Exercise Arrhythmias, Pt 2

Tachyarrhythmias, Asystole, PEA, Pulseless VT/VF

- Atrial tachyarrhythmias
- Ventricular tachyarrhythmias
- Treatment of tachyarrhythmias
- Asystole
- Pulseless Electrical Activity
- Defibrillation

SVT: Case Study

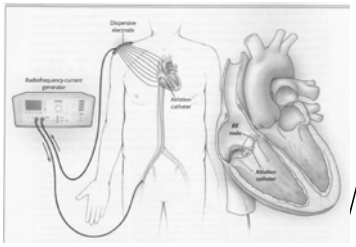
N Eng J Med: 354:1039-51, 2006

- 28 yr-old women suddenly has rapid palpitations and chest pain while playing her cello
- In the emergency room, she has
  - HR 190
  - BP 82/54
- EKG shows regular tachycardia with a narrow QRS and no apparent P waves

Treatments

- Try cardiac sinus pressure or other vagal maneuvers
- Try intravenous adenosine
- If all fails, and tachycardia is recurrent and causes symptoms, treatment may be catheter ablation to destroy an accessory pathway

Ablation Treatment



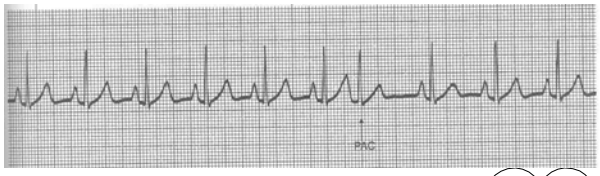
Causes of Tachycardias

- Supraventricular tachycardia
- PACs
- Atrial flutter/atrial fibrillation
- Ventricular tachycardia
- PVCs

Atrial Arrhythmias

- Tend to “go away” with vagal withdrawal at the start of exercise
- Re-appear during recovery
- Occurs in 4-18% of patients
  - 5 % in normals
  - 40% in CAD
- Reduces “atrial kick” to increase stroke volume

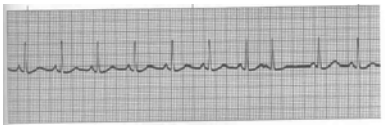
Premature Atrial Contractions



- Occur at low exercise intensity and have little clinical significance

PACs

What else do you see here?



Where's the PAC?

Atrial Flutter or Fibrillation

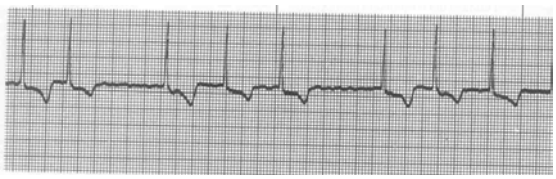
- Transient Atrial flutter or fibrillation occur frequently in patients
- Associated with
  - CAD
  - rheumatic heart disease
  - thyrotoxicosis
  - myocarditis
  - sometimes in normal people with no disease

Exercise Response with Atrial Flutter or Fibrillation

- Cardiac output is compromised
  - 5-30% lower stroke volume
  - elevated heart rates
  - greater incidence of ischemia (inadequate perfusion time)
- Atrial flutter rate 220-300
- Atrial fibrillation, rate indeterminant

Fib or Flutter?

A



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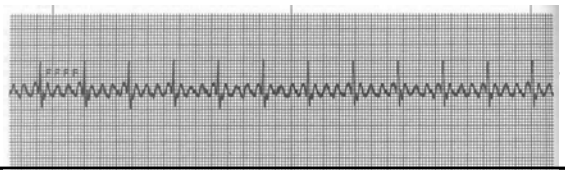
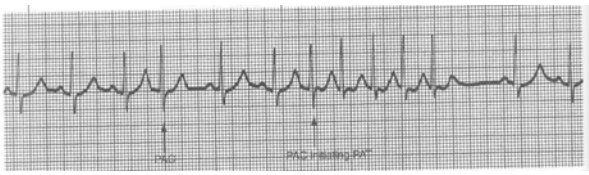


