JACC: CARDIOVASCULAR IMAGING
VOL. 8, NO. 3, 2015
© 2015 BY THE AMERICAN COLLEGE OF CARDIOLOGY FOUNDATION
ISSN 1936-878X/$36.00
PUBLISHED BY ELSEVIER INC.

iMAIL

LETTERS TO THE EDITOR

Transthoracic Echocardiography Guidance for TAVR Under Monitored Anesthesia Care

Two- and three-dimensional transesophageal echocardiography (TEE) has played a vital role in transcatheter aortic valve replacement (TAVR) procedures for evaluating aortic annulus and root geometry, device selection, procedural guidance, and assessment of prosthetic valve function. The use of intraprocedural TEE, however, often necessitates the use of general anesthesia (GA) with endotracheal intubation, which may increase procedural time and the potential risks of complications associated with GA. An alternate strategy is the use of transthoracic echocardiography (TTE) so that the TAVR procedure is completed under controlled sedation and analgesia, also referred to as monitored anesthesia care (MAC) (1). In this letter, we summarize our initial experience in performing TTE-guided TAVR under MAC. The procedural outcomes from a group of patients who underwent TEE-guided TAVR under GA were matched on the basis of the mean EuroSCORE II values and used as a comparison cohort.

We included all patients who underwent TAVR through the transfemoral approach (either percutaneous or direct arterial cut down) from May 1, 2012 to

TABLE 1 Baseline Characteristics and Outcomes

	Moderate Sedation (n = 47)	General Anesthesia (n = 64)	p Value
Age, yrs	82.70 ± 7.89	82.03 ± 8.22	0.667
Female	26 (56.52)	41 (64.06)	0.462
EuroSCORE II, %	7.79 ± 5.87	8.56 ± 4.15	0.440
Body mass index, kg/m^2	26.30 ± 4.23	27.60 ± 6.55	0.236
Diabetes mellitus	12 (25.53)	18 (28.12)	0.920
Lung disease (moderate/severe)	18 (38.29)	20 (31.00)	0.258
Chronic kidney disease (stage 4 or 5)	8 (17.02)	7 (10.93)	0.517
Hypertension	45 (95.74)	64 (100.00)	0.177
Peripheral vascular disease	4 (8.51)	7 (10.93)	0.757
Prior stroke	2 (4.25)	5 (7.81)	0.697
Prior transient ischemic attack	3 (6.38)	4 (6.25)	–
Coronary artery disease	25 (53.19)	31 (48.43)	0.764
Prior CABG	11 (23.40)	13 (20.31)	0.887
Prior PCI	19 (40.42)	20 (31.25)	0.424
Prior myocardial infarction	7 (14.89)	8 (12.50)	0.920
Pre-existing defibrillator	3 (6.38)	2 (3.12)	0.649
Pre-existing pacemaker	8 (17.02)	9 (14.06)	0.862
Prior atrial fibrillation or atrial flutter	16 (34.04)	15 (23.43)	0.310
Procedure time, min	144.26 ± 28.96	193.75 ± 62.35	<0.001
In-hospital death	1 (2.17)	3 (4.91)	0.636
Stroke	–	2 (3.27)	0.507
Multiple TAVR valve deployment	2 (4.34)	3 (4.91)	–
Post-procedure PVR (SAPIEN-THV)			
None/trace	3 (33.33)	35 (68.62)	0.063
Mild	6 (66.67)	13 (25.49)	
Moderate	–	3 (5.88)	
Post-procedure PVR (CoreValve)			
None/trace	20 (52.63)	9 (75.00)	
Mild	15 (39.47)	3 (25.00)	0.200
Moderate	3 (7.89)	0 (–)	
ICU length of stay, h	64.51 ± 29.81	65.30 ± 31.37	0.895
Length of hospital stay, days	7.19 ± 3.84	8.00 ± 6.97	0.839

Values are mean ± SD or n (%).

CABG = coronary artery bypass graft; ICU = intensive care unit; PCI = percutaneous coronary intervention; PVR = paravalvular regurgitation; TAVR = transcatheter aortic valve replacement.

