# AVNRT in children:
## Epidemiology, Diagnosis and Medical Treatment

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# Supraventricular tachycardia in children

- SVT prevalence in children
  - 1/1000

| | Children [1] | Adults [2] |
|---|---|---|
| AVNRT | 13% | 51% |
| AVRT | 73% | 34% |
| Atrial | 14% | 15% |

1 Josephson and Wellens. Cardiol Clin 1990;8:411-442

# AVNRT – age dependent incidence

| | AVRT | Atrial | AVNRT |
|---|---|---|---|
| Fetal | 85% | 15% | - |
| < 1 years | 82% | 14% | 4% |
| 1-5 years | 65% | 12% | 23% |
| 6-10 years | 56% | 10% | 34% |
| > 10 years | 68% | 12% | 20% |

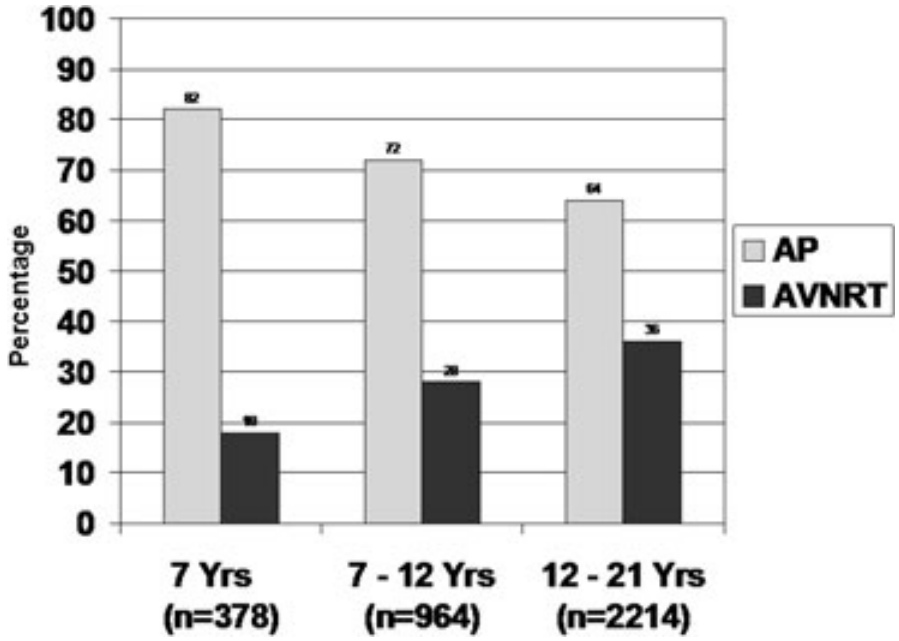
Ko et al. Am J Cardiol 1992;69:1028-1032