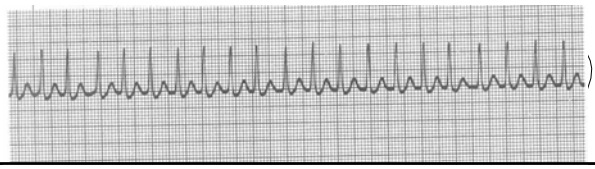
Paroxysmal Supraventricular Tachycardia (PSVT or PAT)

- 2-3 beats of PAT or junctional tachycardia occasionally occur with exercise
- rate of ~160 to 220
- Not associated with increased mortality
- Sustained PAT is rare
- Sometimes, but not always associated with ischemia with ST depression

Intermittent PAT

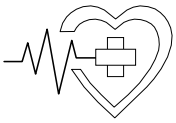


Sustained PAT

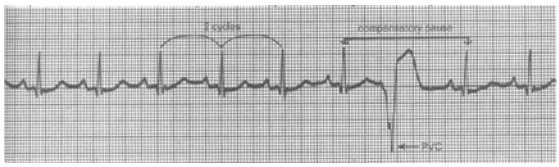


Premature Ventricular Contractions

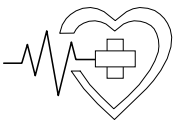
- PVCs at Rest
  - controversy over significance
  - most agree that PVCs at rest are not significant in healthy people
  - Patients with CAD who have PVCs have a "small" increase in mortality
  - PVCs during recovery, usually are not significant



Single PVC

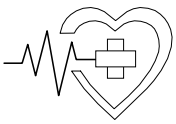


PVC and compensatory pause

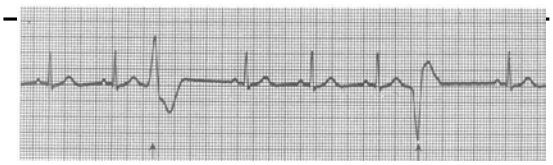


Exercise-Induced PVCs

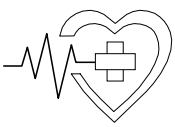
- Caused by excess catecholamines and vagal withdrawal
- May be caused by electrical re-entry and ectoptic beats
- Occur in 36-42% of normal subjects during intense exercise
- Occur in 50-60% of CAD patients and at lower HR
- not significant, if asymptomatic



Ominous PVCs



- Multi-focal, multiform, repetitive
- Moderate increase in mortality in CAD patients



Bigeminy

Trigeminy

Couplet

Figure 9-12. Interpolated PVC.

Exercise Guidelines and PVCs?

- Relative contra-indications to stop exercise
  - sustained VT (4 or more PVCs)
  - multi-focal PVCs
  - Triplets of PVCs

Non-Sustained Ventricular Tachycardia

- 4 or less = non-sustained
- usually not a problem unless accompanied by other signs or symptoms

Sustained VT

- Relatively rare
- Usually portray serious underlying cardiac disease
- Often deteriorates to VF

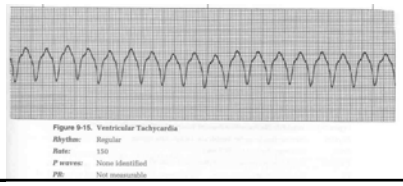


Figure 9-15. Ventricular Tachycardia
Rhythm: Regular
Rate: 150
P waves: None identified
PR: Not measurable

VT vs. V flutter

- VT rate is 140 to 250
- VF > 250

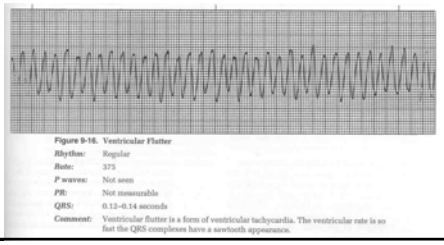
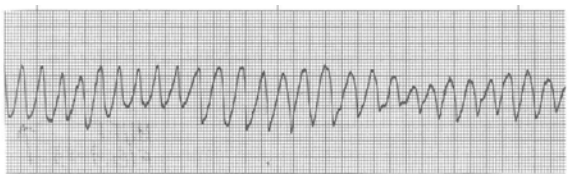


Figure 9-16. Ventricular Flutter
Rhythm: Regular
Rate: 375
P waves: Not seen
PR: Not measurable
QRS: 0.12–0.14 seconds
Comment: Ventricular flutter is a form of ventricular tachycardia. The ventricular rate is so fast the QRS complexes have a sawtooth appearance.