August 30, 2014. Both TEE and TTE were performed with the use of a Vivid 9 imaging platform (GE Healthcare, Waukesha, Wisconsin). Valve sizing was determined by means of multidetector computed tomography. Fluoroscopic guidance was used in all cases. Anesthesia was administered and monitored by a cardiac anesthesiologist. General anesthesia consisted of tracheal intubation facilitated with a paralytic and induction agent. Anesthesia was maintained with inhaled anesthetics and intravenous opioids. MAC was administered with the use of infusions of either dexmedetomidine or propofol in combination with intravenous opioids and local anesthesia (2.0% lidocaine with 0.5% bupivacaine) applied to the femoral access site. Both cohorts were monitored with insertion of a central venous catheter, pulmonary artery catheter, temporary right ventricular pacemaker, and invasive arterial blood pressure catheter. The 2 groups were compared by use of standard statistical methods for continuous and categorical variables, with differences considered statistically significant at $p < 0.05$.

The study population included 111 patients, of whom 64 underwent TAVR with TEE (GA) and 47 underwent TTE (MAC). The Edwards-SAPIEN THV (Edwards Lifesciences, Irvine, California) was placed in 50 of the TEE cohort and in 9 of the TTE cohort. The remainder of the patients received the CoreValve prosthesis. Two patients in the TTE cohort were converted to TEE because of inadequate transthoracic windows. The baseline characteristics are presented in **Table 1**.

Outcome data were statistically similar between the cohorts with regard to procedural success, degree of paravalvular regurgitation, need for additional valve implantation, or complications such as periprocedural stroke or death (**Table 1**). Procedural time was longer in the TEE (GA) cohort ($p < 0.001$) and related to the time needed for weaning off the ventilator. The median length of stay was 6 days in both groups and was not affected by type of valve. The similar length of stay was related to our institutional policy that required monitoring for 48 h in the intensive care unit, irrespective of the type of anesthesia or valve implanted.

Although this is a retrospective study with a modest sample size and relative heterogeneity with respect to type of valve implanted, our data suggest that TAVR can be safely performed with the use of TTE guidance under MAC. These findings require larger, prospective, multicenter studies to more clearly define potential benefits such as shorter procedural times, decreased length of stay, and reduced hospital costs.

Partho P. Sengupta, MD*
Brandon M. Wiley, MD
Sandeep Basnet, MD
Anitha Rajamanickman, MD
Jason C. Kovacic, MD, PhD
Gregory W. Fischer, MD
Annapoorna S. Kini, MD
Samin K. Sharma, MD

*Zena and Michael A. Wiener Cardiovascular Institute
Icahn School of Medicine at Mount Sinai
One Gustave L. Levy Place
New York, New York 10029
E-mail: Partho.Sengupta@mountsinai.org

http://dx.doi.org/10.1016/j.jcmg.2015.01.002

Please note: Dr. Kovacic has received grant support from AstraZeneca. Dr. Sharma has received speaker's fees from Boston Scientific Corporation, Abbott Vascular Inc., AngioScore, DSI/Lilly Inc., and ABIOMED, CSI. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose. Sherif Nagueh, MD, has served as the Guest Editor for this article.

REFERENCE

1. Frohlich GM, Lansky AJ, Webb J, et al. Local versus general anesthesia for transcatheter aortic valve implantation (TAVR): systematic review and meta-analysis. BMC Med 2014;12:41.

Dobutamine Stress Echocardiography for Risk Stratification of Patients With Low-Gradient Severe Aortic Stenosis Undergoing TAVR

Patients with low-gradient severe aortic stenosis (LGSAS) have dismal outcomes when medically managed and although their long-term outcomes are improved with surgery, their risk of death is significantly higher than that of their counterparts with mean transaortic gradient (ΔP) >40 mm Hg (1). Low-dose dobutamine stress echocardiography (DSE), by determining whether flow reserve (FR) is present with inotropic stimulation, has proven useful in enhancing risk stratification of this high-mortality subgroup undergoing surgical aortic valve replacement (SAVR) (2,3). Whether the lack of FR in patients undergoing transcatheter aortic valve replacement (TAVR) similarly portends poor prognosis is unknown and was explored in this study.

Electronic medical records of patients who underwent TAVR for severe AS at Emory University Hospital from January 2009 to March 2013 were reviewed. Demographics and clinical characteristics including comorbidities, outcomes, and echocardiographic data were retrospectively collected. LGSAS was defined as ΔP <40 mm Hg and an aortic valve area (AVA) ≤1.0 cm^2, with either reduced or normal ejection fraction (EF) on baseline transthoracic echocardiogram. Forty-nine patients with LGSAS who