Atrial tachycardia

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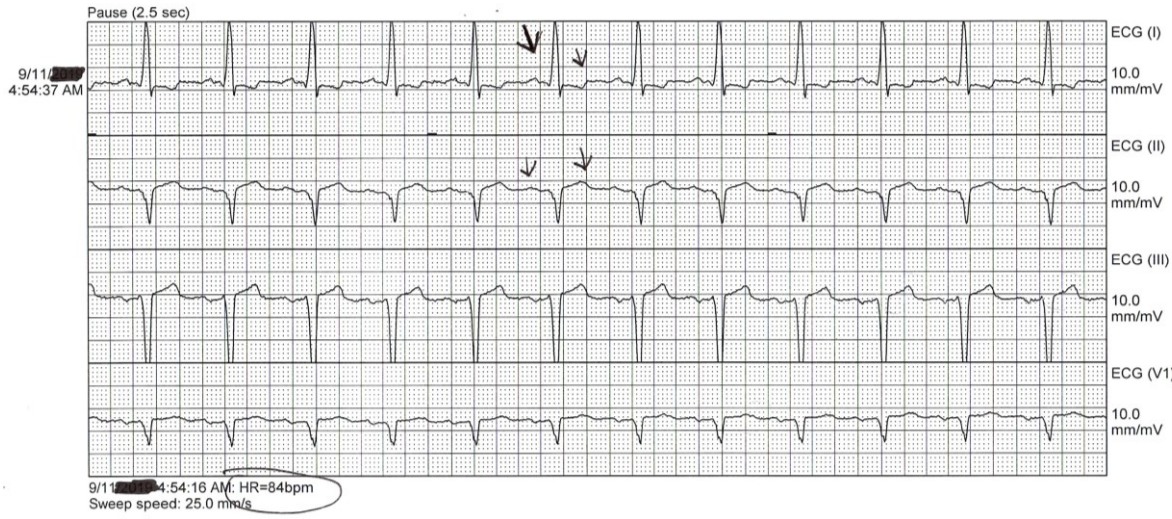
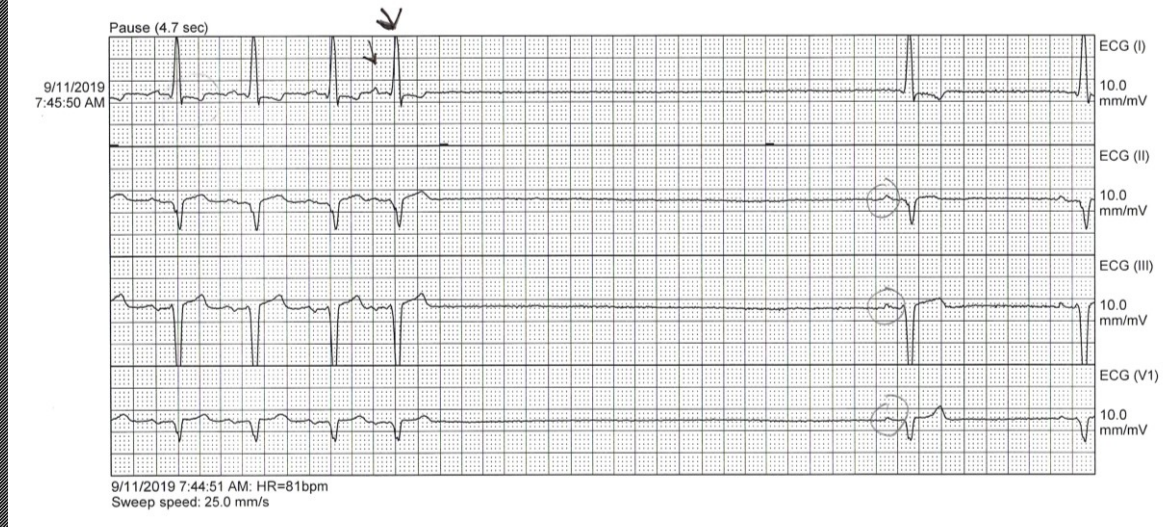
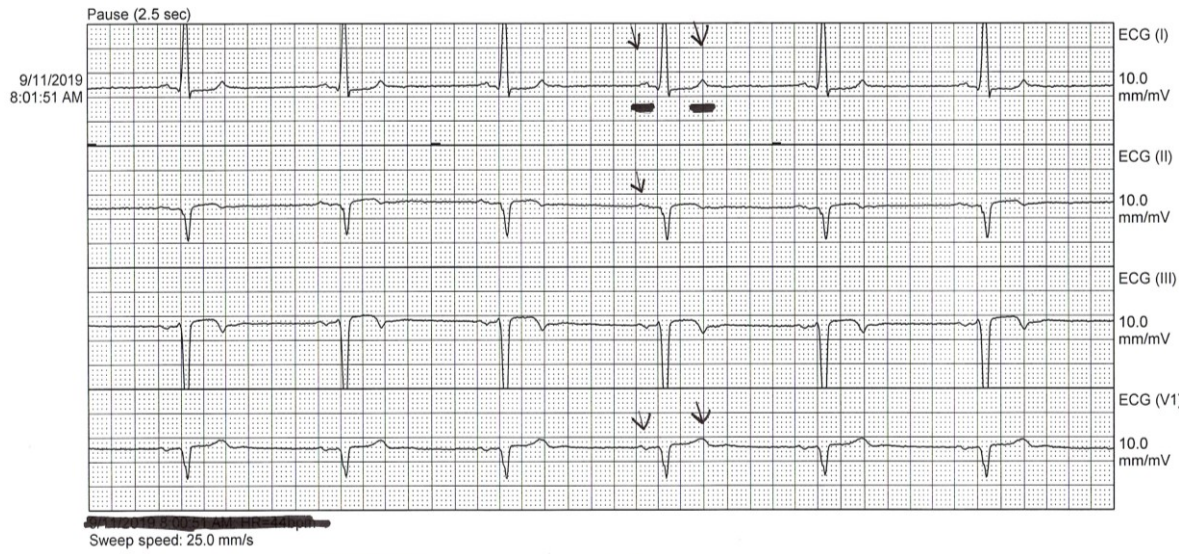
1. Differentiate atrial tachycardia from sinus tach and atrial ectopic rhythms
2. Discuss pathology
3. Discuss treatment options

