Mapping and ablation of Junctional Tachycardias

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NO CONFLICT OF INTEREST TO DECLARE

Disclosures
SVT: What is the diagnosis?

1. AVNRT
2. AVRT
3. AT
4. JT
5. Call Dr. Schienman

- Para-hisian AT
- Focal Junctional Tachycardia
- Concealed Nodofascicular (Nodoventricular) tachycardia

Para-hisian AT

Para-hisian AT: ECG findings

- Narrower P waves during AT than in sinus rhythm
- Negative P waves in II, III, avF (Occasionally can be positive)
- Positive P waves in avL and I
- Biphasic in V_1 (initial isoelectric/negative followed by positive)

Transition from short RP to long RP SVT with low dose adenosine

AT termination with Adenosine

AT termination with Verapamil
Para-hisian AT: Non coronary cusp

Parahisian AT: Activation Map

Para-hisian AT

- Parahisian AT has characteristic P wave morphology (narrower than NSR)
- Electrophysiological characteristics are similar to other annular ATs and most consistent with cyclic AMP-mediated triggered activity
- Catheter ablation guided by 3D mapping is safe and effective in majority of the patients
Narrow complex tachycardia with VA block

- Para-hisian AT
- Focal Junctional Tachycardia
- Concealed Nodofascicular (Nodoventricular) tachycardia
Focal Junctional Tachycardia

Clinical Presentation

- 18 pts (7 males); ages 22-78
- Predominantly 1:1 AV relationship with earliest retrograde A preceded or buried in the QRS
- Occasional narrow complex SVT with AV dissociation
- Paroxysmal in nature
- Symptoms despite maximally tolerated AV nodal blockers; referred for ablation

Zhong et al. HRS 2011 (abstract)

Focal Junctional Tachycardia:

Mechanism

- Mean tachycardia CL 450+/−64 ms
- Initiation with ventricular overdrive pacing in 72% pts (triggered); isoproterenol required in 17% of pts
- Spontaneous sustained tachycardia in 5 pts
- Termination with adenosine and carotid massage (triggered)
- 3D mapping system showed focal activation pattern from the right atrial septal region

Zhong et al. HRS 2011 (abstract)

JT - Initiation with atrial overdrive pacing

JT - Initiation with ventricular overdrive pacing
Role of Late APC during SVT to differentiate AVNRT from JT / Parahis AT

- Pulls in the next His--- non diagnostic
- Push out the next His or terminate SVT-diagnostic
- Dissociate the His from atrium--- rule out Parahisian AT

Late PAC pulls in the next His- non diagnostic

Late PAC (His A is committed) terminates SVT

Late PAC terminates SVT without affecting the V

Viswanathan MN et al. HRS abstract. 2007.

Late PAC pushes out the next His

Wenckebach during SVT

Late PAC dissociates the next His

Catheter Ablation

- Map the earliest A during JT with 1:1 VA relationship
- Stepwise approach in patients with no VA relationship
- Atrial overdrive pacing to ensure intact AV conduction during ablation
- 3D mapping system used to mark earliest A as well as His
Focal Junctional Tachycardia: Results of Ablation

- 17/18 underwent radiofrequency catheter ablation (1 refused)
- Ablation sites
  - Posteroseptal (10)
  - Midseptal (2)
  - Anteroseptal (5)
- 2 patients had transient AV block; conduction returned at the end of the case, no long term AV block
- Long term success with no recurrence of JT over 80 month follow up off drugs

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Nodofascicular (Nodoventricular) fibers
- Double fire
- Manifest nodofascicular / nodoventricular
- Concealed nodofascicular / nodoventricular tachycardia

Baseline split His
A on V tachycardia

VOD terminates SVT

PVC on His advances the next V

Prolongation of tachycardia CL with LBBB
**Discrete potential on the ablator at the successful site within the Cs**

**Ablator signal within CS in sinus rhythm**

**Concealed nodofascicular(nodoventricular) tachycardia**

- Evidence of AV dissociation during SVT (rules out extranodal AP)

- PVC on His during SVT advanced / delayed the next His and V or terminated SVT

- Bundle branch block leads to prolongation of VA interval or tachycardia cycle length

**Concealed nodofascicular(nodoventricular) tachycardia**

- Critical infranodal delay often needed for SVT

- Fusion during ventricular pacing favors diagnosis of nodoventricular SVT

- Proximal end of tract (perinodal or within CS) targeted for RFA
Proposed circuit for concealed right sided nodofascicular tachycardia

Wide complex Tachycardia

1. SVT  2. Pacemaker mediated tachycardia  3. Artifact
4. WPW with preexcited tachycardia  5. Call Dr. Schienman

Proposed circuit for left sided concealed nodofascicular tachycardia

Narrow complex tachycardia

1. AVNRT  2. AVRT
3. AT  4. Concealed nodofascicular
5. Call Dr. Schienman
Thank you