



Validation of right ventricular pacing response during SVT in mechanistic diagnosis. (Transition zone)

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Background

There are many **diagnostic maneuvers** during electrophysiological study to differentiate different types of SVT.

For example:

I-Entrainment from the right ventricle during tachycardia.

II-Delivery of His-synchronous premature beat.

III-Parahisian pacing



- During entrainment from the right ventricle (RV) pacing is performed at a cycle length slightly faster (10–40 ms) than the tachycardia. This allows for the penetration of the excitable gap of the re-entrant circuit and acceleration of the atrium to the pacing cycle length



- Many informations can be obtained from RV entrainment that help in differentiating different types of SVT include:

a-Post-pacing response.

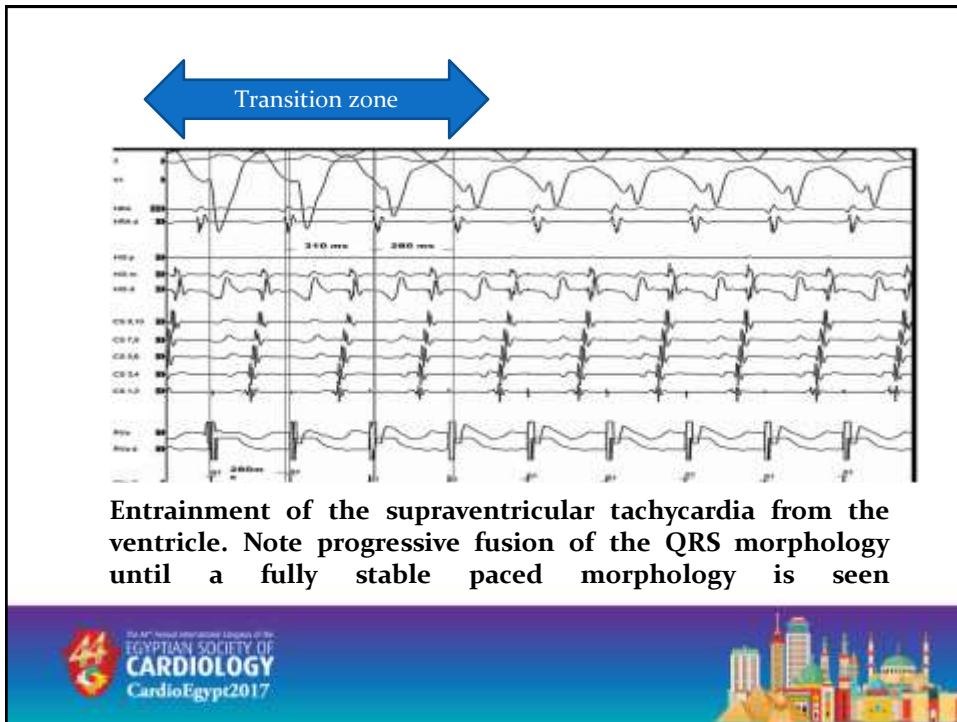
b-Post-pacing interval.

c-SA-VA interval



- RV entrainment produces progressive QRS fusion before the QRS morphology becomes stable. This **transition zone (TZ)** may provide useful information for differentiating orthodromic reciprocating tachycardia (ORT) from atrioventricular nodal reentrant tachycardia (AVNRT) and atrial tachycardia (AT) independent of entrainment success.





Aim of the work

- The aim of this work was to evaluate **value of transition zone during right ventricular entrainment** in differentiating supraventricular tachyarrhythmias (AVNRT ; AVRT ; AT) in electrophysiology lab compared to known pacing maneuvers used in differentiation



Methods

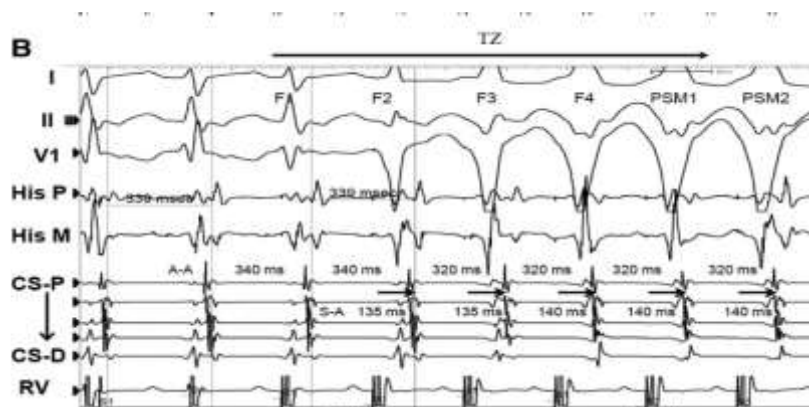
- We studied the effect of properly timed RVP on **atrial timing during the TZ** in 63 patients with supraventricular tachycardia who had RVP within 40 ms of the tachycardia cycle length. The TZ during RVP includes progressively fused QRS complexes and the first paced complex with a stable QRS morphology based on analysis of the 12-lead ECG.



