A SIMPLE APPROACH TO TACHYARRHYTHMIAS
KISS PRINCIPLE

“When you are stressed your IQ drops significantly”

R.Lepage
QUICK REVIEW

Sinoatrial (SA) node
AV node
AV bundle
Bundle branches
Purkinje fibers
Internodal pathways
SEQUENCE OF EXCITATION

1. SA Node
2. Atria
3. AV Node
4. Bundle of His
5. Bundle Branches
6. Purkinje Fibers
7. Endocardium
8. Epicardium
9. Apex to Base
Pacemaker of the heart under normal circumstances
• 50-100
• Most areas of the heart can generate a rhythm but not as stable and slower
• P wave: atrial depolarization
AV NODE

- Electrical connection b/w atrium and ventricles
- Slows conduction
- Protects against very rapid ventricular rates
- PR interval – slowing in the AVN and HIS bundle
BUNDLES

• Narrow QRS complex – Normal ventricular depolarization

• Diseases of Purkinje system produce BBB

• Diseases of AVN cause heart blocks
2 MAJOR MECHANISMS
TACHYARRHYTHMIAS
DISTURBANCE OF AUTOMATICITY

CAN BE FROM INCREASED SNS TONE:
• Anxiety
• Fever
• Thyrotoxicosis
• MI
• Overdose – Drug abuse

TREATMENT
• Treat underlying problem
• Treat with drugs to reduce automaticity
• Overdrive pacing
REENTRY

Requires:
- Available circuit
- Unequal responsiveness of the 2 segments of the circuits
- Slow conduction in one limb
- Re-excitation of the initial blocked pathway
THE ECG TRACING
APPROACH

1. Plan on being stupid
2. Prepare IV, O2, monitor, airway equipment and defibrillator
3. Is the patient stable or unstable
4. Is the rate regular or irregular
5. Narrow complex narrow or wide.
6. Are there P waves
7. Are the P waves of the same morphology?
8. Are they related to the QRS
9. Are there flutter waves
IS THE PATIENT STABLE OR UNSTABLE

Unstable Patient:
- Ischemic Chest pain
- Hypotension
- Altered LOC
- Poor perfusion
- CHF

70% of patients with tachyarrhythmias complain of chest pain most not having MI

Unstable usually means cardioversion or defibrillation but may sometimes try medications.
IS THE RATE REGULAR OR IRREGULAR

Irregular rhythms usually generated about the AV node and treatment consist of blocking AV Node
**ARE THE QRS NARROW OR WIDE**

**Adult**
- $> 0.12$ seconds (or 3 small squares) = wide. Most much greater than 0.12

**Children < 8 years old**
- $> 0.08$ seconds = wide

**Wide rhythms**
- Block of normal conduction pathway (BBB)
- Rhythm start in ventricle

**Safest to assume wide rhythms are ventricular**
ARE THERE P WAVES

Are they related to the QRS?
- Check the different leads
- ? From sinus node (P upright in II, negative in aVR)

Are there flutter waves?
- Saw tooth
- Regular at 150

Are the P waves of the same morphology?
- MAT at least 3 different P waves
# Atrial Fibrillation

Atrial Fibrillation

<table>
<thead>
<tr>
<th>Heart Rate</th>
<th>Rhythm</th>
<th>P Wave</th>
<th>PR interval (in seconds)</th>
<th>QRS (in seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: 350-650 bpm V: Slow to rapid</td>
<td>Irregular</td>
<td>Fibrillatory (fine to course)</td>
<td>N/A</td>
<td>&lt;.12</td>
</tr>
</tbody>
</table>
**ATRIAL FLUTTER**

<table>
<thead>
<tr>
<th>Heart Rate</th>
<th>Rhythm</th>
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<th>PR interval (in seconds)</th>
<th>QRS (in seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: 220-430 bpm</td>
<td>Regular or variable</td>
<td>Sawtoothed appearance</td>
<td>N/A</td>
<td>&lt;.12</td>
</tr>
<tr>
<td>V: &lt;300 bpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Atrial Fibrillation
(>400; circus motion theory)

