Invasive & Noninvasive Electrophysiologic Testing

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Disclosures

I have no relevant relationships with commercial interests to disclose.
Invasive & Noninvasive Electrophysiologic Testing

- Electrophysiology study
- Tilt table testing
- Ambulatory ECG monitoring
- Implantable loop recorders

Invasive Cardiac Electrophysiologic Study (EPS)

- Establish the etiology of an arrhythmia
- Investigate the cause of syncope
  - Sinus node dysfunction
  - AV block
  - Arrhythmias
- Risk stratification for sudden cardiac death
- Evaluate non pharmacologic therapies for arrhythmias (ablation, drugs, ICD’s)
## EPS Indications

- **Syncope**
  - Structural heart disease
  - LVEF <40%
  - Certain conduction abnormalities - AV block, LBBB, bifascicular block
  - Suspected sick sinus syndrome
  - Unexplained syncope

## EPS Indications

- Survivors of sudden cardiac death with no established cause
- Evaluate wide QRS complex tachycardias if noninvasive evaluation does not yield a diagnosis
- NSVT with LVEF >35% & hypertrophic CM
- SVT as a prelude to ablation
- WPW - risk stratification or as a prelude to ablation
Contraindications to EPS

- Bacteremia
- Acute decompensated CHF
- Unstable angina
- Acute lower extremity DVT
- Bleeding diathesis

EPS

- Vascular access from femoral, subclavian, & internal jugular sites
- Supplemental oxygen
- Defibrillation pads to chest
- Monitoring (BP, O2 sat, telemetry)
- Conscious sedation (sometimes anesthesia)
EPS

• Catheters are positioned in the RAA, anteroseptal TA (HBE), RV, & coronary sinus under fluoroscopic guidance
• Baseline intervals are measured
• Sinus node recovery times
• Decremental A & V pacing
• Programmed A & V stimulation
• Arrhythmia induction, mapping, ablation
Medications used during EP study:

- Isoproterenol
- Atropine
- Adenosine
- Procainamide
EPS Baseline Data

EPS
AV Node Wenchebach Block
EPS
Complete AV Block

EPS
SVT
EPS
Atrial Flutter

EPS
AFL Animation
EPS
3D Mapping

Tilt Table Testing
Tilt Table Testing
Indications

- Recurrent syncope / near syncope in pts with no structural heart disease
- Recurrent syncope / near syncope in pts with structural heart disease after arrhythmias have been excluded
- Single episode of syncope with injury
- Differentiate neurocardiogenic syncope & orthostatic hypotension
- Assess POTS

Tilt Table Testing
Contraindications

- Severe coronary artery disease
- Severe cerebrovascular disease
- Pregnancy
- Morbid obesity
## Tilt Table Testing Protocol

- Tilt 60-80 degrees
- Baseline tilt 15-20 minutes
- Provocative agent - NTG or Isoproterenol
- Continuous ECG & BP monitoring
- Carotid sinus massage in pts >40
- Occasionally coupled with EEG

## Tilt Table Testing

- Assess the syncopal mechanism - cardioinhibitory, vasodepressor, orthostatic
- Correlation of symptoms with findings
- Assess for POTS
- The longer the period of tilt together with the use of provocative agents increases sensitivity but reduces specificity
- Repeat tilt table testing to assess therapy is generally not recommended
Tilt Table Testing
Mixed Cardioinhibitory & Vasodepressor Response

Tilt Table: Vasodepressor Syncope

Figure 3: 70 degree tilt table in VDS

Tilt Table Testing
Marked Cardioinhibitory Response
Tilt Table Testing
POTS

Tilt Table: Postural Tachycardia

Figure 2: 70 degree tilt table in POTS

Ambulatory ECG Monitoring

• Indications for Holter monitor:
  • Unexplained syncope or near syncope
  • Palpitations
  • Assess rate control in AF
  • Risk assessment in cardiomyopathies, post MI, Long QT, ARVD
Ambulatory ECG Monitoring

- Data obtained in Holter monitor report:
  - Total heart beats
  - Max, min, average HR
  - # PAC’s / PVC’s
  - Arrhythmia episodes
  - Pauses
  - Symptoms (if documented in diary)
Ambulatory ECG Monitoring

- Indications for an event recorder:
  - Infrequent syncope or near syncope
  - Infrequent palpitations
Implantable Loop Recorders

• Indications:
  • Syncope, near syncope, or palpitations in which Holter monitoring & Event recorder has been non diagnostic
  • Syncope with injury
  • Cryptogenic CVA

Reveal LINQ™ Insertable Cardiac Monitoring System

• Long-term Monitoring up to 3 Years¹
• Continuous, long-term monitoring
Medtronic LINQ

[Image of a medical report showing heart rate and other metrics over time]

Medtronic LINQ

[Image of an ECG report with heart rate tracings]
Invasive & Noninvasive Electrophysiologic Testing Summary

- EP Study
  - Indications
  - Procedure
  - Interpretation & application of information obtained

Invasive & Noninvasive Electrophysiologic Testing Summary

- Tilt Table Testing
  - Indications
  - Procedure
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Invasive & Noninvasive Electrophysiologic Testing

Summary

• Ambulatory ECG Monitoring
  • Role of 24 hr Holter monitoring
  • Role of event recorders
  • Role of implantable loop recorders

Thank You