- **Atrial preexcitation** was defined as atrial cycle length shortening by ≥ 15 ms during RVP. **Atrial postexcitation** was defined when atrial cycle length increased by ≥ 15 ms. Termination without atrial depolarization was defined when SVT terminated with abrupt VA block during RVP.



- The **SA interval** was also measured at the end of the TZ, from the first paced complex showing a stable QRS morphology and for each subsequent QRS complex until pacing terminated or VA block occurred.
- A **fixed SA** interval was defined as varying by <10 ms



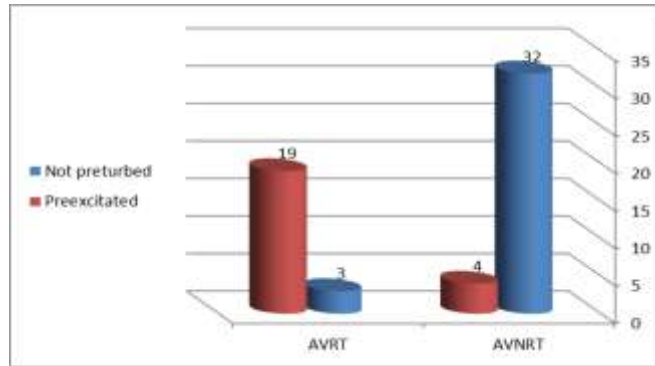
- Atrial tachycardia was diagnosed by either AV dissociation or VAAV response on termination of entrainment.



