CARDIAC PACING

UNIQUE IMAGE REVIEW

“Old and New”: Novel and Traditional Medical Technologies in Juxtaposition

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ABSTRACT. *An 81 year old male with severe aortic stenosis, dialysis dependency and prior bypass surgery underwent transcatheter aortic valve replacement (TAVR). The procedural course was complicated by development of complete heart block ultimately requiring placement of a leadless pacemaker due to vascular access issues from the upper extremities. Fluoroscopy is presented demonstrating simultaneous old and new medical technologies. Etiology, risk factors and implications of post-TAVR heart block are reviewed.*

KEYWORDS. *Heart block, leadless pacemaker, Micra™ Transcatheter Pacing System (TPS), TAVR.*

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Introduction

An 81-year-old male with symptomatic, severe aortic stenosis and end-stage renal disease was deemed high risk for surgical aortic valve replacement. A preoperative electrocardiogram demonstrated Wenckebach second-degree atrioventricular (AV) block. A transfemoral Sapien XT valve (Edwards LifeSciences, Irvine, CA) was deployed in good anatomic position but was complicated by complete heart block. A transvenous pacing lead (St. Jude Medical, St. Paul, MN) was placed via the right internal jugular vein and actively fixed in the right ventricular (RV) apex for temporary pacing support. After persistence of complete heart block, a leadless pacemaker (Micra™ Transcatheter Pacing System (TPS), Medtronic Inc., St. Paul, MN) was placed in the RV apex. Traditional, transvenous pacemaker therapy was avoided due to prior or active dialysis access in his bilateral upper extremities. The image, obtained prior to removing the transvenous pacemaker lead, provides a unique

juxtaposition of “new and old” in cardiovascular medicine. A traditional pacemaker lead is paired here with a leadless pacemaker. The sternal wires, previously a requisite for valve replacement, and percutaneous aortic valve represent a second such pairing of old and new. The implantable loop recorder (Reveal XT, Medtronic Inc., St. Paul, MN) was previously implanted; this device has undergone similar transformative change with a >80% reduction in size of current models (**Figure 1**).

Comments

The incidence of and predictors for the need for long-term pacing support following transcatheter aortic valve replacement (TAVR) have been well reported, with estimates for the Sapien valve ranging from 5% to 18% and from 12% to 50% for the CoreValve (Medtronic, Inc., St. Paul, MN).^{1–3} Preoperative right bundle branch block appears to be the strongest predictor of need for pacemaker therapy following TAVR regardless of valve type (Sapien OR 7, CoreValve OR 29)^{2,4} as the proximal left bundle may be impinged by the inferior skirt of the valve extending into the left ventricular outflow tract. The need for pacemaker placement following TAVR does not appear to be associated with worsened long-term mortality.² Given the patient’s dialysis access history, a leadless pacemaker was utilized to treat his heart block in a percutaneous manner. While not preferred in the

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Figure 1: Fluoroscopy image of unique juxtaposition of new and old medical technologies in cardiovascular medicine.

majority of cases, the use of a single chamber pacemaker system in the presence of sinus rhythm has not been demonstrated to lead to excess mortality.⁵ In summary, the fluoroscopy image demonstrates a unique confluence of old and new medical technologies. Given described rates of AV block associated with TAVR, the use of a leadless pacemaker may be considered when traditional, transvenous pacemakers cannot be used or in the setting of atrial fibrillation when single chamber pacing is sufficient.

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References

1. Maan A, Refaat MM, Heist EK, et al. Incidence and predictors of pacemaker implantation in patients undergoing transcatheter aortic valve replacement. *Pacing Clin Electrophysiol.* 2015;38(7):878–886.
2. Nazif TM, Dizon JM, Hahn RT, et al. Predictors and clinical outcomes of permanent pacemaker implantation after transcatheter aortic valve replacement: the PARTNER (Placement of AoRtic TraNscathetER Valves) trial and registry. *JACC Cardiovasc Interv.* 2015;8(1 Pt A):60–69.
3. Siontis GC, Juni P, Pilgrim T, et al. Predictors of permanent pacemaker implantation in patients with severe aortic stenosis undergoing TAVR: a meta-analysis. *J Am Coll Cardiol.* 2014;64(2):129–140.
4. Guetta V, Goldenberg G, Segev A, et al. Predictors and course of high-degree atrioventricular block after transcatheter aortic valve implantation using the CoreValve Revalving System. *Am J Cardiol.* 2011;108(11):1600–1605.
5. Connolly SJ, Kerr CR, Gent M, et al. Effects of physiologic pacing versus ventricular pacing on the risk of stroke and death due to cardiovascular causes. Canadian Trial of Physiologic Pacing Investigators. *N Engl J Med.* 2000; 342(19):1385–1391.