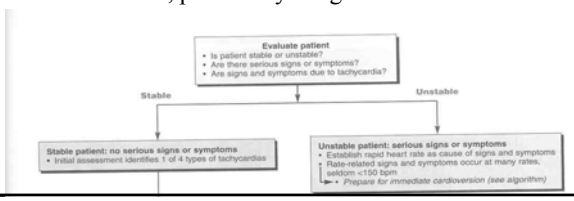
Torsades de Pointes



Often related to hypoxia, electrolyte disturbances such as hypokalemia, or drugs

Tachycardia Algorithm

- Immediate assessment: stable or unstable?
- Unstable= chest pain, shortness of breath, shock, heart failure, pulmonary congestion



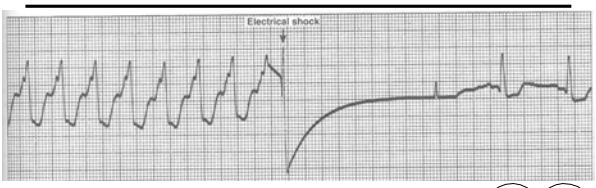
Treatment for Unstable Tachycardia

- HR < 150, usually try anti-arrhythmic medications, vagal maneuvers
- HR> 150, immediate cardioversion
- Cardioversion used for
  - VT
  - paroxysmal supraventricular tachycardia
  - atrial fibrillation
  - atrial flutter

Stable Tachyarrhythmias

- Vagal maneuvers
  - Massage carotid sinus to stimulate vagus nerve
  - Apply pressure at level of the cricoid cartilage for about 5 sec in a circular motion
  - Valsalva
  - Ice to face
- Adenosine: causes a transient a-v block
  - don't use with wide-complex tachycardia!
- Use Ca^{+} channel or beta-blockers

Cardioversion



- Use defib with low levels of energy (50-360 J)
- Medicate first
  - sedatives (diazepam, barbiturates)
  - analgesic (morphine)

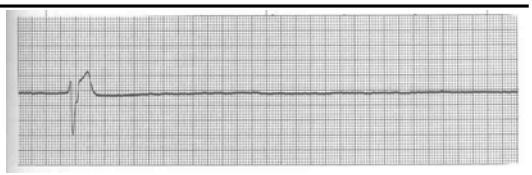
Treatments for Atrial fib or flutter

- atrial fibrillation or flutter
  - control rate (calcium channel blockers, beta blockers)
  - control rhythm (amidodarone, lidocaine)
  - cardioversion
  - CAUTION, use anti-coagulants for 3 wks before converting with electricity or drugs, if atrial fib or flutter has persisted for >48hrs

Tachycardia Summary

- Name 3 conditions that result in atrial-initiated VT.
- When are PVCs during exercise a concern?
- When cardiovert?
  - Tach > 150 with signs/symptoms
  - AFl or Afib < 48hrs or after coagul rx
  - VT, PSVT, AFl, AFi

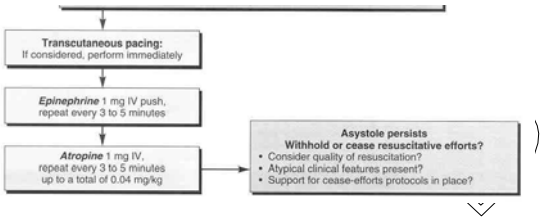
Asystole!