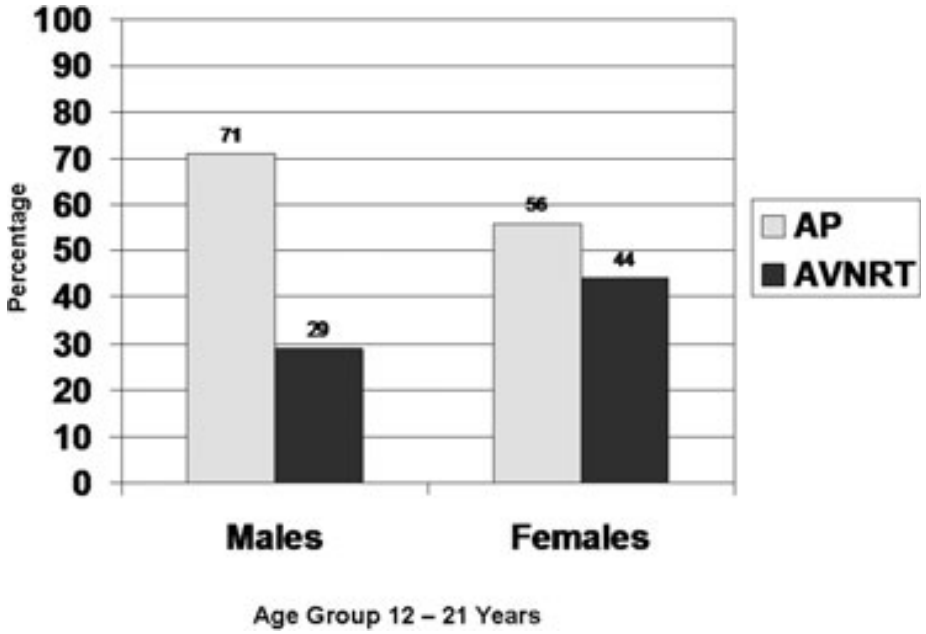
# AVNRT –in infants

- AVNRT in infants [1]
  - 52 infants with transesophageal EPS
  - 6 (11.5%) diagnosed with AVNRT
    - VA < 30 ms - 55 ms
    - 5/6 discontinuous AV conduction curve
- AVNRT in infants [2]
  - 42 patients with SVT in infancy
  - Transesophageal EPS at 13 months
  - 27/42 inducible
    - AVNRT 8/42 (19%), VA 40 - 60 ms
    - None with fetal presentation had AVNRT

1 Crosson JE et al. PACE 1995;18:2144-2149
2 Blaufox et al. Pediatr Cardiol 2011;32:1110-1114

# SVT mechanism – influence of age and gender




32% AVNRT

Anand RG et al. Congenit Heart Dis. 2009;4:464–468

# Dual AV-node conduction

- Differential slow and fast pathway conduction properties
  - SP ERP < FP ERP
  - AH conduction time SP > FP
- AH ”jump” > 50 ms during atrial stimulation
  - VA ”jump” during ventricular stimulation
- Sustained slow pathway conduction
  - PR >/= RR during atrial pacing

# Dual AV-node conduction

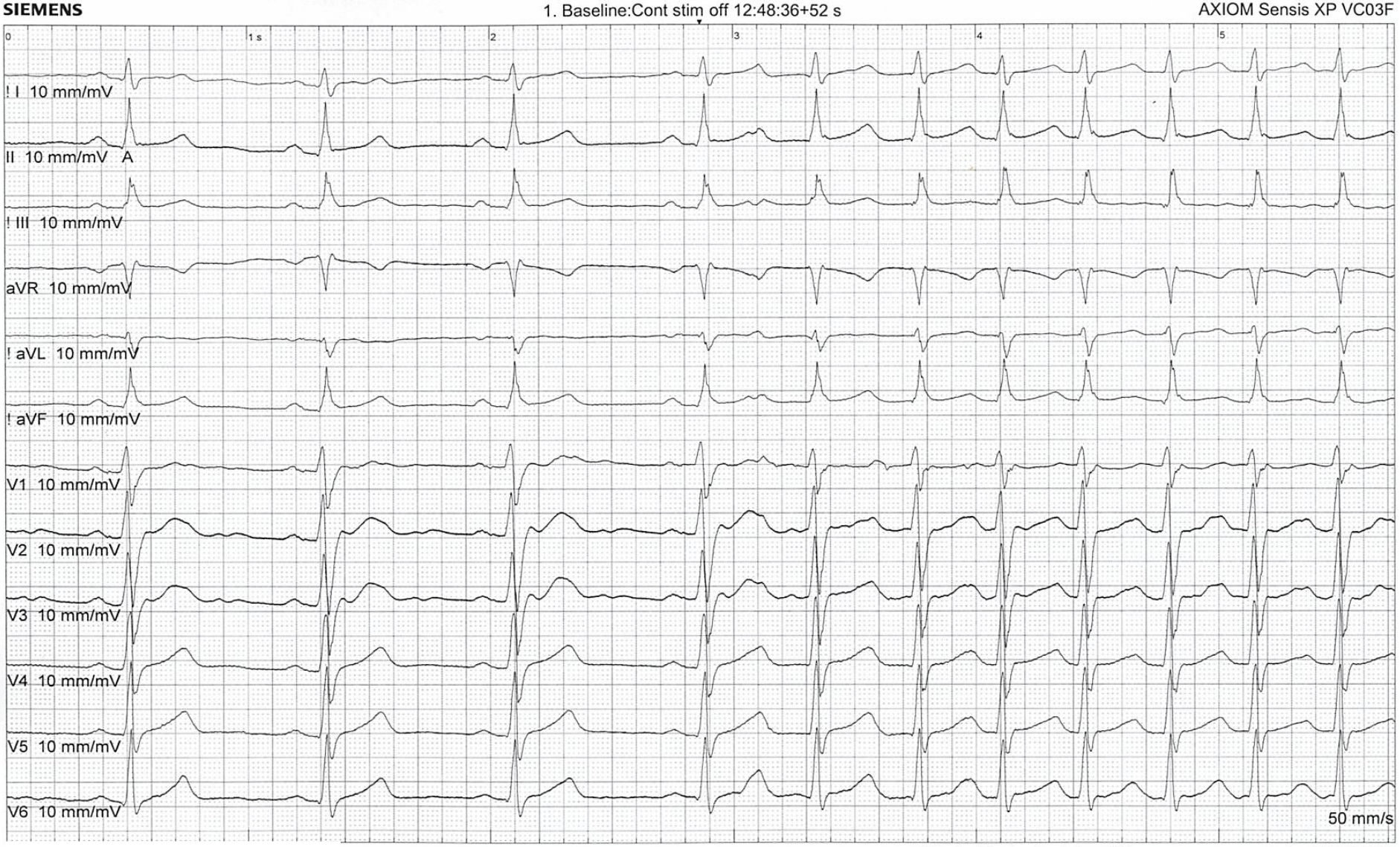
- Present in 40% of children with AVNRT [1]
  - 60 - 85% of adults with AVNRT
- Dual AV-node conduction is more prevalent in adolescents than children [2]
  - 15% vs. 44%
- Incidental dual AV-node conduction does not predict AVNRT after AP ablation [3]
  - 66 patients with incidental DAVN
  - 2 (3%) developed AVNRT

