Introduction

- Cardiac Electrophysiology studies are becoming more common in the U.S. An understanding of the basic principles of these studies is crucial for success as a Cardiac Electrophysiology Technician.

Overview

- Indications
- Anatomy
- Catheter Placement
- Normal Intervals
- Programmed electrical Stimulation
Diagnostic Indications for EP Study

- Diagnose Sinus Node dysfunction
- Define etiology of syncope
- Distinguish VT from SVT in wide complex tachycardias
- Diagnose and define the level of AV block
- Define mechanism of VT/SVT and map origin

Therapeutic Indications for EP Study

- Guide drug therapy
- Select candidates for ICD implantation
- Select candidates for ablation/surgery

Interventional Indications for EP Study

- AVN ablation for A-fib
- Atrial tach or Atrial flutter ablation
- AVN modification for AVNRT
- Accessory pathway ablation for WPW
- VT ablations
- Pulmonary vein isolation for A-fib
Anatomy

- Electrical impulse originates in the Sinus Node
  - located in the high right atrium
- Impulse spreads across the atria at 1000mm/sec and is stopped at the AV ring
- Travels through the AV node to the ventricles

Anatomy

- Conduction is slowed to 200mm/sec in the AV node
  - coincides with the PR interval on ECG
  - allows for greater ventricular filling
- Impulse travels at 4000mm/sec as it enters the His-Purkinje System and is dispersed to the ventricles
AV Node Physiology

- Electrical properties of the AVN cause slowing of impulse
  - Allows for maximum ventricular filling
- AVN tissue has decremental conduction properties
  - Conduction is slowed as HR increases

- Occasionally individuals have two paths of conduction through the AVN
- Fast and slow pathways
  - Fast pathway has fast conduction and long refractoriness
  - Slow pathway has slow conduction and short refractoriness
Catheter Placement

- HRA catheter placed on high lateral wall near SVC junction
- His catheter is placed across posterior TV
- CS ostium is located posterior and inferior to the tricuspid valve
- RV catheter is placed in the RV apex
Normal Intervals

- Intervals are measured from onset to onset
- QRS 80-100 ms
- P-R 120-200 ms
- Q-T 250-400 ms
Normal Intervals

- A-H 50-130 ms (may vary throughout study)
- H-V 35-55 ms (remains constant throughout study)
  - measured from onset of His potential to earliest surface R-wave
Programmed Electrical Stimulation

- Sinus Node Recovery Time
- Rapid Atrial Pacing
- Rapid Ventricular Pacing
- Atrial Extra-stimulus
- Ventricular Extra Stimulus

Sinus Node Recovery Time

- Atrial pacing for at least 30 seconds
- Gradually reduce PCL until approximately 300ms

Sinus Node Recovery Time

- SNRT measured from last paced beat to first intrinsic beat
- > 1500 ms considered abnormal
- CSNRT= SNRT-BCL
- CSNRT > 525 ms considered abnormal
Rapid Atrial Pacing

- Assesses antegrade conduction
- Begin pacing at 600 ms
- Decrement by 10 ms every 2 beats
- Wenckebach Cycle Length when 1:1 conduction is lost
Rapid Ventricular Pacing

- Assesses retrograde conduction
- Begin pacing at 600 ms
- Decrement by 10 ms every 2 beats
- 1:1 conduction is lost
Atrial Extra-Stimulus

- Used to assess AV node effective refractory period
- Determines dual AV node physiology
- Drive train of 8 beats (S1) followed by PAC (S2)
- S2 is decremented by 10-20 ms

Note is made when A-H interval is increased by 50 ms after 10 ms decrease in S1-S2 interval
AVNERP is longest S1-S2 interval that does not conduct to the ventricles
Ventricular Extra-Stimulus

- Used to assess retrograde AV node effective refractory period
- Also used to induce VT
- Drive train of 8 beats (S1) followed by PAC (S2)
- S2 is decremented by 10-20 ms
Conclusion
- Watch V1 and HRA
- Understand anatomy
- Understand AV node physiology

Questions???