75 y/o female
Hx of MI, PAD, HTN, dyslipidemia, DM, bifasicular block (RBBB/LAFB), sinus bradycardia

- Hospitalized for peripheral procedure
- Post procedure sinus rhythm in 85-95 bpm alternated with sinus brady 35-50 bpm
- Multiple pauses 2.0 up to 5.5 seconds
- Asymptomatic- blood pressure stable
- Labs: Na 133, K 4.6, Bun/Creat NL, CBC NL, TSH 2.04
- Echo: EF 49%, Normal RA and LA size, no valvular heart disease, apical hypokinesis.

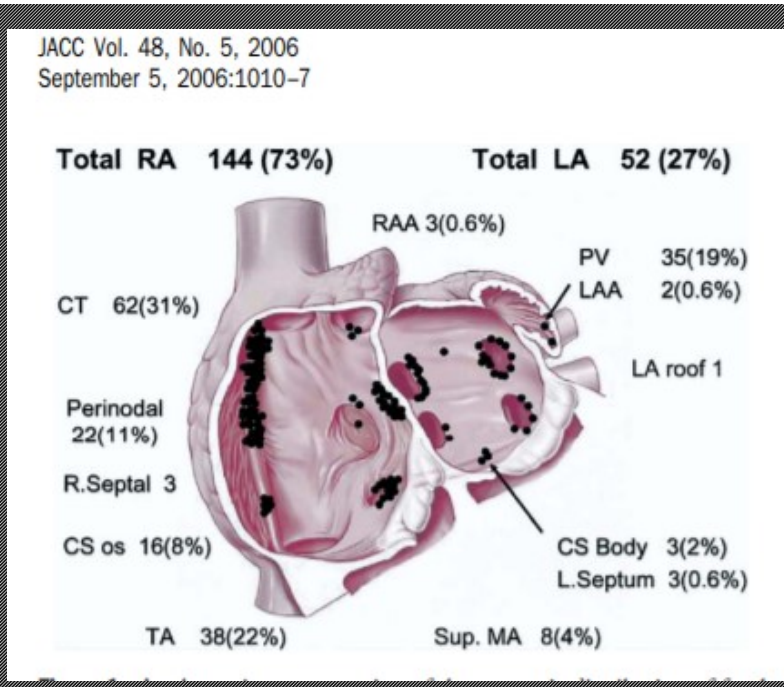

Pause (2.5 sec)
9/11/[redacted]
4:54:37 AM
ECG (I)
10.0
mm/mV
ECG (II)
10.0
mm/mV
ECG (III)
10.0
mm/mV
ECG (V1)
10.0
mm/mV
9/11/[redacted]4:54:16 AM: HR=84bpm
Sweep speed: 25.0 mm/s


Pause (4.7 sec)
9/11/2019
7:45:50 AM
ECG (I)
10.0
mm/mV
ECG (II)
10.0
mm/mV
ECG (III)
10.0
mm/mV
ECG (V1)
10.0
mm/mV
9/11/2019 7:44:51 AM: HR=81bpm
Sweep speed: 25.0 mm/s



Atrial Tachycardia (AT)

- SVT arising from localized atrial tissue different from SA node.
- Regular, organized atrial activity with discrete P waves.
- Change in P wave morphology, different from normal P wave.
- May be associated with prolonged PR interval
- Typically an isoelectric segment between P wave.
- May be paroxysmal or incessant.

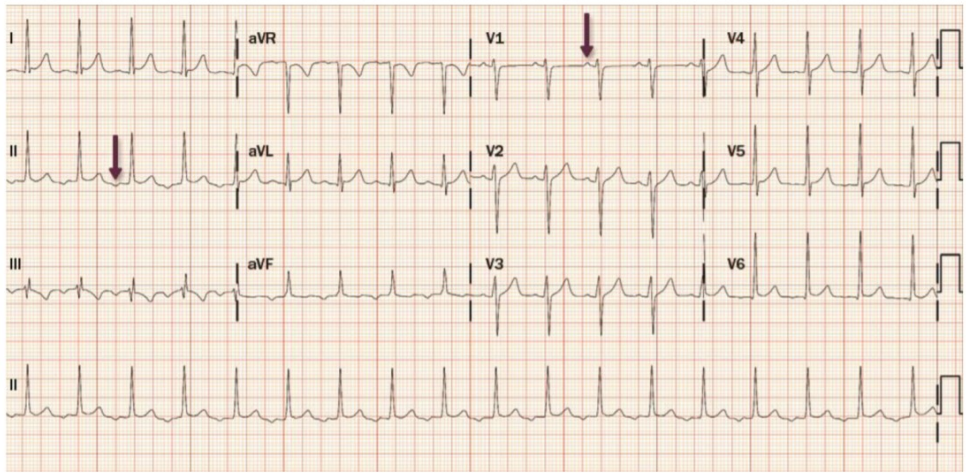


Junction of an anastomosis with a venous structure or valve or septum

Atrial Tachycardia (AT)