1 Blurton DJ et al.JCE 2006;17(6):638-44
2 Cohen M et al. JACC 1997;29:403-407
3 McCanta AC et al. PACE 2010;33(12):1528-32

# Clinical presentation

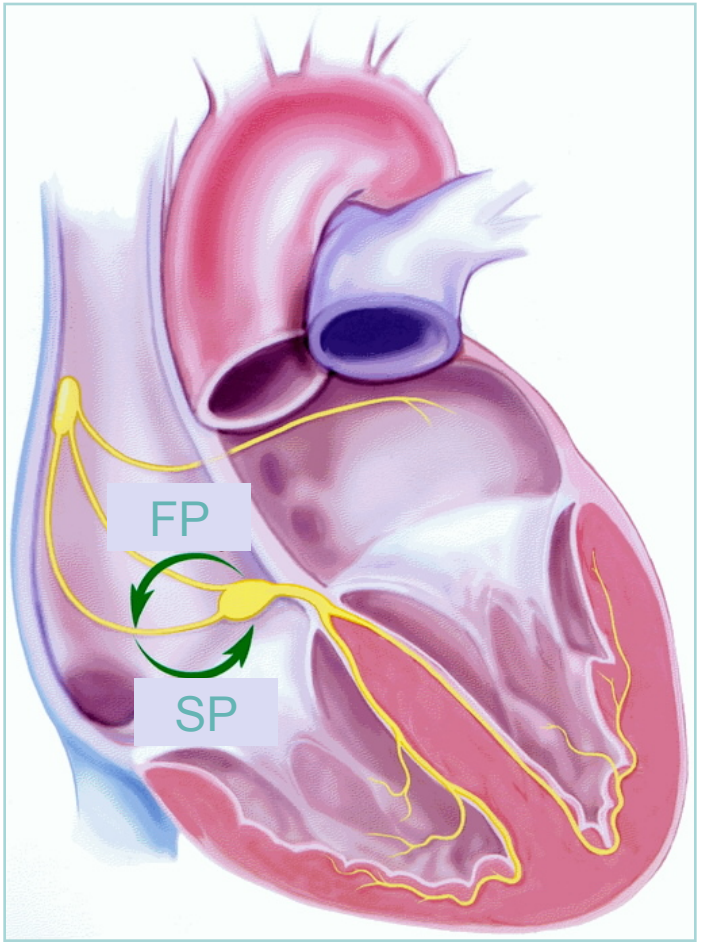
- Older child or adolescent with SVT
  - Likelihood increases with increasing age
- Variable symptoms
  - Paroxysmal tachycardia
  - Prolonged frequent SVT episodes
  - Short infrequent palpitations
  - Dizziness, presyncope
  - Rarely  syncope
- Signs of DAVN
  - ECG, Holter or exercise test