P-frequency (P waves or fibrillation waves)

R-frequency (150-180; irregular pulse)

Atrial Flutter
(Sawtooth with 300 P)

Foci

Ventricular Fibrillation

Two beats of sinus rhythm

Ectopic beat

Elevated
ST - segment (anoxia reduces the Skou pump)

Downslope of T (vulnerable period)

1s

1s

Tumultous twitching
JEOPARDY
What is this?
JEOPARDY
What is this:
FOUR POSSIBLE GROUPS

Narrow complex, Regular, no P wave

Narrow complex, Irregular, no P wave

Wide complex, Regular, no P wave

Wide complex, Irregular, no P wave
NARROW COMPLEX, REGULAR, NO P WAVE

DIFFERENTIAL DX:
- PSVT
- Atrial Flutter
- Orthodromic WPW
- Narrow complex VT*
  *very rare

TREATMENT FOR STABLE PT.
- Block AV Node
- Adenosine
- Verapimil
- Diltiazem
- Atrial Flutter – AV blockade will make diagnosis

TREATMENT FOR UNSTABLE PT.
- Cardioversion
NARROW COMPLEX, IRRREGULAR, NO P WAVE

DIFFERENTIAL DX:
• Atrial Fibrillation
• Atrial Flutter with variable block
• MAT

TREATMENT FOR STABLE PT.
• Aim is to slow ventricular rate – not convert
• Diltiazem
• Digoxin
• B-blockers
• Amiodarone

TREATMENT FOR UNSTABLE PT.
• Diltiazem and Dopamine

*Difficult rhythm to treat
*Often don’t stay in sinus
*If over 48 hrs, risk of embolic stroke.
WIDE COMPLEX, REGULAR, NO P WAVES

DIFFERENTIAL DX:
• VT
• SVT
• Antidromic WPW Syndrome

TREATMENT FOR STABLE PT.
• Adenosine for younger patient with no history of IHD
• Procainamide
• Amiodorone

TREATMENT FOR UNSTABLE PT.
• Cardioversion
WIDE COMPLEX, IRREGULAR, NO P WAVES

DIFFERENTIAL DX:
• Atrial Fibrillation with BBB
• Atrial Flutter with variable Block and BBB
• WPW and Atrial Fibrillation
• Polymorphic VT or Torsade de Pointes

Consider WPW A-Fib if:
• Very rapid ventricular response > 250
• Wide QRS
• Bizarre QRS morphology
• History WPW

TREATMENT FOR STABLE PT.
• Adenosine for younger patient with no history of IHD
• Procainamide
• Amiodorone

TREATMENT FOR UNSTABLE PT.
• Cardioversion
WOLF-PARKINSON-WHITE (WPW)
WPW

Kent bundle act as direct link between atria and ventricles - bypass AV Node

Short PR Interval

Orthodromic Tachycardia
  • 80-90% of re-entrant SVT, impulse down normal pathway and up bypass tract, normal QRS

Antidromic Tachycardia:
  • Impulse conducted down bypass tract and retrograde up the AV node. Wide QRS

TREATMENT FOR STABLE PT.
WPW A-FIB:
  • Caridoversion or Procainanamide

ATRILA FIB WITH BBB:
  • Same as for narrow complex irregular tachycardia

TREATMENT FOR UNSTABLE PT.
  • Cardioversion
WPW- Block & Long QT-syndrome

The Long QT - Syndrome

Bundle of Kent

WPW - Block

Short PQ

Delta - wave

1 mV

1 second

RR = 0.65 s

QT = 0.45 s

1 second

KMc
NOTES OF DRUGS
ADENOSINE

SIDE EFFECTS:
- Chest pain, flushing, bronchospams*
  *Take care with asthmatics
- Effects is potentiated with carbamazepine (Tegretol) and dipyramide → increased AV block
- Reduced effect with methylxanthine (Theophylline)
- Cardiac transplant patients are very sensitive (avoid or start with 1 mg)
- Can cause transient increase in AV conduction after initial blocking.
I found pedal pulses... now what?