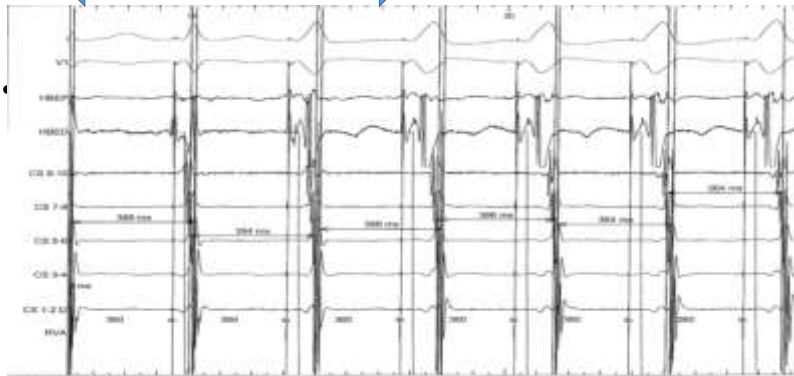
Results



a-Atrial timing perturbation in TZ

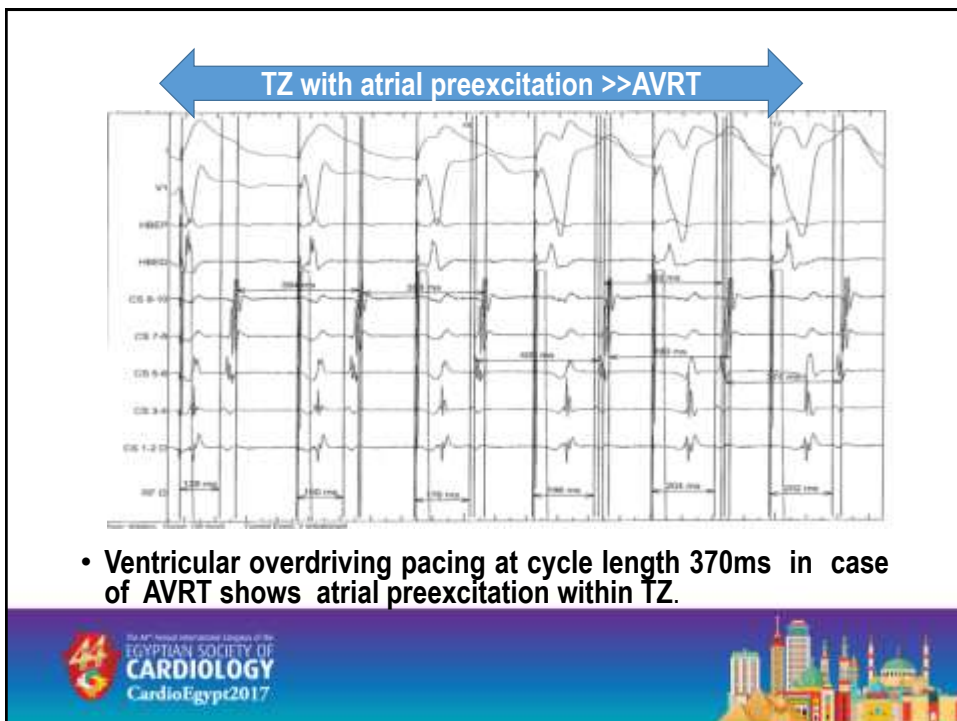
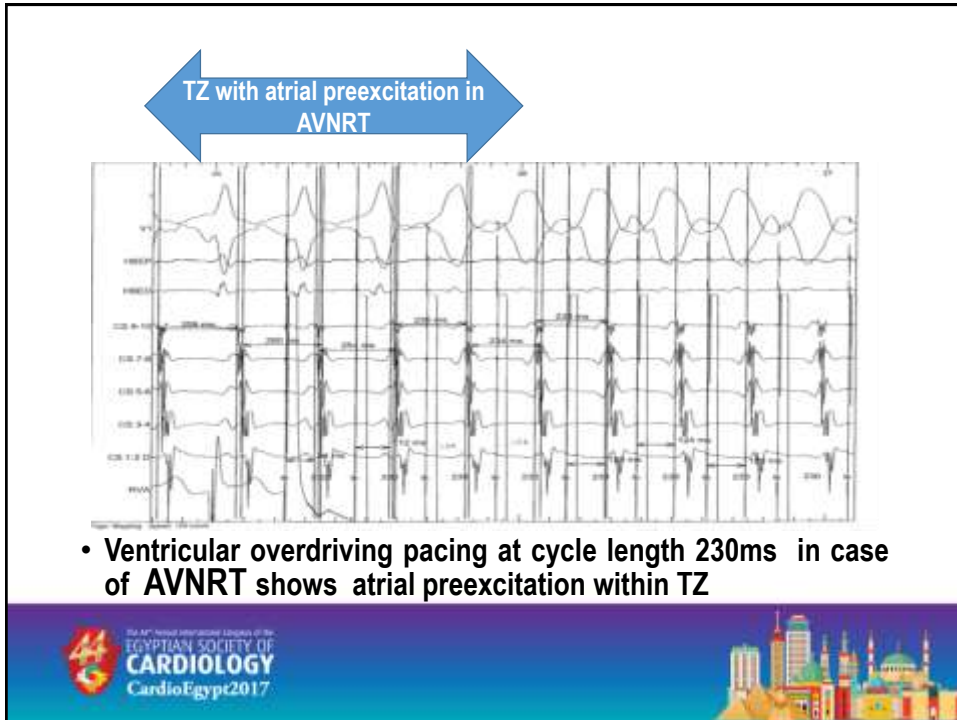


← TZ with no atrial perturbation in AVNRT →

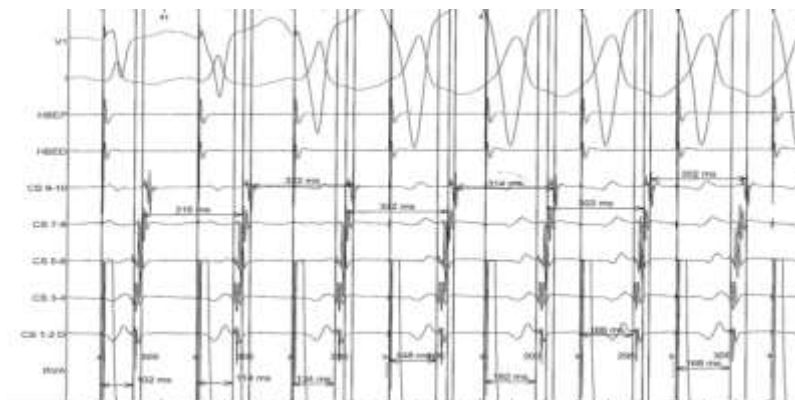


- Ventricular overdriving pacing at cycle length 360ms in case of AVNRT shows no atrial perturbation within TZ





