Differential diagnosis and pacing in maneuvers narrow QRS tachycardia
Differential diagnosis of narrow complex QRS tachycardia

- Anything that activates the ventricle normally via the His purkinje system
  -- Atach/AFL
  -- AVNRT
  -- AVRT
  -- AF
Therefore we are not dealing with

- Anti-dromic AVRT
- SVT with aberrancy
- VT (incl fascicular VT)
Atrial Fib/flutter

- A>V (regular or irregular)
Atrial tachycardia

• The ventricle is not a critical part of the circuit therefore either:
  – $A > V$ on ECG or EP study
• Or
  – $V$ can be dissociated from $A$ with pacing
Atrial tachycardia

- V can be dissociated from A with pacing
Atrial tachycardia differential diagnosis

- AVRT – V pacing advances tachycardia, retrograde conduction during SR is not decremental and abnormal
Atrial tachycardia differential diagnosis

- AVRT – V pacing advances tachycardia example
Atrial tachycardia differential diagnosis
Atrial tachycardia differential diagnosis
Atrial tachycardia differential diagnosis

• Typical AVNRT – earliest a is at the His position, starts with jump in AV nodal conduction.
• Atypical AVNRT – earliest a is near slow pathway (a common site for atach as well)
A Technique for the Rapid Diagnosis of Atrial Tachycardia in the Electrophysiology Laboratory

Bradley P. Knight, MD, Adam Zivin, MD, Joseph Souza, MD, Matthew Flemming, MD, Frank Pecosi, MD, Rajiva Goyal, MD, K. Ching Man, DO, S. Adam Strickberger, MD, FACC, Fred Morady, MD, FACC

Ann Arbor, Michigan

Atrial tachycardia
AAV response

AVNRT/AVRT
AV response
Atrial tachycardia

Practical point:
• If A=V during tachy then find earliest A
• If earliest A is anywhere other than the fast pathway His position (incl. slow pathway) then ablate
• If earliest A is at fast pathway consider typical AVNRT (starts with jump in AV nodal conduction)
AVNRT/AVRT

- **AVNRT**
  - Narrow complex
  - Normal anterograde activation
  - Normal retrograde activation
  - Does not use the ventricle

- **AVRT (concealed accessory pathway)**
  - Narrow complex
  - Normal anterograde activation
  - Normal retrograde activation (if R sided)
  - Uses the ventricle

www.escardio.org/EHRA
WPW
Concealed accessory pathway
Concealed accessory pathway – mechanism of AVRT
Concealed accessory pathway left sided
Concealed accessory pathway – right sided
Responses to entrainment

AVNRT – VAV response
Responses to entrainment

AVRT septal accessory pathway – VAV response
Concealed accessory pathway – right sided
Responses to entrainment

AT – VAAV response because with only one retrograde pathway entrainment makes AV node refractory
Responses to entrainment

Atypical AVNRT – pseudo VAAV response because retrograde conduction during entrainment is slow.
Concealed accessory pathway – right sided
Concealed accessory pathway – right sided
Treatment

- AVNRT
  - Ablate slow pathway
  - Look for SP potentials
  - Ablate during sinus rhythm

- AVRT
  - Ablate during tachycardia or ventricular pacing
  - Look for earliest A (shortest VA)
  - Look for tachycardia termination (may move cath) or lengthening /abolition of VA conduction

www.escardio.org/EHRA
ECG - August 2009
Holter monitor
Tachycardia
Tachycardia
Ventricular entrainment
Ventricular entrainment
Single VPB
His synchronous VPB
Single VPB
Pre-excitation index

Pre-excitation index
V1-V1 = 382ms
V1-V2 = 378ms
PI = 4

PI < 45ms only seen with septal APs

Miles et al Circ 2006
RV-HRA timing
Post-pacing intervals
Post-pacing intervals

- Pacing from RVA - PPI = pacing spike to 1st RV EGM
- Differentiate AVRT vs atypical AVNRT
- Calculate PPI - TCL
  - If <115ms = AVRT (Michaud JACC 2001)
- Calculate difference Stim RV-HRA vs tachy RV-HRA
  - If <85ms = septal AVRT (Michaud JACC 2001)
- Adjust for AH prolongation during increased rate
  - cPPI - TCL = PPI - TCL - (A-HPP - A-HT)
  - If cPPI-TCL < 110ms = AVRT

www.escardio.org/EHRA
AVRT vs atypical AVNRT

VA = 440 ms
TCL = 470 ms
S-A = 480 ms
PPI = 550 ms
A
200 ms
B

Michaud JACC 2001
AVRT vs atypical AVNRT

V1
I
II
III
HRA
HBd
RVS

VA = 500 ms
S-A = 620 ms
TCL = 540 ms
PPI = 690 ms

A  B
200 ms
AVRT vs atypical AVNRT

- S-A - VA intervals (msec): 85 msec
- PPI - TCL (msec): 115 msec
Single VPB
Pathway mapping
Pathway mapping
Cryomapping
Testing post Cryoablation
Case study
Adenosine
Adenosine
Unusual pathways

• Mahaim/Nodofascicular
• Posteroseptal
• Parahisian
Mahaim Pathways

- Probably should be nodofascicular
- Term also used for accessory pathway with decremental properties
- Often “sheathed” so only mappable distal to the AV ring
- Prone to bumping
Posteroseptal pathways

• Complex because of position
• Often epicardial
• Closest position may be in neck of coronary veins
• RF not ideal for these pathways
Parahisian pathways

- Damage to AV node is a high risk
- His catheter may obstruct ablation catheter position
- Stability difficult
- Cryoablation may be helpful
Question 1

Catheters are in the standard positions what is the most likely diagnosis?

a) Typical AVNRT
b) AVRT with left sided pathway
c) AVRT with posteroseptal pathway
d) Pre-excited AVRT
e) AVRT with right sided accessory pathway
Catheters are in the standard positions the following is shown:

a) Orthodromic AVRT
b) Typical AVNRT
c) Atypical AVNRT
d) Antedromic AVRT with septal pathway
e) Antedromic AVRT with lateral pathway
Question 3

• The following is standard for ablation of AVRT:
  a) Power 30W, Temp 60°, Time 60s
  b) Cooled RF – Power 30W, Temp 45°, Time 60s
  c) Power 60W, Temp 60°, Time 60s
  d) Cryo for 2 minutes
  e) Cryo for 4 minutes
Question 4

- The following are useful techniques for distinguishing AVNRT from AVRT:
  a) His synchronous Ventricular premature beats advance A
  b) A PPI-TCL of <115msecs
  c) A preexcitation index of >85msec
  d) All of the above
  e) None of the above
Question 5

- Pathways with mahaim characteristics always:
  a) Connect nodofascicular
  b) Connected to the V at the AV annulus
  c) Decrement
  d) Block conduction with pressure
  e) Result in orthodromic tachycardia