

Rhythms of Life: The Patient Undergoing an Electrophysiology Procedure

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Session Description:

This session will present the best practice in nursing considerations regarding the patient pre and post electrophysiology procedure. Planning, rationale and implementation of care will be described. Risks, complications and interventions will be listed. Updated technology such as left atrial appendage closure devices, pulmonary artery heart failure sensor devices, leadless pacemakers and updated MRI safety guidelines for patient with cardiac implantable electronic devices (CIEDs) will be briefly discussed. Patient follow-up and patient/family education will also be reviewed.

Learning Objectives:

By the end of this session, the participant will be able to:

1. Describe and provide rationale for the pre and post care of the patient undergoing an electrophysiology procedure:
 - a. Radiofrequency ablation and left atrial appendage closure device
 - b. Implantation of a pacemaker, ICD and other cardiac electronic implantable devices (CIEDs).
2. Identify and list potential complications and interventions when caring for the patient post EP procedure.
3. Describe why a patient with a pacemaker may now safely undergo magnetic resonance imaging (MRI).

Outline:

I. Electrophysiology: Overview

A. Definition: Cardiac Electrophysiology

Cardiac electrophysiology is a cardiac catheterization of the electrical system of the heart, for the purpose of diagnosis, treatment and management of arrhythmias.

B. Arrhythmia management:

1. Syncope/Bradycardia – Pacing
2. Tachycardia – ATP – Antitachycardia pacing/Defibrillation
3. SVT/Atrial Fibrillation – CVN/RFA/ LAA CD
(Cardioversion/Radiofrequency ablation/Left atrial appendage closure device)

4. Heart Failure device/Sudden cardiac arrest – pulmonary artery heart failure device/CRT - Cardiac resynchronization therapy or Biventricular PPM/ICD

C. EP measurements

1. Sweep speed
 - a. 12 lead Electrocardiogram sweep speed = 25 mm/sec
 - b. EP sweep speed = 100 mm/sec
2. EP conversion for conduction study = msec = milliseconds
 - a. 60,000/bpm = milliseconds
 - b. 60,000/msec = beats per minute

II. EP study/RFA – Radiofrequency ablation

A. Pre orders:

1. NPO
2. Consent: EPS & Anesthesia
3. Check Allergies
4. Patent IV via Left * arm (20G or larger)
5. No jewelry
6. Foley
7. No Dentures
8. Give (as ordered):
 - a. Anti – HTN's
 - b. Antibiotics (if patient has an existing PPM or ICD)
 - c. IV Dye Prep:
 - 1) Solumedrol 100 mg
 - 2) Pepcid 20 mg
 - 3) Benadryl 25-50 mg
9. Pre: Lab Values
 - a. Sma7
 - b. PT/INR
 - c. PTT
 - d. Hematology
 - e. Urine:
 - 1) Pregnancy test
 - 2) Drug screen
10. Anticoagulation
 - a. Coumadin: continue with therapeutic INR (most procedures)
 - b. ASA and Plavix: continue
 - c. Eliquis and Xeralto: hold night before and day of

- d. Pradaxa: based on creatinine clearance, procedure dependent and EP attending preference
 - e. Heparin: stop at 4:00 am morning of procedure or 2 hrs prior to procedure
 - f. Question: Antiarrhythmics and Antidiabetic oral agents and/or Insulin
11. TEE: transesophageal echocardiogram – AFib/AFlutter/ATach
To rule out left atrial thrombus, if positive for thrombus there is potential risk for a cerebral, coronary or peripheral vascular embolic event.

B. Ablation Methods and Techniques

- 1. Methods:
 - a) Radiofrequency
 - b) Cryoablation
- 2. Techniques
 - a) PVI – Pulmonary vein isolation
 - b) Pappone/WACA (Wide area circle ablation)
 - c) CFAE – Complex Fractioned Atrial Electrograms
- 3. Remote Control Ablation
 - a. Remote Magnetic Navigation:
 - b. Advantage: Better map, less risk of cardiac perforation, minimal fluoroscopy and deeper lesions

C. Atrial Fibrillation – 3 phases

- 1. Paroxysmal: episodes that terminate spontaneously within 7 days
- 2. Persistent: episodes of AF lasting > 7 days which can be still be converted to NSR
- 3. Permanent: inability of drug or non-drug methods to restore NSR

D. LAA CD - Left atrial appendage closure device

- 1. Atrial Fibrillation
 - a. Pooling in the LAA
 - b. Stagnant blood is ideal environment for thrombus formation
 - c. Thrombus dislodges and travels through arterial system
 - d. Thrombus lodges in the brain, restricting arterial blood flow therefore causing stroke
- 2. Closure device occludes left atrial appendage to prevent LA thromboembolism thereby preventing stroke or PE.