- Usually Fast rhythm- 100 to 250 bpm
- Faster rate in younger patients
- Symptoms depend of frequency of episode, duration and whether occur with exercise or rest.
- Palpitations, chest pain, lightheadedness, DOE
- Rarely syncope
- One large review- AT increases with age up to 23% of SVT

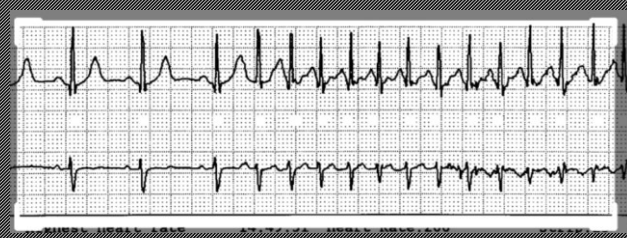
FIGURE 5 Atrial Tachycardia



Arrows point to the P wave, which is inscribed before the QRS complex. The focus of this atrial tachycardia was mapped during electrophysiological study to an area near the left inferior pulmonary vein.

Atrial Tachycardia

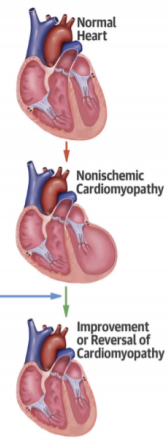
- At times irregularity is seen especially at onset (warm up) and termination (warm down)



AT-medicated cardiomyopathy

CENTRAL ILLUSTRATION Arrhythmia-Induced Cardiomyopathies: Possible Triggers, Mediators, Effect, and Recovery

	Tachycardia	Frequent PVCs	Atrial Fibrillation
Triggers	Increased HR	• LV dyssynchrony • AV dissociation • HR irregularity • Intermittent tachycardia • Sympathetic dysregulation • Post-extrasystolic potentiation	• HR irregularity • Sympathetic dysregulation • Loss of atrial contraction
Mediators	• Ca^{2+} overload • Ca^{2+} mishandling	• Ca^{2+} overload • Ca^{2+} mishandling ???	• Ca^{2+} mishandling ???
Effect	• Fibrosis • Myocyte and electrical remodeling • Contractile dysfunction • Neurohormonal activation	• Myocyte and electrical remodeling • Contractile dysfunction ? Fibrosis	• Contractile dysfunction ???
Arrhythmia Suppression	Ablation / Antiarrhythmic drugs		
Recovery	• Normalized LVEF • Ventricular dilatation • Diastolic dysfunction • Reactive hypertrophy • Persistent fibrosis	• Normalized LVEF and dimensions	• Normalized LVEF ???

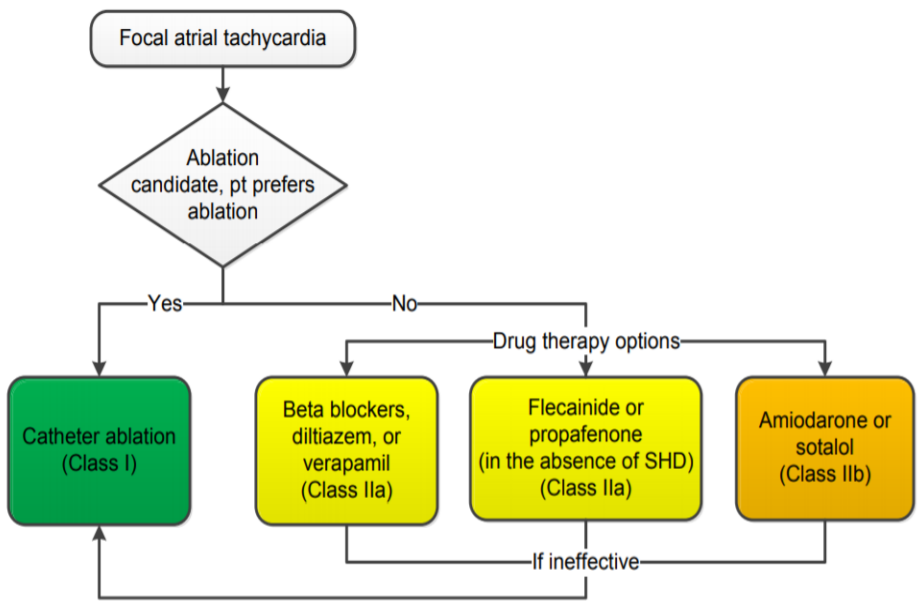


Huizar, J.F. et al. J Am Coll Cardiol. 2019;73(18):2328-44.

AV = atrioventricular; HR = hazard ratio; LVEF = left ventricular ejection fraction.