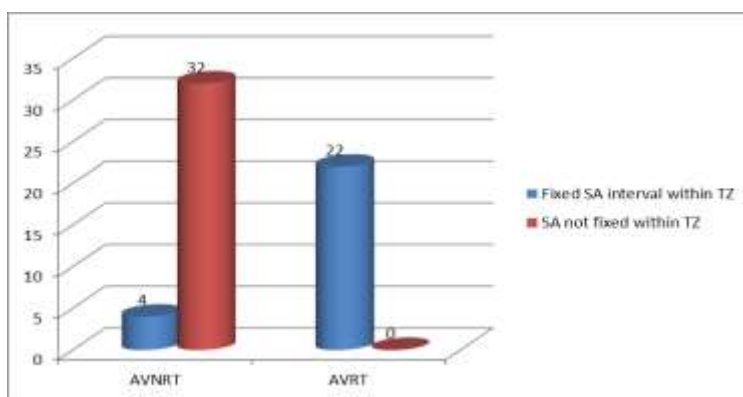
← TZ with no atrial perturbation in AVRT →

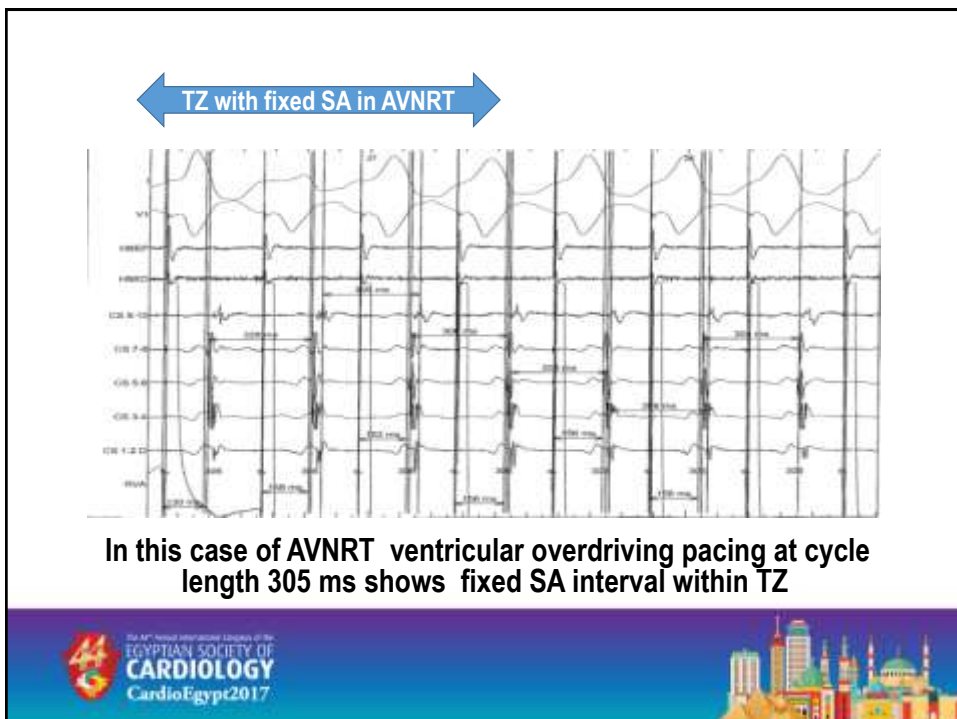
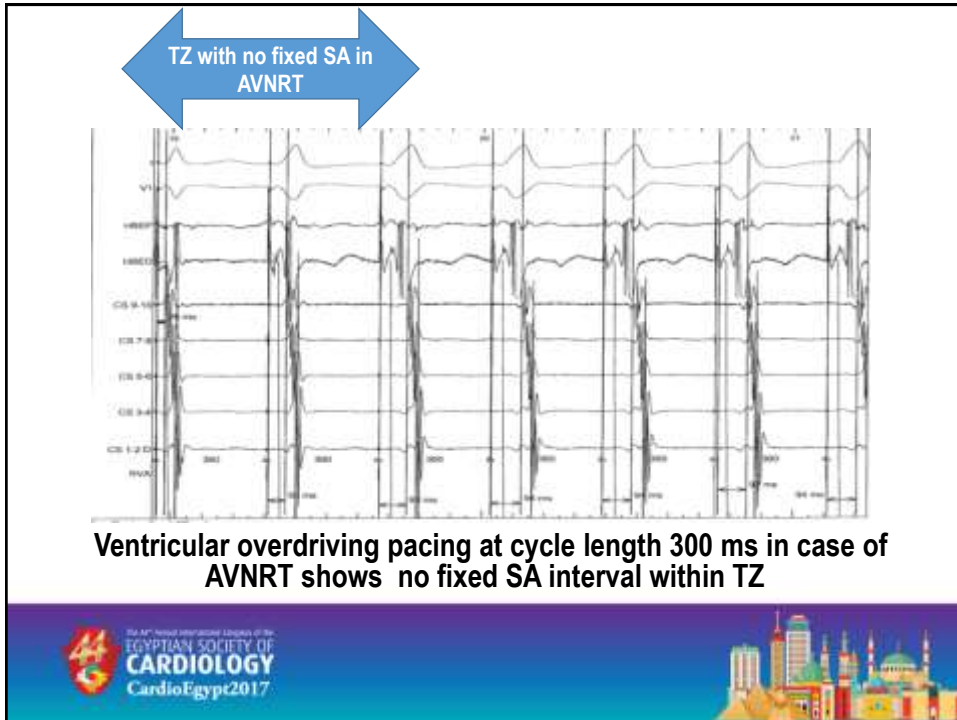