E. Risks & Complications:

- 1. Infection – fever, chills, septic shock/death

2. Groin punctures:
 - a. Hematoma
 - b. Bleeding – retroperitoneal
 - c. Arteriovenous Fistula
 - d. Pseudoaneurysm
 - e. Vasovagal episode
 - f. Circulatory compromise
3. Catheter manipulation within the heart
 - a. Cardiac Tamponade
 - b. Cardiac perforation
 - c. Venous Dissection
 - d. Hypotension
 - e. Stroke
4. Pressure ulcers – extended table time
5. Radiation burns - extended fluoroscopy/cine
6. UTI – foley
7. Laryngeal injury – intubation/general anesthesia
8. AFib Ablation:
 - a. Intubation
 - b. Trans-atrial septal puncture
 - c. Phrenic Nerve injury – dyspnea, hiccups, atelectasis, pleural effusion, thoracic pain, diaphragmatic paralysis
 - d. Thrombolytic events
 - e. Risk of Pulmonary vein stenosis – cough, SOB & pneumonia
 - f. *Risk of Atrio-esophageal fistula
 - g. Risk of Air embolus
 - h. Adequate lesion application
9. LAA CD: Same as Afib ablation

10. Patient education and follow-up:
 1. Ablation follow-up:
 - a. Contact the physician if S/S of arrhythmia return
 - b. Instruct patient to continue Coumadin, ASA anticoagulation as ordered
 - c. Post ablation FU with physician in 6 weeks
 - d. Atrial Flutter: Coumadin dced at 6 weeks
 - e. Atrial Fibrillation: Coumadin continued at least 3months, may dc at 6 months if no recurrence of Afib
 - f. Recommended follow-up: Post Afib RFA:
 - 1) 3 month/ 6 month x 2 years
 - 2) Arrhythmia evaluation:

- a) ECG
- b) Holter monitor/TTM
- c) Coumadin
- d) Quality of Life

11. Post orders:

1. VS: q 15 min x 2 hrs then, q 1 hr x 4hrs if stable, resume after 6 hrs per unit protocol
2. Check bilateral groin and pulse checks q 15 min x 2 hrs then q 1hr x 4 hrs, if stable resume after 6 hrs per unit protocol
3. Check groin sites for bleeding, swelling q 15 min x 2hrs then q 1 hr x 4 hrs, if stable then resume after 6 hrs per unit protocol
4. Activity: Bedrest with legs straight x 6 hrs after sheath removal, followed by bed rest until 6 am next morning.
5. Diet: resume previous
6. Call physician for fever is above 38.0 C, change in mental status, new onset neurological symptoms, chest pain, hypotension or bleeding.
7. ECG upon arrival to room
8. ECG tomorrow morning
9. Groin sheaths are removed when ACT < 180 secs.
10. Transthoracic echocardiogram to assess for pericardial effusion tomorrow
 - ✓ Medication:
 - a. Acetaminophen 325 mg x 1-2 tabs po q 4 hrs prn pain (max 12 tabs in 24 hrs) OR
 - b. Acetaminophen with Codeine x 1-2 tabs po q 4 hrs prn pain (max 12 tabs in 24 hrs) OR
 - c. Percocet 5/325 mg x 1-2 tabs po q 4 hrs prn pain (max 12 tabs in 24 hrs)
 - d. Pantoprazole (Protonix) 40 mg po daily; first dose upon arrival to floor

III. Cardioversion:

- A. External delivery of 50-200 joules to convert to NSR
 1. Atrial tachycardia
 2. Atrial fibrillation
 3. Atrial flutter

IV. Loop Recorder – Syncope/Bradycardia

V. Pulmonary Artery Heart Failure Device

- A. Pressure sensor

- B. Measure PA pressures
- C. Determines fluid overload before patient demonstrates HF symptoms
- D. Avoids heart failure re-hospitalization
- E. CHAMPION Trial
 1. mortality reduced by 57%, HF hospitalizations reduces by 43%

VI. Pacemaker/ICD/CRT

- A. Chambers: Single/Dual/Multiple
 1. Single chamber
 - a. AAI or VVI
 2. Dual chamber
 - a. atrium + ventricle
 - b. only both ventricles
 3. Multi chamber – CRT - BiV
 - a. CRT-P
 - b. CRT-D
 4. Leadless PPM