- Reported in 10% of patients with AT
- And as high as 37% in pt with incessant AT
- Presenting with HF

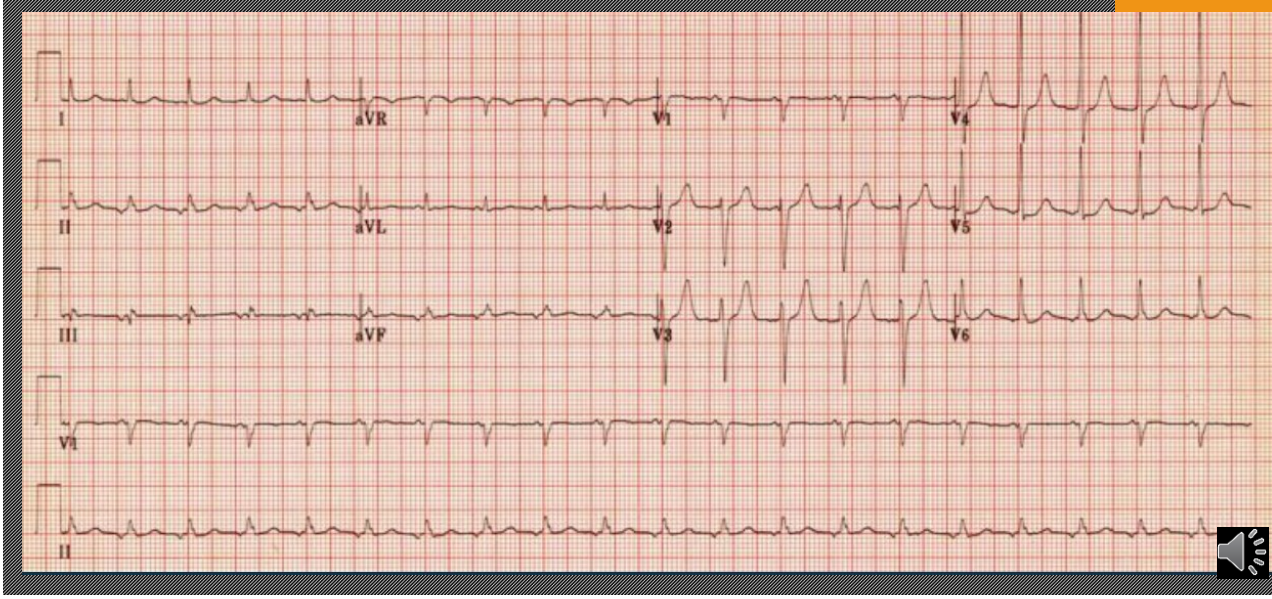
FIGURE 11 Ongoing Management of Focal Atrial Tachycardia

