Peri-procedural Management of Patients undergoing Catheter Ablation

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Course Objectives

• Review the arrhythmias appropriate for treatment by ablation, as well as associated success rates.
• Identify other medical conditions that may increase procedural risk and/or require additional management.
• List necessary peri-procedural diagnostic testing and results requiring intervention.
• Describe appropriate patient education necessary for patient comfort and obtaining informed consent.
Why catheter ablation?

- Patient desire to avoid pharmacologic treatment
- Patient unable to tolerate pharmacologic treatment
- Pharmacologic treatment ineffective
- Highly effective for most SVTs, providing cure

(Ferguson, 2003)
Arrhythmia ID

- Supraventricular arrhythmias
  - atrial-ventricular reentry tachycardia (AVRT)
  - atrial-ventricular nodal reentry tachycardia (AVNRT)
  - atrial tachycardia (AT)
  - atrial fibrillation (AF)
  - atrial flutter (AFL)
- Ventricular tachycardia (VT)
AVRT
AVRT

• Second most common SVT, accounts for approximately 30%
• Occurs most often in younger women and children
• May occur with WPW
• Reentry tachycardia either orthodromic or antidromic through AV node
• Success rate with ablation >95%

(Colluci, 2010)
WPW

| Vent. Rate | 72 bpm | Normal sinus rhythm |
| PR interval | 160 ms | Wolff-Parkinson-White |
| QRS duration | 118 ms | Abnormal ECG |
| QT/QTc | 428/468 ms | |
| P-R-T axes | 27/41/42 | |
| P duration | 96 ms | |
| RR interval | 836 ms | |

Technician CINA
Medication:
WPW

- Characteristic EKG finding, does not necessarily have associated symptoms or arrhythmia
- Can be present with AVRT or a-fib
- EKG finding present in 0.1-0.3% of the population
- 100% success with ablation, though controversy in ablating asymptomatic patients

(Wellens, 2005 and Pappone, 2005)
AVNRT
AVNRT

- Most common SVT, accounts for 50-60%
- Mostly in healthy young women
- Can occur in pericarditis, previous MI or MVP
- Reentry with two pathways, typical and atypical
- Success rate with ablation 96%

(Colucci, 2010 and Ferguson, 2003)
AT
AT

- Third most common atrial arrhythmia, accounts for approximately 10%
- Occurs most often in middle aged persons or HF or COPD
- Reentry tachycardia; AT and multifocal AT
- Success rate with ablation somewhat lower than other SVTs

(Colluci, 2010)
AF
AF

- Now effects an estimated 33.5 million people worldwide
- Occurs most commonly in those aged 65 or older
- More commonly in those with HTN, COPD, valvular heart disease, previous cardiac surgery, thyroid dysfunction, DM, CHF, sleep apnea
- 22-44% of patients return within one year after primary ablation with recurrent arrhythmia

(Chugh, 2013 and Shah, 2012 and hrs.org)
AFL
AFL

- 200,000 new cases per year
- More common in men, elderly and those with HF, COPD

(Granada, 2000)
VT

Atrial Fibrillation (69-87 bpm)
07/23/13  07/23/17

Atrial Fibrillation (87-114 bpm), Ventricular Tachycardia (84-207 bpm)
07/24/13  07/24/13
VT

- Can be idiopathic (younger patients)
- Common in patients with cardiomyopathy (ICM, NICM, AVRD) and CHF
- Occur from RVOT, RCC, NCC, deep myocardium or epicardial

(Yamada, 2013 and Killu, 2013)
What is ablation?

- Electrophysiology: study of the heart’s electrical conduction system (EPS)
- Ablation: removal of aberrant cardiac tissue
- Began as surgical ablation in 1968
- First intracardiac radiofrequency ablation in 1991
- Several different energy sources now available: radiofrequency, cryothermy and laser

Ching, 2011
Ablation vs. AAD

http://circ.ahajournals.org/content/126/2/223/F2.large.jpg
Mechanics of endocardial ablation

• Vascular access similar to angiogram
• Several multipolar catheter electrodes placed at various intracardiac sites through sheath in the groin, sometimes enter through subclavian or jugular
• Sizes range from 5-8 french, capable of pacing and recording or mapping and ablating
• Catheters placed in right atrium, across tricuspid valve annulus to AV node and HIS bundle, RV, coronary sinus and sometimes LV

