Acute Arrhythmias in the Hospitalized Patient

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Disclosures

• Medtronic: Research Support
• SentreHeart: Research Support
Don’t Forget the Basics

• 79 yo man with a history of CHF s/p remote ICD presents with progressive, severe dyspnea at rest
• Compliant with his medicines; described some diarrhea after a recent trip to Mexico
• Sitting up, diaphoretic, tachypneic, oxygen saturation ~87%, blood pressure ~88/40
Don’t Forget the Basics
Don’t Forget the Basics

When you have a questionable ECG:

IF you can, always…

1. Compare it to a previous ECG
Current:

2 months prior:
Don’t Forget the Basics

When you have a questionable ECG:

IF you can, always…

1. Compare it to a previous ECG

2. Think about electrolytes (K+, Mg2+, Ca2+)
Tachyarrhythmias - Unstable

SVT
- Unconscious, altered mental status, ongoing chest pain
- "Hypotension" is a clinical judgment

Atrial fibrillation

AF with WPW

VT/ VF
Tachyarrhythmias—quasi-stable

SVT

Atrial fibrillation

AF with WPW

VT/ VF
Tachyarrhythmias-quasi-stable

SVT
Tachyarrhythmias-quasi-stable

SVT

Vagal Maneuvers

WAIT!

GET A 12 LEAD ECG!
Tachyarrhythmias—quasi-stable

SVT

Vagal Maneuvers

- Carotid sinus massage
- Valsalva
- Carotid sinus massage will terminate ~20%

Tachyarrhythmias—quasi-stable

SVT

Adenosine
The primary method of adenosine clearance is

1. Liver metabolism
2. Renal excretion
3. Red blood cell metabolism
Tachyarrhythmias-quasi-stable

SVT

Adenosine
- Metabolized by red blood cells and endothelium
- Give 6 mg IV with 20 cc flush
- Repeat with 12 mg IV X 2
- How do I know if I’ve given enough?
SVT can be cured with ablation

1. >95 % of the time
2. 85-95% of the time
3. 75-85% of the time
4. 65-75% of the time
5. 55-65% of the time
6. 45-55% of the time
SVT can be cured with ablation

**Hazard Ratio for Emergency Department Visits (95% CI)**
Multivariable adjusted Cox proportional hazard ratios for predictors of recurrent Emergency Department visits for SVT taking clustering of individuals into account. The vertical line represents a hazard ratio of 1 (no difference), and the error bars denote 95% confidence intervals. Filled circles denote baseline (static) variables, and open circles represent variables that were time-updated throughout the study period.
Tachyarrhythmias-quasi-stable

Atrial Fibrillation

Blood Pressure
1. Address underlying condition
2. Esmolol
3. Digoxin
4. Amiodarone
5. Dronaderone?
Tachyarrhythmias- quasi-stable
The most likely diagnosis is:

1. Ventricular Tachycardia
2. Atrial fibrillation with WPW
3. SVT with aberrancy
Tachyarrhythmias-quasi-stable
Tachyarrhythmias-quasi-stable

Atrial Fibrillation with preexcitation

Give:
- Procainamide
- Ibutilide

AV nodal blockers
A Patient with WPW Syndrome Should Be Referred to an EP Because

1. Genetic testing will be helpful for family counseling
2. An implantable defibrillator may be indicated to prevent sudden death
3. An ablation may be indicated to prevent sudden death
Tachyarrhythmias - quasi-stable

Ventricular Tachycardia

- Scarcity of data
- Amiodarone probably the most effective\(^1,2\)
  -- Can cause bradycardia
  -- Can hinder EP studies/ablation

Extrapolate from cardiac pulseless VT/VF versus placebo:

Tachyarrhythmias-quasi-stable

Ventricular Tachycardia

- Scarcity of data
- Consider
  -- Lidocaine gtt
  -- Procainamide
  - watch for hypotension and prolonged QT
Tachyarrhythmias—quasi-stable

