

3. Lamas GA, Lee KL, Sweeney MO, Silverman R, Leon A, Yee R et al. Ventricular pacing or dual-chamber pacing for sinus-node dysfunction. *N Engl J Med* 2002;**346**:1854–62.
4. Toff WD, Camm AJ, Skehan JD. Single-chamber versus dual-chamber pacing for high-grade atrioventricular block. *N Engl J Med* 2005;**353**:145–55.
5. Barold SS. Adverse effects of ventricular desynchronization induced by long-term right ventricular pacing. *J Am Coll Cardiol* 2003;**42**:624–6.
6. Sweeney MO, Hellkamp AS, Ellenbogen KA, Greenspon AJ, Freedman RA, Lee KL et al. Adverse effect of ventricular pacing on heart failure and atrial fibrillation among patients with normal baseline QRS duration in a clinical trial of pacemaker therapy for sinus node dysfunction. *Circulation* 2003;**107**:2932–7.
7. Funck RC, Blanc JJ, Mueller HH, Schade-Brittinger C, Bailleul C, Maisch B. Biventricular stimulation to prevent cardiac desynchronization: rationale, design, and endpoints of the 'Biventricular Pacing for Atrioventricular Block to Prevent Cardiac Desynchronization (BioPace)' study 4. *Europace* 2006;**8**:629–35.
8. Gregoratos G, Abrams J, Epstein AE, Freedman RA, Hayes DL, Hlatky MA et al. re 3jACC/AHA/NASPE 2002 Guideline Update for Implantation of Cardiac Pacemakers and Antiarrhythmia Devices—summary article: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (ACC/AHA/NASPE Committee to Update the 1998 Pacemaker Guidelines). *J Am Coll Cardiol* 2002;**40**:1703–19.
9. Yu CM, Chan JY, Zhang Q, Omar R, Yip GW, Hussin A et al. Biventricular pacing in patients with bradycardia and normal ejection fraction. *N Engl J Med* 2009;**361**:2123–34.
10. Curtis AB, Worley SJ, Adamson PB, Chung ES, Niazi I, Sherfese L et al. Biventricular pacing for atrioventricular block and systolic dysfunction. *N Engl J Med* 2013;**368**:1585–93.
11. Bristow MR, Feldman AM, Saxon LA. Heart failure management using implantable devices for ventricular resynchronization: Comparison of Medical Therapy, Pacing, and Defibrillation in Chronic Heart Failure (COMPANION) trial. COMPANION Steering Committee and COMPANION Clinical Investigators. *J Card Fail* 2000;**6**:276–85.
12. Cleland JG, Daubert JC, Erdmann E, Freemantle N, Gras D, Kappenberger L et al. The effect of cardiac resynchronization on morbidity and mortality in heart failure. *N Engl J Med* 2005;**352**:1539–49.
13. Moller M, Amsbo P, Askund M, Christensen PD, Gadsboll N, Svendsen JH et al. Quality assessment of pacemaker implantations in Denmark 3. *Europace* 2002;**4**:107–12.
14. Toff WD, Skehan JD, De Bono DP, Camm AJ. The United Kingdom pacing and cardiovascular events (UKPACE) trial. United Kingdom Pacing and Cardiovascular Events. *Heart* 1997;**78**:221–3.

EP CASE EXPRESS

doi:10.1093/europace/eut298

Online publish-ahead-of-print 26 September 2013

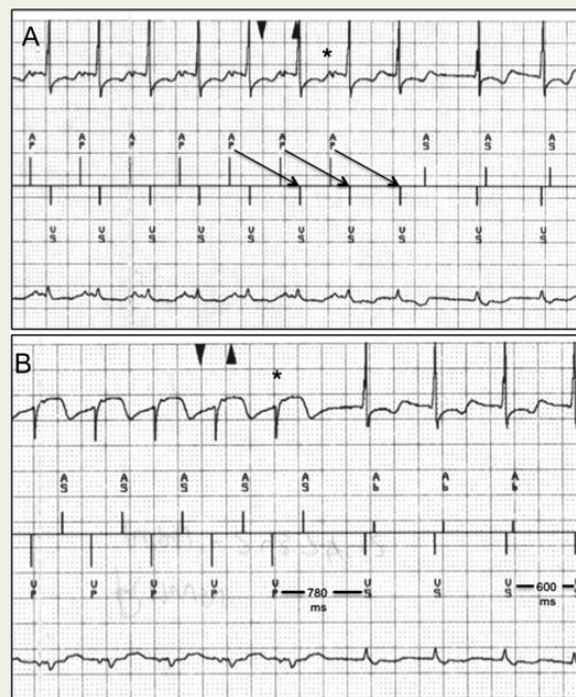
Simple and non-invasive diagnostics of a broad complex tachycardia in a device patient**Sigfus Gizurarson, Jack M. Colman, and Krishnakumar Nair***

Division of Cardiology, University Health Network, University of Toronto, Toronto, Canada

* Corresponding author. Peter Munk Cardiac Centre 3-548, Toronto General Hospital, 150 Gerrard Street W, Toronto, ON M5G 2C4, Canada. Tel: 416 340 3194; fax: 416 595 1811, Email: krishnakumar.nair@uhn.on.ca

A 36-year-old woman presented with paroxysmal palpitations and shortness of breath to the emergency department. She was known to have transposition of the great arteries and had undergone the Mustard operation, in addition to having a pacemaker implanted.

The electrocardiogram at the time of admission showed a broad QRS complex tachycardia with a ventriculoatrial time of ~100 ms. *Panel A* shows the response to atrial overdrive pacing. After cessation of pacing (*), the last entrained ventricular (V) is demonstrated by the arrows, and is one beat removed, i.e. the PR interval was far greater than the RR, indicating the existence of dual-atrioventricular (AV) nodal physiology, due to the paced AV delay being substantially longer than the RR interval. In addition, an A–V–A response is seen ruling out ventricular tachycardia or junctional tachycardia. Finally, entrainment of the tachycardia (*Panel B*) with ventricular pacing has a V–A–V response upon cessation of pacing, which again suggests atrioventricular nodal reentrant tachycardia (AVNRT) or atrioventricular reentrant tachycardia. The long post-pacing interval minus the tachycardia cycle length (180 ms) supports the diagnosis of AVNRT. Patients with cardiac pacing devices who present with tachycardia offer an opportunity to conduct basic bedside electrophysiological studies that can provide exact diagnoses and allow treatment via the pacemaker.



The full-length version of this report can be viewed at: <http://www.escardio.org/communities/EHRA/publications/ep-case-reports/Documents/-broad-complex-tachycardia.pdf>.