(Krishnan, 2011 and Murgatroyd, 2011)
3 Catheter wires introduced into the heart
Mechanics of endocardial Ablation

• EP uses catheters and mapping system to create 3D image of patient’s anatomy based on activation sequence which identifies arrhythmogenic focus (aberrant tissue)
• Focus is stimulated to recreate arrhythmia
• Then applies energy source- radiofrequency or cryo to ‘burn’ the arrhythmogenic focus

(Kern, 2011)
Comorbidities

Consider when arrhythmias occur:
- MI
- pericarditis
- MVP
- COPD
- HF
- post-CTS

Chronic conditions:
- HTN
- DM
- PVD
- RF
Pre-procedure testing

• EKG, event monitor if available
• LABS: BUN, Cr, electrolytes, PT/INR, pregnancy test
• Stress test
• Echocardiogram
• MRI/CT
Pre-procedure teaching

- Informed consent including procedural risks-cardiac and non-cardiac
- Pre-op testing, medication instructions
- Expectations during the procedure
- Immediate post-procedure course
- ‘curative’ statistics for that ablation
Informed consent

• Non-delegable duty of cardiologist
• Must include:
  - why ablation is recommended
  - benefits of having the ablation
  - risks associated with ablation
  - risks of not having ablation
  - alternatives

(Babb, 2011)
Pre-procedure testing, medication

- Indication for labs, echo, ECG, MRI/CT
- Need to hold antiarrhythmic meds
- When/if to hold anticoagulant medications
- When to resume medications
- Follow-up lab tests as indicated
Expectations during ablation

- General anesthesia
- Prolonged supine position for some
Immediate post-procedure

- ECG, labs
- Frequent monitoring of vital signs, puncture sites
- Bed rest
- Most can go home same day
Intra-procedure monitoring

- TEE/ICE
- ACT
- EKG, vitals
- Sedation, anesthesia
Post-procedure testing

• EKG, vitals, puncture sites
• Labs: ACT, glucose if DM
• All other depends on clinical signs of complications
Post-procedure teaching

- Puncture site care
- Medication instruction
- What to do in case of arrhythmia recurrence
- Symptoms to be reported
‘curative’ statistics

- Ablation not always curative
- Speak in terms of success rate
- Clearly explain expected timeline for results, need for medication, resolution of symptoms
- Discuss remodeling phase and associated recurrence of arrhythmia
Follow-up

- 1 month, 3 months, every 6 months for two years—more frequently of complications
- ECG at each follow-up
- Event monitor before discontinuing anticoagulation and antiarrhythmic meds

Calkins, 2012
Follow-up testing

- ECG
- Ultrasound
- Labs
- After three months-event monitor
Potential complications

- Hemorrhage
- Venous thromboembolism
- Phlebitis
- Refractory ventricular fibrillation
- Hematoma
- Bradycardia, AV block
- Radiation burn
- Cardiac perforation
- Pneumothorax
- Cardiac Tamponade
- Stroke
- Esophageal fistula
- Mortality
- Pulmonary vein stenosis
- Aspiration

(Krishnan, 2011 and Altamann, 2011)
Vascular complications

- Hemorrhage -3.8%
- Hematoma-1.1%
- AV fistula-0.3%
- Thromboembolic-0.4%
- Psuedoaneurysm-0.9%

(Altmann, 2011 and Deshmukh, 2013)
Cardiac Complications

- Iatrogenic cardiac complications - 1.18%
- Pericardial complications - 1.52%
- Myocardial infarction - 0.37%

(Deshmukh, 2013)
Respiratory complications

- Pneumothorax-0.39%
- Respiratory failure-0.77%
- Aspiration-0.2%

(Deshmukh, 2013 and Altmann 2011)
Neurologic complications

- Stroke/TIA-1.2% in a-fib, 0.3% in other ablations
- Death-0.4%

(Altmann, 2011)
Other complications

- Atrial-esophageal fistula-0.2%
- Radiation burn-?
Risks for complications

• Atrial fibrillation ablation-some quote up to 10%
• Anticoagulation
• Age >75 years
• CAD
• HTN
• Lung disease
• DM
• Heart failure
• Renal disease

(Shah, 2012)
Reducing risk

- Clear indication for procedure
- Good pre-procedure assessment
- Appropriate management of comorbidities
- Use of intra-procedure monitoring tools-TEE, ICE
References

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