Update on the Diagnosis and Treatment of Atrioventricular Nodal Reentry Tachycardia

Written by Mary Beth Nierengarten

A session entitled "Catheter Ablation of AVNRT: State of the Art 2013" brought together a panel of experts who provided an update on the diagnosis and treatment of atrioventricular nodal reentry tachycardia (AVNRT).

THE FINE ART OF DIAGNOSIS

Melvin M. Scheinman, MD, University of California, San Francisco, San Francisco, California, USA, opened the session with a discussion on how the laboratory is used to differentiate the various types of supraventricular tachycardia (SVT). A number of newer concepts have helped in making the differential diagnosis of these different SVT types, which, along with atypical AVNRT, include atrial tachycardia, septal accessory pathway (AP), concealed nodofascicular tachycardia, and functional tachycardia. He referred the audience to two recently published articles by Veenhuyzen and colleagues that provide an excellent review of both the traditional and newer concepts of laboratory diagnosis [*Pacing Clin Electrophysiol* 2011; *Pacing Clin Electrophysiol* 2012].

Dr. Scheinman emphasized that there are pitfalls to every new concept and rule, and shared some useful tricks to differentiate the types of arrhythmias. To differentiate AVNRT from orthodromic reciprocating tachycardia (ORT) in a patient with SVT, for example, ventricular overdrive pacing (VOP) should be used to look for two things: the postpacing interval minus tachycardia cycling, and the stimulus ventriculo-atrial (VA) versus the VA during the SVT. However, this rule does not hold true in all cases and an important trick in these cases is to use entrainment with infusion to make the differential diagnosis, a novel approach used effectively by Dandamudi et al. to differentiate between ORT and AVNRT [*Heart Rhythm* 2010]. This study showed that atrial capture in all ORT patients occurred after the first nonfused paced QRS in all patients during VOP. In AVRNT patients, on the other hand, atrial capture occurred 2 or 3 beats after the first unfused QRS. Dr. Scheinman said that this technique is most valuable for patients who have SVT termination during VOP.

Some of the pitfalls to be aware of when using VOP during SVT, is that VOP may not distinguish the decremental AP, it does not distinguish the presence of bystander AP, and the fusion with capture may not be seen within 3 beats in the left lateral AP.

Mark McGuire, MBBS, PhD, Royal Prince Alfred Hospital, Sydney, Australia, provided a historical review of the different theories of the mechanism of AVNRT.

Based on a review of a number of studies presented, he said that on balance the current evidence suggests a number of AVNRT mechanisms: 1) an upper common pathway of nodal tissue probably does not exist; 2) a lower common pathway of nodal tissue may exist in some patients; 3) AVN reentry can occur by way of any two atrionodal connections that have the appropriate properties of refractoriness and conduction velocity; and 4) the presence in an individual patient of one or more forms of AVNRT probably depends on the properties of the atrionodal connections.

TREATMENT OF AVNRT

Stephan Willems, MD, University Hospital Eppendorf, Hamburg, Germany, provided an update on the most recent data on radiofrequency (RF) ablation for AVNRT. He emphasized that RF ablation of the slow pathway remains the first line of treatment for most forms of AVNRT, with the most recent 2003 guidelines showing a high success rate (96%) and low recurrence rate (3% to 7%) [Blomström-Lundqvist C et al. *J Am Coll Cardiol* 2003].

Summarizing various results from studies that have emerged since this last guideline, Prof. Willems noted that the data over the past decade continue to show that RF ablation is associated with a high acute success rate. However, the data also show a slightly lower success rate in some patients with a variants of

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AVNRT, which he said highlights the need for proper diagnosis. The data also show a very low recurrence rate with long-term follow-up and that slow pathway ablation should be used. One ongoing discussion is whether slow pathway modulation is as good as slow pathway ablation, noting that the current data suggest they are comparable. Prof. Willems also emphasized that current data shows that RF ablation has achieved almost 0% AV block, even in the elderly. Overall, one of the most striking findings is the continuous decrease in AV block during the last decade (Table 1).

Table 1. AVNRT: Slow Pathway Ablation Results Since 2001 (>12-Month Follow-up)

	n	Energy Setting	Acute Success	Recurrence	AV Block (II-III°)	Impact SP cond.
Clague J. et al. *EHJ* 2001	379	50W/ 60-70C	97%	6.9%	0.8%	none
Rostock T. et al. *JCE* 2005	578	50W/ 60-65C	100%	2.5%	0.7%	none
Estner H. et al. *PACE* 2005	506	30W/ 60°C	98.8%	5.2%	0.4%	none
Steven D. et al. *JCE* 2009	138	25-30W/ 65°C	100%	4.9%	0%	none
Hoffmann B. et al. *Heart Rhythm* 2011	3234	30-50W/ 60-70C	98.7%	5.7%	0.2%	—
Feldmann A. et al. *PACE* 2011	1419	50W/ 60°C	98.1%	1.5%	0.04%	none

Isabel Deisenhofer, MD, German Heart Centre, Munich, Germany, discussed the use of cryoablation in AVNRT. Reiterating the high success and recurrence rate and safety of RF ablation for AVNRT, she said that outcomes to date with a number of cryoablation trials have shown comparable acute success rates to RF but the problem is the substantially higher recurrence rates up to ~20% with cryoablation [Gupta D et al. *Europace* 2006].

