Pitfalls in Arrhythmias

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Goals
Using a case based approach, we will review pitfalls in management of:

- Tachydysrhythmias
  - Narrow
  - Wide
- Bradydysrhythmias

Background

2010 ACLS Guidelines

Narrow Complex Tachycardia

- Narrow–QRS-complex (SVT) tachycardias (QRS < 0.12 second), in order of frequency
  - Sinus tachycardia
  - Atrial fibrillation
  - Atrial flutter
  - AV nodal reentry
  - Accessory pathway–mediated tachycardia
  - Atrial tachycardia (including automatic and reentry forms)
  - Multifocal atrial tachycardia (MAT)
  - Junctional tachycardia (rare in adults)
**Background Narrow Complex Tachycardia**

Regular – SVT
- Adenosine preferred
- Beta blocker, CaCB if needed

Irregular – Atrial Fib
- Beta blocker
- CaCB
- Amiodarone
- Procainamide

**Background Regular NCT**

Adenosine
- 6 – 12 mg IV
- Maximize delivery
- Beware with dipyridamole (Aggrenox), carbamezpine

**Background Afib and Aflutter**

Metoprolol
- 5 mg IV Q5 mins x 3 then oral dose
- Causes hypotension, bronchospasm

Diltiazem
- 20 mg IV over 2 min, repeat Q10-15 min
- 10 mg IV if at all tenuous!!!!
- 60 mg po or IV drip
- Causes hypotension

Amiodarone (o.k. if wide)
- 150 mg over 10 mins
- 1 mg/min infusion
- Causes hypotension (less than others)

Procainamide for conversion (best for wide)
- 1 gm over 1 hour
- Causes hypotension and prolongs QT
Background
Wide Complex Tachycardia
- Wide-QRS-complex tachycardias (QRS ≥0.12 second)
- Ventricular tachycardia (VT) and ventricular fibrillation (VF)
- SVT with aberrancy
- Pre-excited tachycardias (Wolff-Parkinson-White [WPW] syndrome)
- Ventricular paced rhythms

Regular WCT
- Adenosine
- Amiodarone
- Procainamide

Background
ADULT BRADYCARDIA
(with Pulse)

Monitor and observe

Persistent bradycardia/bradypnea:
- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Inotropic/alpha-donor?
- Adult heart failure?

Adenosine
- 6 mg
- 12 mg

Consider:
- Inotropes
- Vasopressors
- Defibrillation

Case 1
SVT with Hypotension
- 70 y.o. male is brought in by ambulance from nursing facility with SVT. He drinks several cups of coffee a day.
- HR =150, BP = 88/30 in the field
- Paramedics tried 6 mg and 12 mg of adenosine unsuccessfully
Case #1 – 70y. with SVT

Sinoatrial Node

P waves originate from the sinus node
- P is upright in 2, flipped in aVR

Normal AV Conduction
- Each P followed by a QRS
- Constant PR interval

Approach to Narrow Tachycardia

- Irregular?
  - AFib
- Regular?
  - SVT
  - Atrial Flutter
  - Sinus Tach
SVT

• Rate will not vary or change
• When Adenosine given, will convert to sinus

A-V Nodal Re-entry (AVNRT)

Narrow Complex A-V Nodal Bypass Re-entry (AVRT)

Orthodromic = Anterograde thru AV Node
Atrial Flutter

- Flutter waves best seen in 2 and V1
- May have some irregularity due to varying AV node block
- Rate may or may not change with fluids or fever reduction
- Adenosine will reveal underlying flutter waves
**Sinus Tach**

- P wave upright in 2
- P wave inverted in aVR
- P followed by QRS

  • Rate should slow with fluids or fever reduction
  • Adenosine will block AV node

**Case #1 – 70y. with SVT**

**Another tachycardic patient**

**Case 1 - Pearls**

- Recognize that fast sinus rhythm can be misdiagnosed as SVT
  - Look for the P waves buried in the end of the T wave
    - upright in II, inverted in aVR
- Recognize that Poor R waves in the anterior leads = decreased EF
Case 2
AFib at 160 and ETOH W/D

- 50 y.o. male alcoholic BIBA after found on the street. Noted to have irregular fast heart rate

PEx
- HR = 160, BP = 110/60, RR = 18, Afebrile
- Disheveled, Happily tremulous

- Given diltiazem 10 mg then 20 mg ⇒ rate slowed 90
- Admitted to medicine

- On arrival of medicine team, HR was 140
- What was medicine team’s response?
Case 2
AFib at 160 and ETOH W/D
- Switched to metoprolol since diltiazem not working well
- SBP dropped into 70s, O2 sat into low 90s
- Required emergent cardioversion

Case 2 - Pearls
AFib at 160 and ETOH W/D
- Optimize contributing factors to Atrial Fibrillation with ETOH withdrawal
  - Hydration
  - Electrolytes (check the Mg)
  - Ativan
  - Remember to give the oral dose after rate control
- Low threshold for higher level of care in suspected cardiomyopathy and RVR

Case 3
Wide complex Tachycardia
- 50 y.o. male BIBA with palpitations. He was noted to have intermittent Ventricular Tachycardia. Because the patient was “semi-stable” in the field, no intervention was given
- Presenting vital signs were:
  - HR = 200, SBP = 90, RR = 18, Afebrile
- Exam significant for difficult access due to extensive hx of IDU
Approach to V Tach