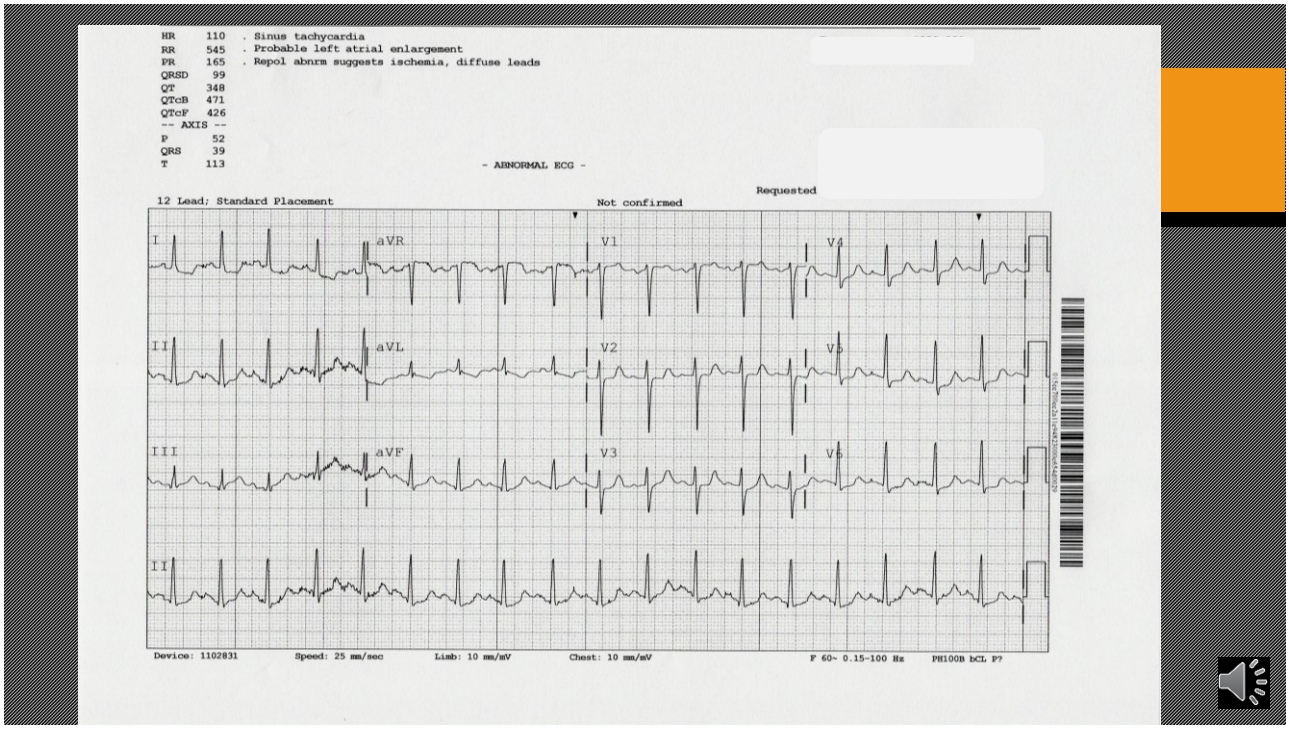


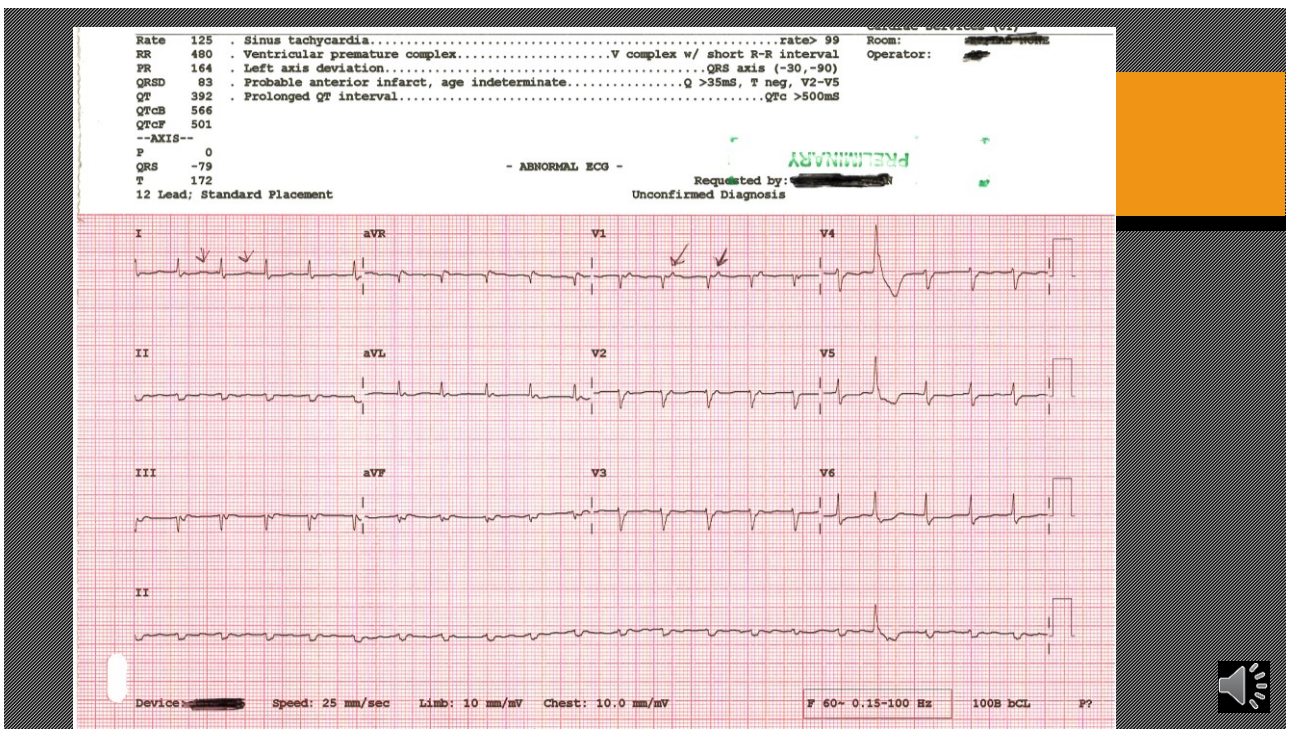
Atrial Tachycardia

- Tachycardia should be first classified if regular or irregular
- Irregular: AF, MAT, atrial flutter with variable AV conduction
- Regular: SVT, AT, Junc tach, re-entrant tachycardia's (AVNRT, AVRT)
- Has P wave morphology or PR interval lengthened
- Upright and distinct P waves, short PR interval, narrow QRS- ST likely

Atrial Tach or Sinus Tachycardia?




HR 110 . Sinus tachycardia
RR 545 . Probable left atrial enlargement
PR 165 . Repol abnrm suggests ischemia, diffuse leads
QRSD 99
QT 348
QTcB 471
QTcF 426
-- AXIS --
P 52
QRS 39
T 113
- ABNORMAL ECG -
Requested
12 Lead; Standard Placement
Not confirmed
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Device: 1102831
Speed: 25 mm/sec
Limb: 10 mm/mV
Chest: 10 mm/mV
F 60~ 0.15-100 Hz
PH100B bCL P?


Rate 125 . Sinus tachycardia.....rate> 99
RR 480 . Ventricular premature complex.....V complex w/ short R-R interval
PR 164 . Left axis deviation.....QRS axis (-30,-90)
QRSD 83 . Probable anterior infarct, age indeterminate.....Q >35mS, T neg, V2-V5
QT 392 . Prolonged QT interval.....QTc >500mS
QTcB 566
QTcF 501
--AXIS--
P 0
QRS -79
T 172
12 Lead; Standard Placement
Room:
Operator:
- ABNORMAL ECG -
Requested by:
Unconfirmed Diagnosis
PRELIMINARY
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Speed: 25 mm/sec
Limb: 10 mm/mV
Chest: 10.0 mm/mV
F 60~ 0.15-100 Hz
100B bCL
P?