# Dual AV-node conduction during sinus rhythm

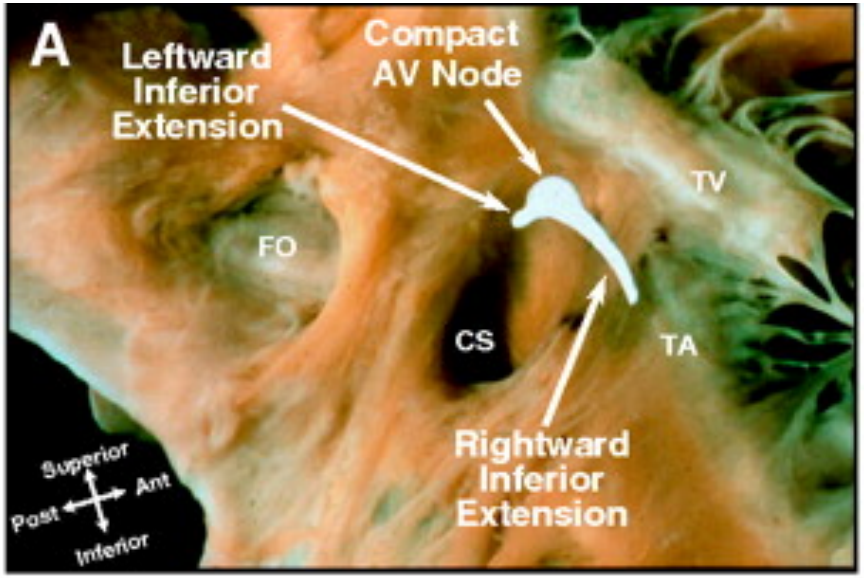

SIEMENS
1. Baseline:Cont stim off 12:48:36+52 s
AXIOM Sensis XP VC03F
0
1 s
2
3
4
5
! I 10 mm/mV
II 10 mm/mV A
! III 10 mm/mV
aVR 10 mm/mV
! aVL 10 mm/mV
! aVF 10 mm/mV
V1 10 mm/mV
V2 10 mm/mV
V3 10 mm/mV
V4 10 mm/mV
V5 10 mm/mV
V6 10 mm/mV
50 mm/s
Study: Electrophysiology^Ele...
Date: 16/04/2013