- Unstable
  - shock

- Stable
  - Procainamide - 20 to 50 mg/min (or 100 mg Q5 min) until conversion, hypotension, QRS increase by 50%, or max of 17 mg/kg
  - Amiodarone

ED Course

- Patient converted to sinus rhythm
- Continued to flip in and out of VTach despite treatment with Amiodarone

Neumar, Circ 2010
ACLS Update

Arrhythmia resolves spontaneously

Case #3 – 50y. with palps
Treatment of Torsades

- Magnesium – 2gms IV
- Increase Rate
  - Pace
  - Dobutamine
  - Dopamine?
- Avoid Amiodarone with prolonged QT

Case 3 - Pearls

- Recognize the difference between Monomorphic VT and TdP
- Anticipate TdP in patients with long QT
  - Place on Cardiac monitor
  - Check and correct K, Mg, Ca
  - Stop or Avoid Meds that prolong QT
- Treat with
  - Magnesium
  - Pacing or chronotropic meds

Case 4

Another wide complex tach

- 25 y.o. male presents with palpitations and pain radiating into left neck
- History of similar episode once in Mexico.
- Told at that time that if recurrent, he should cough or mimic having a bowel movement

Case # 4- 25y. with palps
AFib with WPW

- Irregularity strongly suggests A Fib
- Very fast rates support this
- Young age supports this

Atrial Fibrillation with accessory pathway

Conducted beat through AV Node
- Narrow Complex QRS

Conducted beat down accessory pathway
- Wide Complex QRS

Conducted beat through AV Node AND accessory pathway
- Fusion type QRS Complex
True Capture and Fusion

Apparent Capture and Fusion

Case # 4 - 25y. with palp

Irregular WCT - Treatment

- Never Block the AV Node
- AVOID AMIODARONE/CaCB/B-Blocker
- Block the Accessory Tissue
- Treatment of choice is....

PROCAINAMIDE
Another pt with palps

Case #4 - Pearls

• Recognize irregular and wide = Afib + WPW
• Don’t block the AV node
• Shock or Procainamide is Rx of Choice
  – Amiodarone is 2b recommendation

ACC/AHA/ESC 2006 A Fib Guidelines
http://circ.ahajournals.org/cgi/content/full/114/7/e257

Case 5
Bradycardia with hypotension

• 50 y.o. male feels weak
• HR = 50, BP = 80/50

Case 5 – 50y. with bradycardia
Case 5

Clinical Diagnosis
- Junctional rhythm vs slow afib? and right bundle branch block.
- Patient was paced and admitted to ICU. Taken to cath lab for pacer

Correct Diagnosis
- In cath lab when K reported 7.2
- Bradycardia due to hyperkalemia

3 CAUSES OF A SLOW, REGULAR RHYTHM
- Junctional
- Hyperkalemia
- Digoxin Toxicity

6 CAUSES - WIDE QRS
- Bundle branch block
- Ventricular rhythm
- Hyperkalemia
- Medications
- Paced rhythm
- WPW

Hyperkalemia
- QRS Widens
- Loss of P
- QT Shortens
- Enlarged T
Case 5 – 50y. with bradycardia

Summary
- Narrow complex tachycardias
  - Irregular => Afib
  - Regular => Sinus, A Flutter, SVT
- Wide complex tachycardias
  - Rotating complexes = Torsades
    - Mg++/ Speed rate (stable) or Shock (unstable)
  - Irregular rate = Afib w WPW
    - Procaainamide (stable) or Shock (unstable)
  - Regular = VT
    - Amiodarone (stable) or Shock (unstable)

Case #5 - Pearls
- When you diagnose a junctional rhythm, consider hyper K, especially if there is some QRS widening

Summary
- Bradycardia
  - Junctional rhythm
  - Digoxin toxicity
  - Hyperkalemia
Summary

• YOU CAN MAKE A DIFFERENCE

• YOU CAN AVOID ERROR

• BE THE EXPERT IN ECG ASSESSMENT!

Bibliography


**Bibliography**

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  ACEP Publishing, 2007

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**Trivia**

What animal model is used to test human hepatitis virus infection and treatment?

The Woodchuck

**Trivia**

David Letterman's Top 10 List

1. Signs you're at a bad hospital
2. You go in for routine surgery, you come out with a tail
3. Instead of sponge bath, they send St. Bernard to lick you
4. As you're going under, your surgeon says, "Man, am I baked"
5. In the operating room, they have one of these guys (cut to shot of man waving)
6. Every couple of minutes, you hear a bugle playing taps
7. All the diplomas on the wall are signed by Sally Struthers
8. You and your roommate have to take turns on the IV
9. Through fog of anesthesia, you hear surgeon shouting, "Bring the damn Scotch Tape! And plenty of it!"
10. Instead of "patient," they use the term "plaintiff!"

Courtesy of CBS (March 19, 1982)
Trivia
What is the leading cause of death in Antartica?

Trivia
Fire

Trivia
What was the leading cause of death on Admiral Perry’s expedition to the North Pole?

Trivia
Vitamin A Toxicity