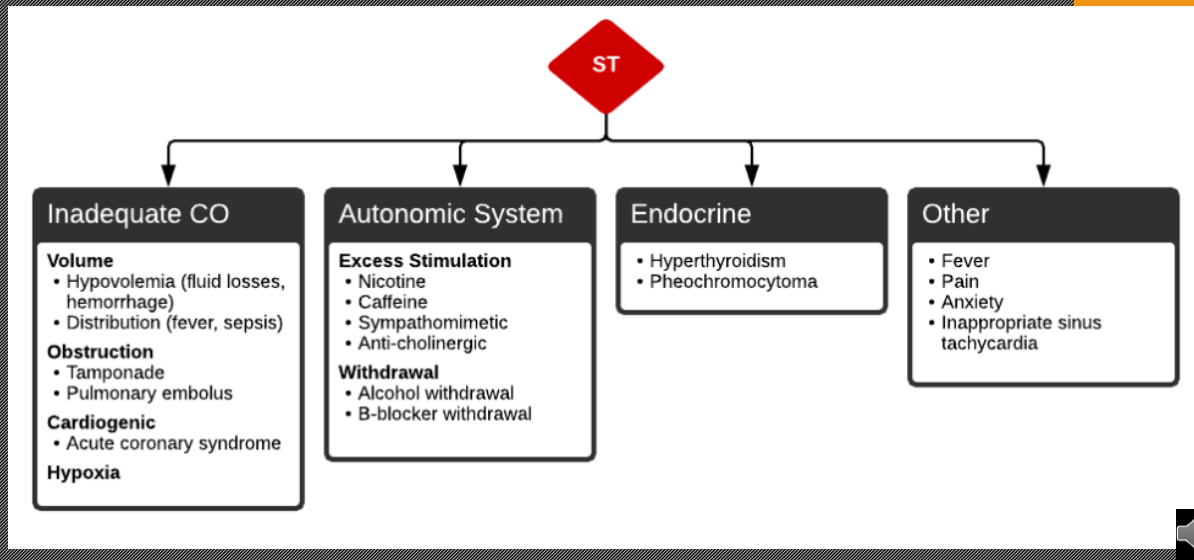
Treatment

- Coreg stopped
- 30 day MCT (mobile cardiac telemetry)
- MCT showed multiple pauses, up to 8 seconds, occurred during sleep and awake
- Ectopic atrial rhythm = 80-95 bpm
- Pt denied any symptoms during the time wearing monitor.
- Dual chamber pacemaker was implanted.

What is the take home message?

- Common problem of differentiating ST from various atrial tachycardia's and re entry tachyarrhythmia's.
- When apparent ST is associated with prolonged PR interval one should suspect that it is NOT really ST.
- If change in P wave morphology and heart rate greater than 100 bpm for no apparent reason- suspect atrial tachycardia