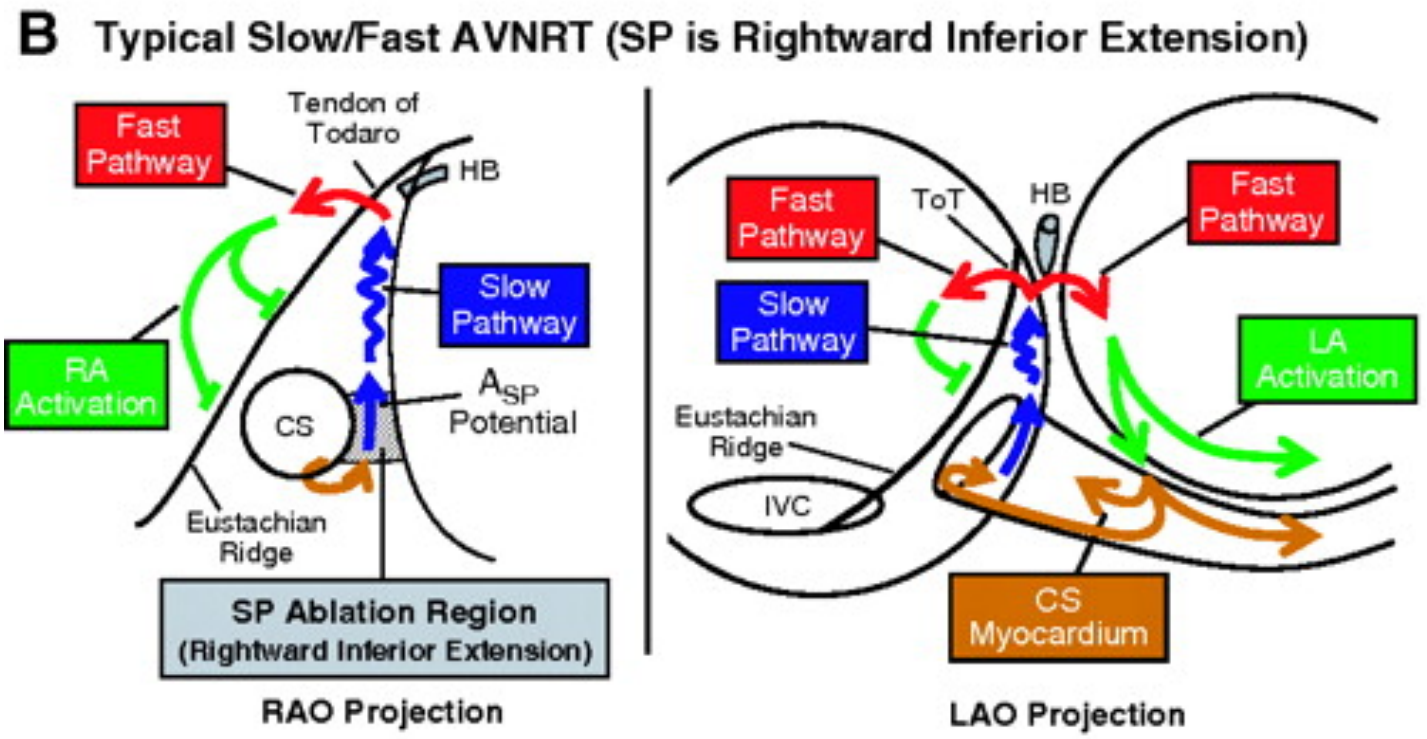

SIEMENS
1. Baseline:
AXIOM Sensis XP VC03F
0
1 s
2
3
4
5
I 10 mm/mV
II 10 mm/mV A
III 10 mm/mV
aVR 10 mm/mV
aVL 10 mm/mV
aVF 10 mm/mV
248
V1 10 mm/mV
V2 10 mm/mV
V3 10 mm/mV
V4 10 mm/mV
V5 10 mm/mV
V6 10 mm/mV
50 mm/s
Study: Electrophysiology^Ele...
Date: 16/04/2013