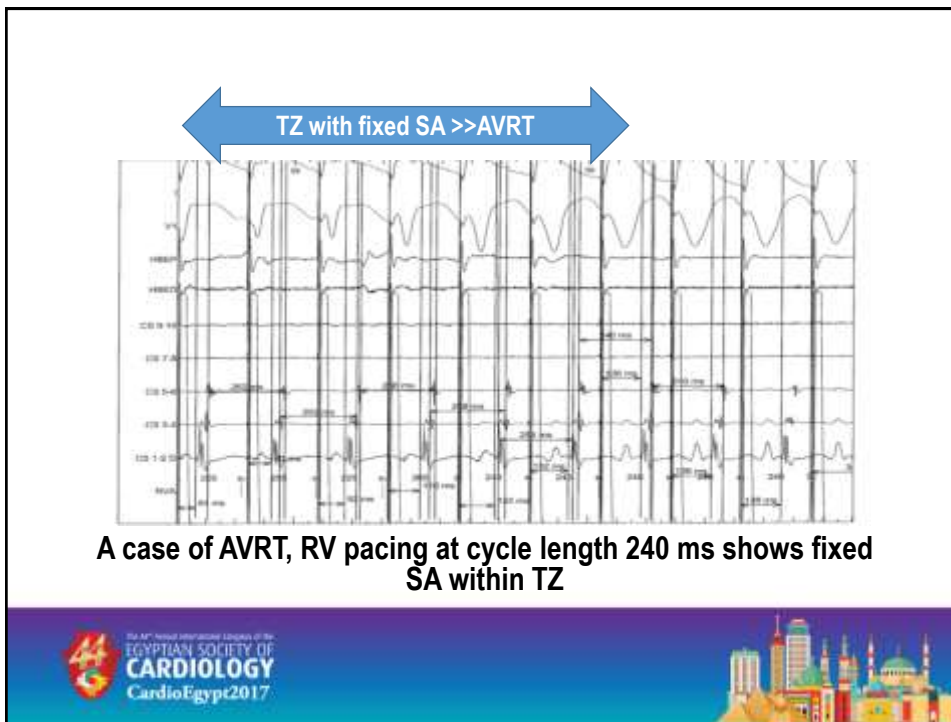
- A case of AVRT ventricular overdriving pacing shows no atrial perturbation within TZ



b- Fixed SA interval established within TZ.







- Sensitivity, specificity, PPV and NPV of different measurements used in differentiating AVNRT from AVRT

	Type of tachycardia				
	Sensitivity	Specificity	PPV	NPV	Accuracy
PPI –TCL	90.9	88.9	95.2	94.1	89.7
SA –VA	95.5	97.2	95.5	97.2	96.6
SA within TZ	100.0	88.9	84.6	100.0	93.1
A-A interval	86.4	88.9	82.6	91.4	87.9
No.of QRS	40.9	69.4	45.0	65.8	55.2

Summary

- In our study we found that examination of transition zone during RV entrainment help in differentiation of different types of SVT.
- **All patients with ORT** had either atrial timing perturbed (86.4%) or a fixed SA interval (100%) established within the TZ when pacing the RV within 40 ms of the tachycardia cycle length. These findings are independent of entrainment success



- In **AVNRT** group most patients did not show atrial perturbation (88.9%) nor fixed SA interval (88.9%), only 3 patients (of 36) show both atrial perturbation and fixed SA interval within TZ , in 2 of them this occurred in 1st beat with stable morphology.
- One case showed atrial preexcitation without fixed SA (this also occurred in 1st beat with stable morphology).



- In patients with **AT**, AV dissociation or VAAV response on termination of entrainment was present during RVP.



Conclusion

- Accurate detection and examination of TZ during RV entrainment help in differentiating AVNRT from AVRT by detecting **SA interval** and **A-A interval**.



Many Thanks