Ventricular Tachycardia

- Get EP involved
- May respond to beta-blockers or calcium channel blockers
- May be amenable to ablation
Tachyarrhythmias
Tachyarrhythmias
Tachyarrhythmias
Tachyarrhythmias

1. Electrolytes
Tachyarrhythmias

1. Electrolytes
   - Hypokalemia
   - Hypo-Mg
Tachyarrhythmias

1. Electrolytes
   - Hypokalemia
   - Hypo-Mg2+
   - Hypo-Ca2+
Tachyarrhythmias

1. **Electrolytes**
   - Hypokalemia
   - Hypo-Mg2+
   - Hypo-Ca2+

2. **DRUGS**

3. **Congenital**
Tachyarrhythmias

1. IV magnesium
2. Isoproterenol
3. Transvenous pacing
4. Unstable → DC shock
Bradyarrhythmias

+ SYMPATHETIC NERVOUS SYSTEM

- PARA-SYMPATHETIC NERVOUS SYSTEM

Blood Flow
Bradyarrhythmias

+ SYMPATHETIC NERVOUS SYSTEM

− PARA-SYMPATHETIC NERVOUS SYSTEM

Blood Flow
Bradyarrhythmias

+ SYMPATHETIC NERVOUS SYSTEM

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Blood Flow
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Blood Flow

+ SYMPATHETIC NERVOUS SYSTEM

- PARA-SYMPATHETIC NERVOUS SYSTEM
Bradyarrhythmias

- Important questions:
  - Is this dynamic/ reversible/ vagal?
    - IE, more likely benign
    - IE, less likely respond to pacing
    - IE, more likely transient
  - Or is this structural
    - IE, more likely dangerous
    - IE, more likely needs pacing
Bradyarrhythmias

Vagal tone

Lengthening P-P interval before pause

Lengthening PR before a pause
Bradyarrhythmias

1. Atropine
Bradyarrhythmias

1. Atropine
2. Dopamine
Bradyarrhythmias

1. Atropine
2. Dopamine
3. Epinephrine
Bradyarrhythmias

1. Atropine
2. Dopamine
3. Epinephrine
4. Isoproterenol (vasodilating)

Bradyarrhythmias

- Beta-blocker
- Calcium channel blocker
- Glucagon
- Calcium
Bradyarrhythmias

Conduction disease

Lev’s disease/fibrosis or an MI
Bradyarrhythmias

1. Atropine
2. Dopamine
3. Epinephrine
4. Isoproterenol
Bradyarrhythmias

1. Atropine
2. Place external pacing pads
3. Pace if atropine fails
4. Dopamine
5. Epinephrine
6. Isoproterenol
7. Transvenous pacer

1. Bradyarrhythmias

1. Atropine

2. Transcutaneous pacing OR Dopamine OR Epinephrine (then mention isoproterenol)

3. Consider consultation ± transvenous pacing

Bradyarrhythmias

Transcutaneous Pacing
Pt. comes in with multiple, recurrent shocks from his ICD

1. Place external pads
2. Place magnet on chest

1. PUTS DEVICE IN “MAGNET MODE”
2. FOR AN ICD: INHIBITS THERAPY DETECTION
3. FOR A PACEMAKER: INHIBITS SENSING
Pt. comes in with catastrophic bleeding on warfarin…but *needs* warfarin for atrial fibrillation and a high CHADS2 score (>2)

Or

Patient comes in with apparent embolic stroke in atrial fibrillation with an INR of 2.5
Devices for stroke prevention

• All anticoagulants by nature will be associated with an increased risk of bleeding

• In AF patients with thrombus/thromboembolism, the left atrial appendage is thought to be the site of thrombus formation in more than 90%
Devices for stroke prevention

• Consider referral for a percutaneous left atrial appendage occlusion:
  – Watchman (occlusion device)
  – Lariat (epicardial suture)
• No guidelines for now
• Reimbursement may be an issue
• Likely indicated for:
  
  – If CHADS2 score warrants warfarin or a novel anticoagulant and there are contraindications (mainly bleeding)
  – If patient has a stroke on therapeutic anticoagulation
Thank You