# AVNRT – a simple arrhythmia?

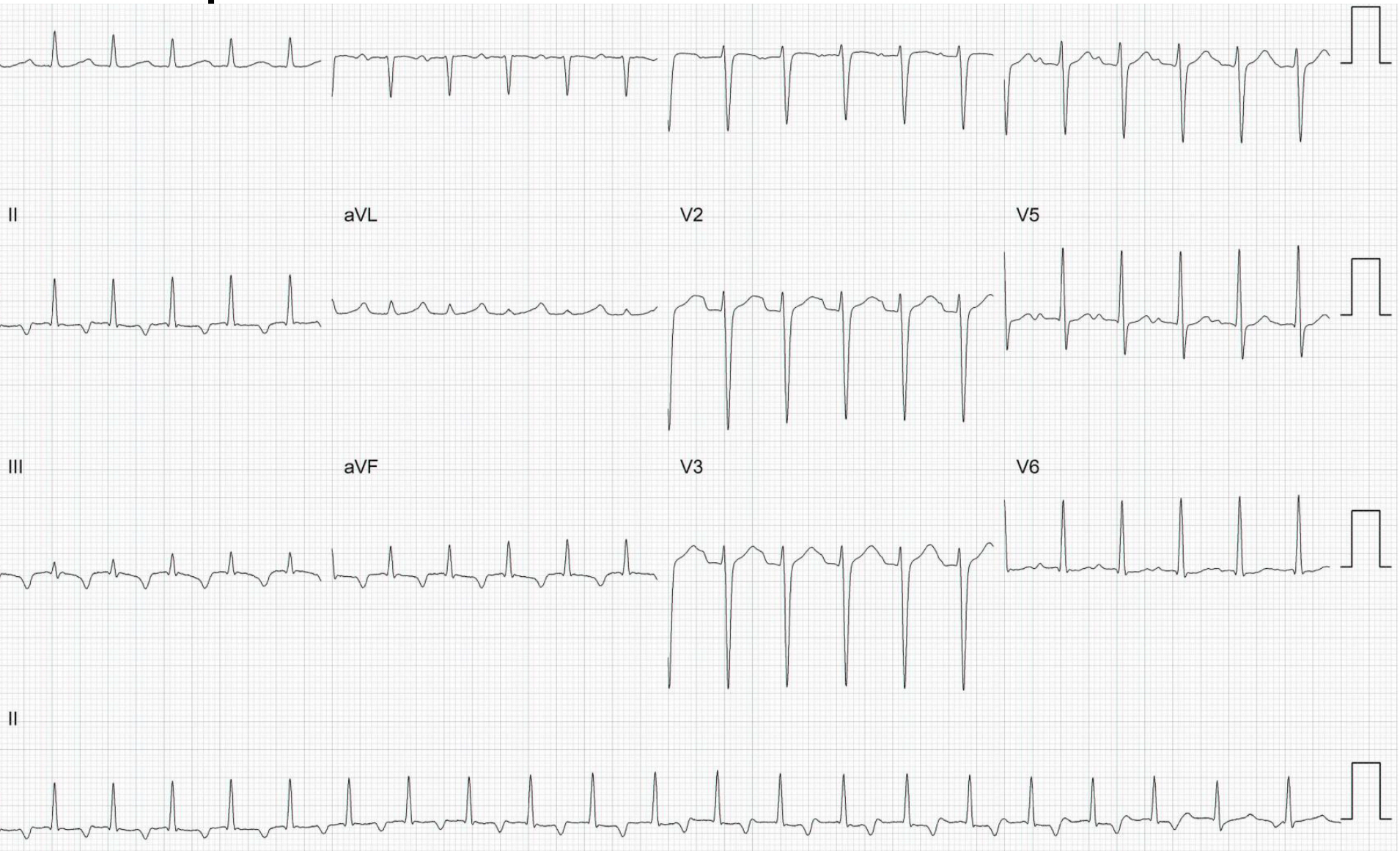



- > 8 forms
  - Slow-fast (85-95%)
  - Slow-slow
  - Fast-slow (10%)
  - Left variant



# Atypical AVNRT – fast-slow



# AVNRT - EPS

- AV node conduction properties
  - AVN ERP
  - Dual AVN physiology
    - Properties of FP and SP
- Arrhythmia induction
  - Baseline, with isoproterenol
- Pacing manoeuvres to confirm the diagnosis
  - V extrastimuli at His refractoriness
  - V pacing

# AVNRT - medical treatment

- Catheter ablation is the treatment of choice for symptomatic patients with AVNRT

Saul JP et al. Heart Rhythm 2016;13:e251-e289
Page RL et al. Circulation 2016;133:e506-574

# AVNRT - medical treatment

- Variable efficacy - about 60%(-80%)
- For whom?
  - Small patients
  - Waiting for ablation
  - Procedure not desired
  - Procedure not available
- How?
  - Prophylactic treatment
  - Pill in the pocket
    - Infrequent, well-tolerated arrhythmias

# AVNRT - medical treatment

- Which medicine?
  - Medication affecting AV-conduction
    - Beta blockers (I, B-R)
    - Verapamil or diltiazem (I, B-R)
    - Flecainide or propafenone (IIa, B-R)
    - Sotalol (IIb, B-R)
    - Amiodarone (IIb, B-R)
  - Pill in the pocket
    - Beta blocker, verapamil or diltiazem (IIB, C-LD)

Page RL et al. Circulation 2016;133:e506-e574

# AVNRT

- Quite rare as a pediatric arrhythmia
  - Incidence increases with age
  - About 1/3 of ablation case load
- Not a simple arrhythmia
  - Amenable to definitive treatment with catheter ablation with excellent results
- Results of medical management are variable
  - Antiarrhythmics still an option in selected cases