Think TEA

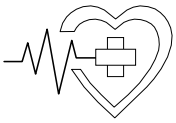
Asystole Algorithm

- Confirm non-responsiveness and asystole



Pulseless Electrical Activity

- Presence of some type of electrical activity but no detectable pulse
- VF/VT and PEA are "rhythms of survival" if
  - VF/VT--resuscitated with a defibrillator
  - PEA--cause is treated in time
- PEA treatment, think PEA
  - Problem, Epinephrine, Atropine



PEA Algorithm

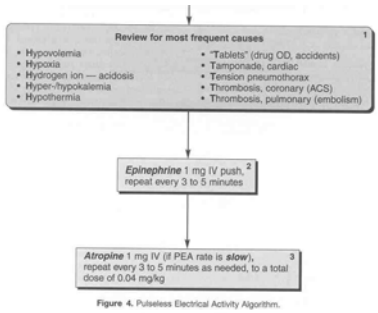
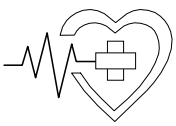


Figure 4. Pulseless Electrical Activity Algorithm.

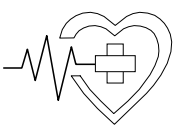
The 5 Hs

- Hypovolemia
  - volume infusion, vasoconstrictor
- Hypoxia
  - oxygen
- Hydrogen ion
  - bicarbonate infusion
- Hyper/hypokalemia
- Hypothermia



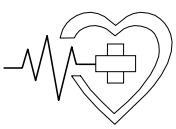
The 5 Ts

- Tablets (antidepressants, beta blockers, ca channel blockers, digitalis)
- Tamponade
- Tension Pneumothorax
- Thrombosis, coronary
- Thrombosis, pulmonary embolism



VF/VT

- Survivable rhythm if defibrillation is performed quickly
- Use CPR skills
- Use AED or get defibrillator



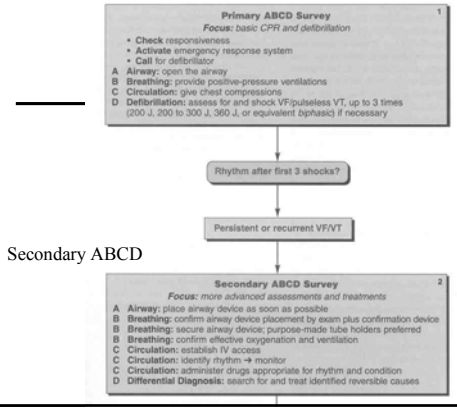
Primary ABCs

Primary ABCD Survey 1

Focus: *basic CPR and defibrillation*

- **Check** responsiveness
- **Activate** emergency response system
- **Call** for defibrillator

A **Airway:** open the airway
B **Breathing:** provide positive-pressure ventilations
C **Circulation:** give chest compressions
D **Defibrillation:** assess for and shock VF/pulseless VT, up to 3 times (200 J, 200 to 300 J, 360 J, or equivalent *biphasic*) if necessary



Secondary ABCD

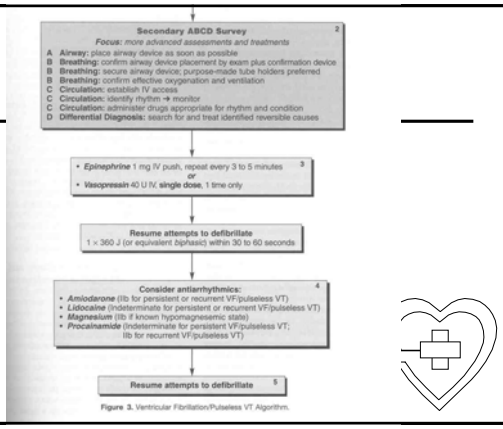


Figure 3. Ventricular Fibrillation/Pulseless VT Algorithm.

Conclusions

- When do you cardiovert, when do you use a defibrillator?
- What are the 5 Hs and the 5 Ts?
- Name 2 times you would consider using a pacer
  - bradycardia and asystole