Look for reasons for ST and if none may be an AT

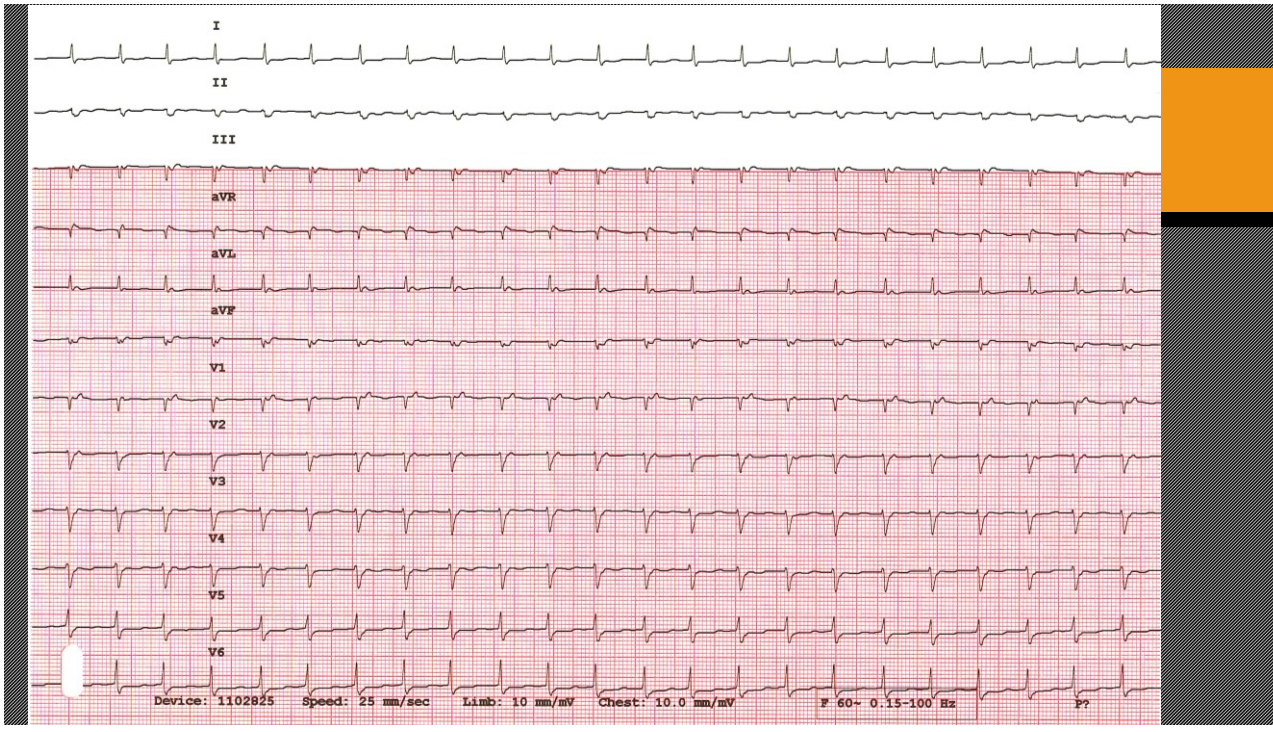


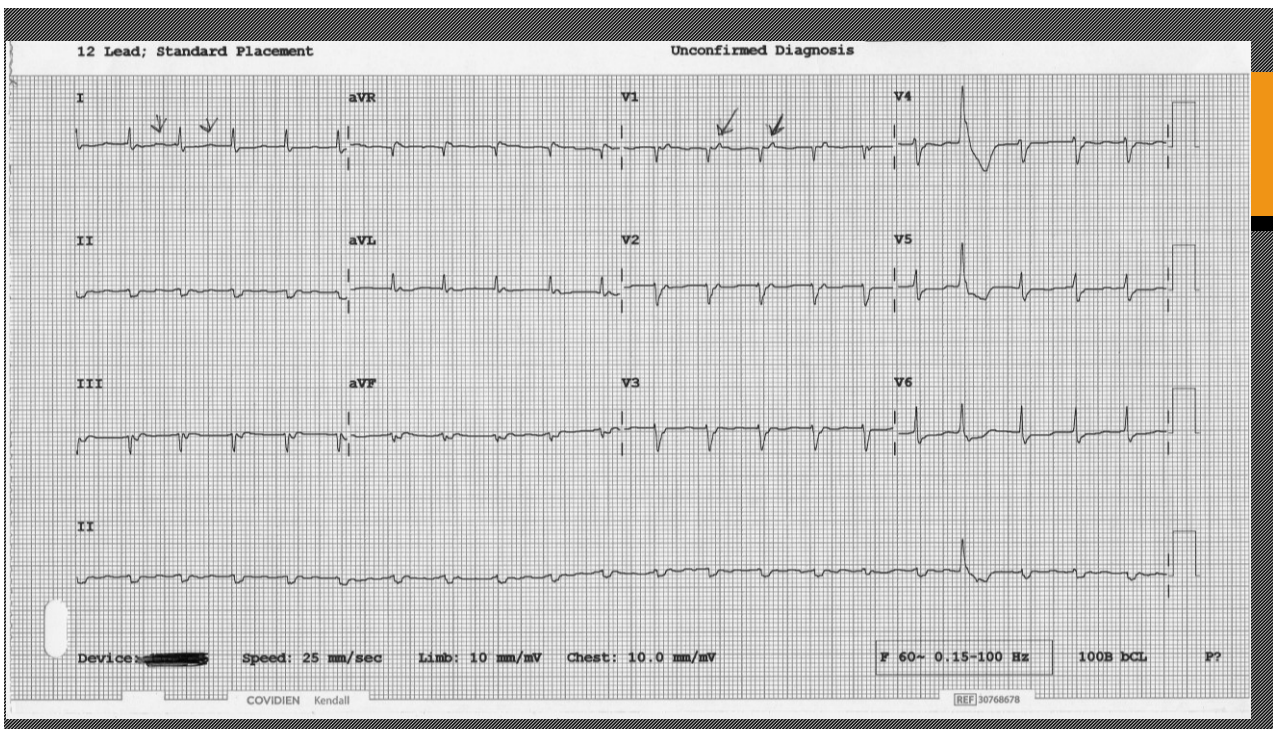
References

Huizar et al., Arrhythmia- Induced Cardiomyopathy; JACC Vol 73, NO.18, 2019
2015 Acc/AHA/HRS SVT Guidelines
Curtis, et al., Arrhythmia in patients > 80 years or age; JACC /vol 71, No.18, 2018

80 year old female with symptomatic SVT

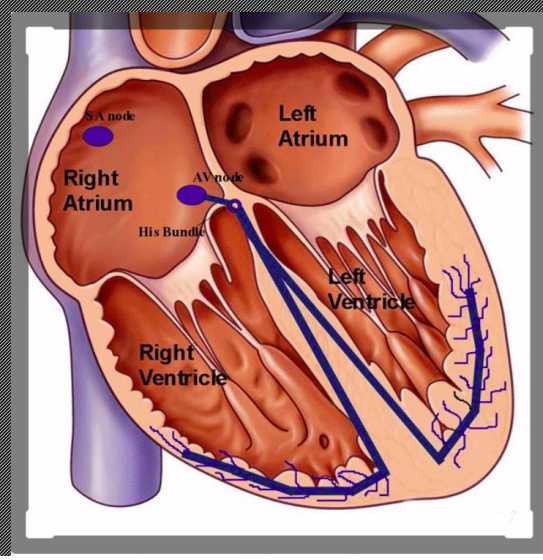
- Symptomatic- palpitations, shortness of breath.
- Unresponsive to Vagel manuvers
- On diltiazem CD 240 mg with minimal improvement.
- Underwent AVNRT ablation.


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
Device: 1102825 Speed: 25 mm/sec Limb: 10 mm/mV Chest: 10.0 mm/mV F 60~ 0.15-100 Hz P?


12 Lead; Standard Placement
Unconfirmed Diagnosis
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Speed: 25 mm/sec Limb: 10 mm/mV Chest: 10.0 mm/mV F 60~ 0.15-100 Hz 100B bCL P?
COVIDIEN Kendall
REF 30768678

Tachycardia-induced cardiomyopathy (T-CM):

1. T-CM refers to the presence of a reversible left ventricular (LV) dysfunction solely due to increase in ventricular rates, regardless of tachycardia origin.
2. Animal models of T-CM show that rapid atrial or ventricular pacing causes structural and electrical remodeling. Cessation of tachy-pacing results in significant recovery of LV ejection fraction (LVEF) or its normalization. Importantly, however, fibrosis appears to persist despite elimination of the tachycardia and normalization of LV function.
3. An ambulatory electrocardiogram (ECG) monitor for ≥2 weeks should be considered to confirm or exclude T-CM. The final diagnosis of T-CM can only be confirmed after recovery or improvement of LV systolic function within 1 to 6 months after elimination of the tachyarrhythmia.
4. In addition to treating tachycardia with antiarrhythmic drugs or radiofrequency ablation, the initial treatment of T-CM should include initiation and optimization of medical therapy for heart failure and LV systolic dysfunction (beta-blockers, angiotensin-converting enzyme inhibitors or angiotensin-receptor blockers, diuretic agents, and aldosterone blockers) to optimize reverse remodeling.