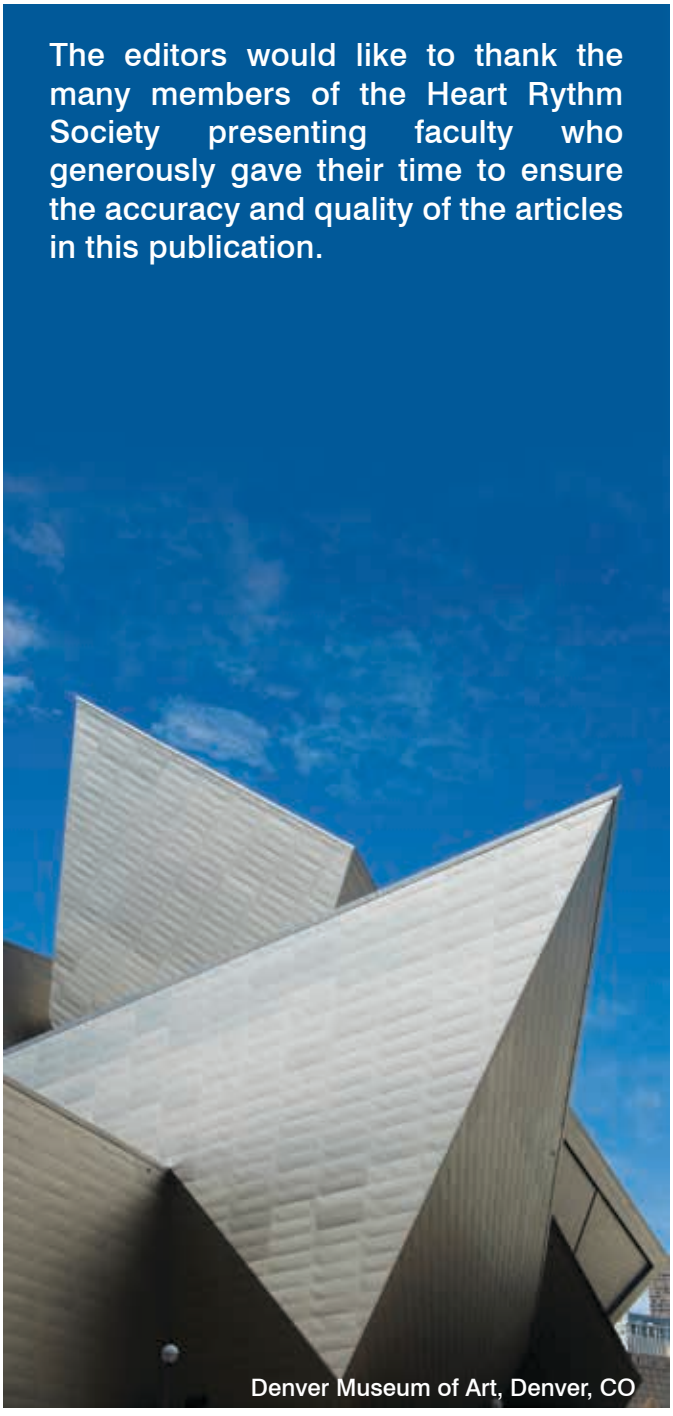
Similarly, results from the European Multicenter Study Radiofrequency Versus Cryo in Atrioventricular Nodal Reentry Tachycardia [CYRANO; Deisenhofer I et al. *Circulation* 2010] that randomized 258 patients with AVNRT to RF ablation and 251 to cryoablation found that the recurrence rate with cryoablation was nearly double compared with RF (9.4% vs 4.4%; p=0.029). No differences were found between the two groups in terms of acute treatment failure or AV block. According to Prof. Deisenhofer, the significant increase in the recurrence rate accounted for the significant difference between cryoablation and RF ablation in terms of the primary endpoint of the study which was a combination of acute treatment failure, complete AV block, and freedom of AVNRT recurrence during 6 months of follow-up (12.6% vs 6.3%; p=0.018).

Results in a study of 49 pediatric patients also showed an unacceptably high rate of AVNRT recurrences, occurring in 22.4% of patients at a mean follow-up of 30.2 months after cryoablation [Reents T et al. *Europace* 2012].

Based on this evidence, Prof. Deisenhofer emphasized that clinicians need to balance the minimal risk of RF-induced AV block risk against the considerable risk of AVNRT recurrence with cryoablation.

Currently, she said that her clinic has switched back to using RF ablation for most patients based on the current data and outcomes.

The editors would like to thank the many members of the Heart Rythm Society presenting faculty who generously gave their time to ensure the accuracy and quality of the articles in this publication.



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