, ACLS/shock
- If hemodynamically stable, don’t shock
  - Don’t use hemodynamics to diagnose
- Call cardiology
- Amiodarone 150mg IV, then 0.5-1.0mg/min gtt
- Lidocaine 100mg IV, 1-4mg/min gtt
- Beta-blocker (propranolol?)
- Impella/IABP/ECMO
- Intubate/paralyze
PVCs
What to do?

- Most times, nothing if asymptomatic
- Beta-blocker/Ca channel if symptomatic
- Check labs?
  - Usually normal
- Turn off telemetry?
  - Reasonable
Polymorphic VT
Polymorphic VT

- Shock/ACLS
- Magnesium
- Get an ECG when not in VT
- Call cardiology
- Beta-blocker
- Isoproterenol
- Pacing
- Ischemia evaluation
- Avoid QT prolonging drugs (www.crediblemeds.org)
VF
VF

- Shock
- Do chest compressions
- ACLS drugs
- Don’t bother with an ECG
Bradycardia
Sinus bradycardia
Type I, 2\textsuperscript{nd} degree AV block (Wenckebach)
AV WB-Very long PR
Type 2, 2\textsuperscript{nd} degree AV block
2:1 AV block
Complete heart block
Slow escape rhythm
Regularized atrial fibrillation
Bradycardia Management

- Usually, HR < 40 bpm
- Is the patient symptomatic?
  - Mental status changes, hypotension, angina, shock, HF
- Acute or chronic
- Are they sleeping? Do they have sleep apnea?
- Not everyone with bradycardia, even complete heart block, needs acute treatment if stable
Management

- Transcutaneous pacing (sedate)
  - Don’t leave pads on patient “to be safe”
- Atropine 0.5mg Q3-5min, max 3mg
  - Avoid if cardiac transplant (may worsen block)
  - Don’t say “Atropine at the bedside”
- Dopamine infusion
- Epinephrine infusion
- Glucagon if beta-blocker overdose
- Transvenous pacing (call cardiology)
Conclusions
Conclusions

- You will be called (frequently) about arrhythmia issues
- Get an ECG
- If tachycardia, don’t use hemodynamics to diagnose
  - Wide or narrow, regular or irregular
  - Beta-blockers, calcium channel blockers
  - Amiodarone
  - Cardioversion
- If bradycardia, where is the level of block?
  - Are they symptomatic? Are they sleeping?
  - Call cardiology for transvenous pacing
Thanks!

EKG's or other questions:

jprutkin@cardiology.washington.edu