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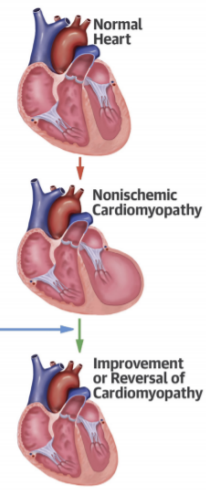

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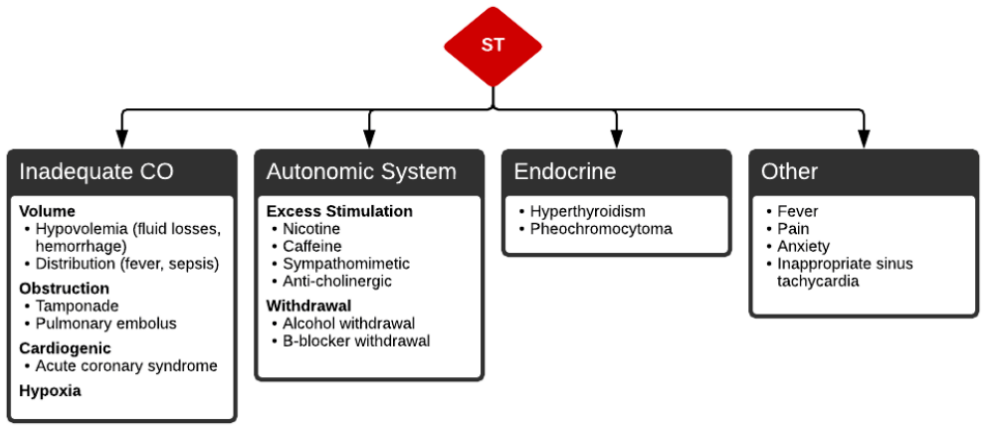
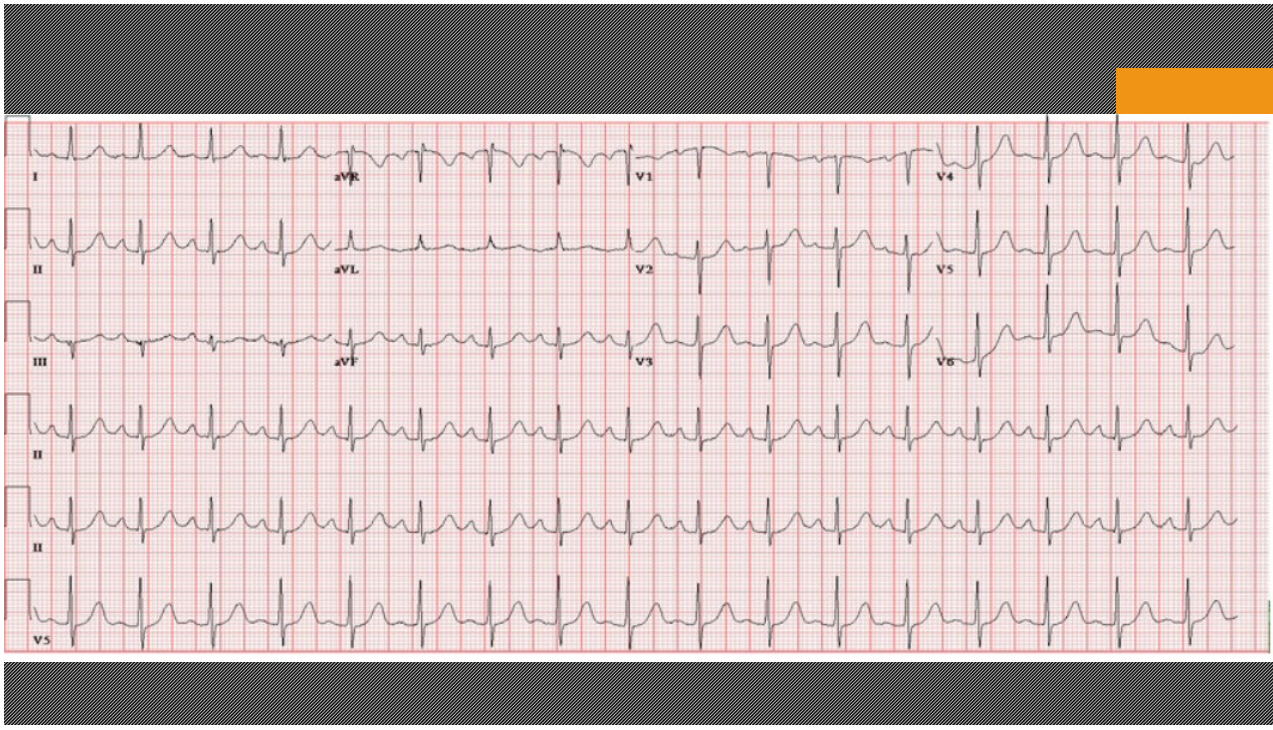
Algorithm for the Evaluation of Sinus Tachycardia




I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
II
V5