- B. Goal of CRT or Cardiac Resynchronization Therapy
 1. Pace both ventricles simultaneously.
 2. Remodel the heart and return cardiac synchrony.
 3. Improve the ventricular pumping efficiency in moderate to severe heart failure patients.
 4. Prevent sudden cardiac death in those patients with heart failure.
 - a. Appropriate care for CRT:
 - 1) Cardiomyopathy – ischemic or nonischemic with LVEF < 30%

- C. **Pre:orders:** same as pre ablation +/-
 1. Antibiotic (Weight based: Ancef 1-3 Gms or 1 Gm Vancomycin)
 2. Hebiclens scrub at implant site the night before and morning of procedure
 3. Bactroban
 4. Mucomyst
 5. Regulated blood glucose control for diabetics

- D. Risks & Complications
 1. Device implantation
 2. Lead dislodgement
 3. Lead perforation
 4. Lead fracture

5. Infection
6. System extraction
7. Subclavian crush
8. Loose Set-screw
9. Diaphragmatic stimulation
10. Thrombophlebitis
11. Pneumothorax
12. Pericarditis
13. Skin erosion

E. Code/Emergency care: Post ICD implantation

1. Magnet Maneuver:
 - a) ICD – magnet blinds therapy but does not interfere with pacing
 - b) PPM – magnet makes PPM pace in an asynchronous mode
2. Do not place defibrillator pads directly over the ICD
3. Start ACLS protocol
4. The person performing CPR will not be harmed if the ICD delivers a “shock”
5. Record strips
6. Know ICD settings:
Example: DDDR 60/120 VT rate: 200 bpm VF rate: 220 bpm
7. ID card – device manufacturer
8. TREAT THE PATIENT NOT THE DEVICE!!!

F. Post: Orders:

1. VS: q 15 min x 2 hrs then, q 1 hr x 4hrs if stable, resume after 6 hrs per unit protocol
2. Activity: Bedrest until 6 am next morning; if stable may then resume normal activities
3. Diet: resume previous
4. Maintain arm in sling/immobilizer x 24 hrs post procedure
5. Call physician: for fever 38.0 C, change in mental status, new onset neurological symptoms, chest pain, hypotension or bleeding, swelling or drainage from surgical wound
6. ECG upon arrival to room
7. ECG tomorrow morning
8. Portable CXR – upon arrival to room check for pneumothorax (Do not elevate arm above shoulder)
9. Portable CXR – tomorrow morning check for pneumothorax and confirmation of lead position (Do not elevate arm above shoulder) OR

10. P/A & Lateral CXR tomorrow to assess for pneumothorax and confirmation of lead position (Do not elevate arm above shoulder)
11. If renal concern due to contrast dye: Check urine output, I & O, maintain foley and labs
 - ✓ Medication:
 - a. Antibiotic: Ancef or Vancomycin x 2 additional doses
 - b. Mucomyst 600 mg by mouth q 12 hrs x 2 dose
 - c. Acetaminophen 325 mg x 1-2 tabs po q 4 hrs prn pain (max 12 tabs in 24 hrs) OR
 - d. Acetaminophen with Codeine x 1-2 tabs po q 4 hrs prn pain (max 12 tabs in 24 hrs) OR
 - e. Percocet 5/325 mg x 1-2 tabs po q 4 hrs prn pain (max 12 tabs in 24 hrs)
 - f. NO HEPARIN, anticoagulation meds unless approved by attending electrophysiologist.

G. Patient education and follow-up post device Implantation:

1. ICD card
2. Patient limitations
3. When to notify MD
4. Emergency care:
 - a. Family should learn CPR
 - b. Family plan in emergency setting
5. Patient instruction sheets
6. Patient education video
7. Nursing staff education
8. Incision checks: 1-2 weeks
9. 1st device follow-up – 3-4 months
10. Pacemakers: q 6 months to 1 yr
11. ICD's: q 3 - 4 months
12. CRT: Heart Failure specialist
- 13. Remote Home Monitoring**
 - a. Decreases in person doctor visits
 - b. CRT – Decreases hospitalizations
14. **EMI** – Electromagnet Interference
 - a. Microwaves are OK!
 - b. Hospital procedures
 - 1) Electrocautery
 - 2) External defibrillation
 - 3) Radiation therapy

- 4) Diathermy
- 5) Lithotripsy
- c. Industrial Magnets i.e. – airport security portals, shopping mall portals
- d. 6 inches away: from cell phones, laptops, iPods, ear pods

15. CIED MRI labeling – 2017 safety guidelines

- a. MR Safe
- b. MR Conditional
- c. MR Non-conditional
- d. MR Unsafe

H. Support Groups

- 1. Psychological Adjustment to living with an implantable defibrillator
 - a. Regional/Local
 - b. Children/Young people/Families
 - c. Support Groups: ICD/Heart Failure

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