Premature Atrial Contractions (PACs)
- Premature atrial contractions (PACs) are atrial beats that arise earlier than expected.
- This one: P wave similar to others (ectopic focus close to SA node)

NSR with PAC
- This one: p wave hidden in previous t wave

Nonconducted PAC
- No QRS follows p wave.
- Impulse comes so early that AV node is refractory.
- Impulse not conducted to ventricles.

Nonconducted PAC
- This one: p wave hidden in the t wave
Nonconducted PAC vs Sinus Arrest

- Sinus arrest: t wave same as others
- Nonconducted PAC: t wave different

PACs: 8 Steps...

1. P wave: premature (early)
   - Abnormally shaped / appears different from other p waves
   - May be lost in the previous t wave
2. Atrial rhythm: irregular as a result of the PAC; underlying rhythm may be regular.
3. Atrial rate: varies according to the underlying rhythm.
4. PR interval: usually within normal limits (0.12 to 0.20 sec), but may be short or prolonged depending on where in atria the ectopic focus originates.
5. Ventricular rhythm: irregular as a result of the PAC; underlying rhythm may be regular.
6. Ventricular rate: varies according to the underlying rhythm.
7. QRS complex: usually within normal limits (0.06 to 0.10 sec)
8. QT interval: usually within normal limits (0.36 to 0.44 sec)

PACs: Significance

- PACs occur both in normal and diseased hearts.
- Significance of PACs depends on the cause and any hemodynamic changes.

Causes of PACs

- Stress, fatigue
- Alcohol, caffeine, nicotine
- Hyperthyroidism
- Acute MI: pain, apprehension
- Heart or lung disease
- Electrolyte imbalance
- Hypoxia
- Digitalis toxicity

PACs: Interventions

- Most patients do not require treatment.
- Eliminate the offending cause; treat the underlying cause.
- If frequent, may give medications:
  - Procainamide
  - Digitalis
  - Verapamil
  - Beta blocking agents
**Paroxysmal Atrial Tachycardia (PAT)**

- Also known as SVT.
- An ectopic rhythm that starts and stops suddenly.
- Very rapid firing of an atrial ectopic focus.
- Usually preceded by frequent PACs.

**PAT (continued)**

- Usually preceded by frequent PACs

**PAT: 8 Steps...**

1. P wave: usually upright, rounded
   - May not be visible ("lost" in previous t wave)
   - If visible, a p wave exists for every QRS complex
2. Atrial rhythm: regular
3. Atrial rate: 150 to 250 beats per minute
4. PR interval: variable; may not be measurable if difficult to distinguish from preceding t wave
5. Ventricular rhythm: regular
6. Ventricular rate: depends on AV conduction ratio
7. QRS complex: usually within normal limits
8. QT interval: usually within normal limits; difficult to measure; may be shortened due to fast rate

**PAT: Significance**

- PAT shortens diastole → reduced myocardial blood flow.
- Episodes may be brief, or may last for hours.

**Causes of PAT**

- Digitalis toxicity
- Coronary artery disease
- Hyperthyroidism
- Wolff-Parkinson-White syndrome
- Hypoxia
- Hypertension
- Stress
- Caffeine / stimulants

**PAT: Interventions**

- Treatment depends on patient S/Sx
- Vagal maneuvers
  - Carotid sinus massage
  - Valsalva’s maneuver
- Cardioversion
- Overdrive pacing
- Medications:
  - Digitalis (unless due to dig toxicity)
  - Beta blocking agents
  - Verapamil
  - Adenosine
  - Phenylephrine
Atrial Fibrillation (AF)
- Atrial rhythm characterized by disorganized atrial activity.
- No visible p waves.

Uncontrolled AF
- Rate > 100 beats per minute

AF: 8 Steps...
1. P wave: N/A. Appear as erratic, fibrillatory waves.
2. Atrial rhythm: grossly irregular
3. Atrial rate: indiscernible. If measurable, 400-600 beats per minute.
4. PR interval: N/A
5. Ventricular rhythm: grossly irregular
6. Ventricular rate: usually 100 to 150 beats per minute
7. QRS complex: usually within normal limits, normal configuration.
8. QT interval: not measurable.

AF: Significance
- Atria “quiver” rather than contract.
- Loss of “atrial kick.”
- Fibrillating atria tend to develop thrombi.

 Causes of AF
- Rheumatic heart disease
- Cardiac valve disorders
- Hypertension
- Cardiomyopathy
- CAD
- Thyrotoxicosis
- Chronic obstructive pulmonary disease
- CHF

AF: Interventions
- Control ventricular response
- Attempt conversion to NSR
- Vagal manoeuvres
- Medications:
  - Amiodarone
  - Flecanide
  - Digitalis
  - Verapamil
  - Beta blocking agents
  - Quinidine
  - Procainamide
Atrial Flutter

- Atrial rhythm characterized by a rapid atrial rate.
- Circus movement pathway ("reentry").
- Enhanced automaticity.

Atrial Flutter: 8 Steps...

1. P wave: saw-toothed "flutter" F waves
2. Atrial rhythm: regular
3. Atrial rate: 250 to 350 beats per minute
4. PR interval: not measurable
5. Ventricular rhythm: usually regular
6. Ventricular rate: depends on degree of AV block. Can be 2:1, 4:1, etc.
7. QRS complex: usually within normal limits
8. QT interval: not measurable (no identifiable t waves)

Atrial Flutter: Causes of Atrial Flutter

- Cardiac disease (acute or chronic)
- Valve disease
- Cor pulmonale
- Sick sinus syndrome
- Hyperthyroidism
- Hypoxia
- Pericarditis

Atrial Flutter: Significance

- Depends on the ventricular rate: if too slow or too fast, can \( \rightarrow \) decreased cardiac output.

Atrial Flutter: Interventions

- Synchronized cardioversion
- Atrial overdrive pacing
- Remove the cause (if possible)
- Medications
  - Verapamil
  - Digitalis
  - Beta blocking agents
  - Amiodarone