Atrioventricular Nodal Reentry
How to measure and where to ablate?

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No conflict of interest
Atrioventricular nodal reentrant tachycardia

- >50% of regular SVT
- More common in females (2:1)
- <5% of SVTs in infants
- RF ablation >90-97% cure or significant improvement
- Risk of total AV block <0.3%

How to measure and where to ablate?
ECG: AVNRT versus SR

[Images of ECG tracings with annotations showing differences between AVNRT and SR]
[...] quick reciprocating movement of the ventricle and the atrium [...] (Mines et al) divisions of the AV connexion might determine that an extrasystole of a ventricle [...], should spread up to the auricle (atrium) by that part of the AV connexion having the quicker recovery process [...] the other portion of the AV connexion would be ready to take up the transmission back to the ventricle [...] (Mines et al, J Physiol 1913)
Dual Atrioventricular Nodal Physiology

„Fast pathway“
Faster conduction
Longer refractory period

„Slow pathway“
Slower conduction
Shorter refractory period

Denes et al, Circulation 1973
Mechanism of AVNRT: Anatomically distinct pathways

Slow-fast AVNRT

Fast-slow AVNRT

Modified from Ganz & Friedman, NEJM 1995
Triangle of Koch

Atrio-nodal connections

Superior input = fast pathway

Inferior input = slow pathway
Fluoroscopic views

RAO

LAO

HRA

CS

His

RV

HRA

CS

RV

CS Os
Diagnostic criteria: Dual AV Nodal Physiology

Baseline

![Diagram showing diagnostic criteria for Dual AV Nodal Physiology]
Diagnostic criteria: Dual AV Nodal Physiology

Drive CL A1-A1 500ms
A1-A2 400ms
A decrease of ≤10msec in A1-A2 is followed by >50msec increase in A2-H2 interval “jump”

**Diagnostic criteria: Dual AV Nodal Physiology**

**Drive CL A1-A1 500ms**  
A1-A2 390ms
Diagnostic criteria: Dual AV Nodal Physiology

A1-A2 Echobeat

Slow pathway antegrade – fast pathway retrograde: AH interval longer than HA interval
Diagnostic criteria: Initiation depends on critical AH interval

- A1-A1 700ms; A1-A2 510ms
- A1-A2 500ms
- A2-H2 190ms
- A2-H2 377ms
- Jump 187ms
Diagnostic criteria: Initiation depends on critical AH interval

DD orthodromic AV reentrant tachycardia: VA conduction time ≥ 50msec
Diagnostic criteria: Concentric activation
Diagnostic criteria: Entrainment and ventricular PPI

Transient entrainment pro AVNRT
Diagnostic criteria: VAV versus VAAV response

**VAV response AVNRT**

**VAAV response atrial tachycardia**
Diagnostic criteria: Dissociate atrium and ventricle from tachycardia
Atypical AVNRT

Fast-slow

- Short AH during SVT (<180ms)
- HA longer than AH
- Initiation dependent on critical HA interval during retrograde slow pathway conduction
- Early retrograde activation near CS ostium or within proximal CS (excentric activation)

➢ May mimic accessory pathway

Modified from Otomo HR 2007
DD septal bypass: Parahisian pacing
Slow pathway ablation

Anatomical approach (Jazayery et al)

AV electrogram ratio 0.1-0.5
Slow pathway ablation

**Electroanatomical approach**

**SR**

**Fast-slow AVNRT**

Atrial end of the slow pathway

Jackmann et al NEJM 1992
Interval between the His atrial electrogram and the ablation atrial electrogram should be >20msec
Slow pathway ablation

Junctional rhythm with 1:1 conduction during RF
Slow pathway ablation

Junctional rhythm
End Points of ablation

- Tachycardia rendered non-inducible (including pharmacological maneuvers)
- Jump with *single* echos only (previous inducible)
- Elimination of slow pathway
A1-A1 700ms; A1-A2 510ms
A1-A2 500ms: Fast pathway refractory

A2-H2 190ms
A2-H2 377ms
Slow pathway elimination

A1-A1 700ms; A1-A2 360ms

A1-A1 700ms; A1-A2 350ms

A2H2 180

block

Fast pathway refractory
No jump
No slow pathway conduction
End Points of ablation

- Tachycardia rendered non-inducible
- Jump with *single* echos only (previous inducible)
- Elimination of slow pathway
- PR interval prolongation (persistent)
- Heart block lingering after ablation
Slow pathway ablation

Electroanatomical approach

SR

A1-A2 530ms

A1-A2 500ms

Haissaguerre Circ 1992
Diagnostic criteria: VA in SVT versus VA pacing

VA during SVT: 30ms
VA during VA pacing: 140ms
Difference: 110ms

$\Delta$ VA pacing (with SVT-CL) – VA in SVT >85ms
DD septal bypass: VA interval during pacing at apex and base

Septal bypass:
VA during basal pacing shorter than VA during apex pacing

AVNRT:
VA during apex pacing shorter than VA during basal pacing