JACC: CARDIOVASCULAR INTERVENTIONS
VOL. 9, NO. 11, 2016

ISSN 1936-8798/$36.00
PUBLISHED BY ELSEVIER
http://dx.doi.org/10.1016/j.jcin.2016.02.028

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Choice of Treatment for Aortic Valve Stenosis in the Era of Transcatheter Aortic Valve Replacement in Eastern Denmark (2005 to 2015)

Ole De Backer, MD, PhD,[a] Ngai H.V. Luk, MD,[a] Niels T. Olsen, MD, PhD,[a] Peter S. Olsen, MD, DMSc,[b] Lars Søndergaard, MD, DMSc[a]

ABSTRACT

OBJECTIVES The aim of this study was to evaluate the choice of treatment for severe aortic valve stenosis in the era of transcatheter aortic valve replacement (TAVR) in Eastern Denmark.

BACKGROUND Until the early 21st century, the only therapeutic option for aortic valve stenosis was surgical aortic valve replacement (SAVR), but this has changed with the introduction of TAVR.

METHODS Using the East Denmark Heart Registry, the evolution of AVR over time was studied for the period 2005 to 2015.

RESULTS TAVR has since its introduction in 2007 seen steady growth, with currently more than 35% of AVR procedures—and 45% of isolated AVR procedures—being performed by transcatheter-based technology. The number of SAVR procedures remained rather stable over the study period and even saw a slight decline since 2012—there was a marked decrease in the age at which surgical bioprostheses are considered appropriate. The age profile of TAVR patients remained unchanged over the study period, with a recent trend toward more low- and intermediate-risk patients. Currently, patients age ≥80 years and/or with a Society of Thoracic Surgeons (STS) surgical risk score >6 are automatically referred for TAVR, and one-half of patients age 70 to 80 years with an STS risk score of 4 to 6 are treated with TAVR.

CONCLUSIONS The number of TAVR procedures has increased steadily in recent years, with a TAVR penetration rate of 35% in 2015 and close to 45% when considering isolated AVR. The number of SAVR procedures remained stable over the study period, and surgical bioprostheses are currently used at a much younger age than in 2005. (J Am Coll Cardiol Intv 2016;9:1152–8) © 2016 by the American College of Cardiology Foundation.

Patients with symptomatic, severe aortic valve stenosis (AS) are known to face a high mortality risk. With the onset of symptoms, 75% of patients succumb within 3 years if not treated (1). Until the early 21st century, the only therapeutic option for these patients was surgical aortic valve replacement (SAVR) (2), but this has changed with the introduction of transcatheter aortic valve

From the [a]Department of Cardiology, The Heart Center, Righospitalet, Copenhagen University Hospital, Copenhagen, Denmark; and the [b]Department of Cardiothoracic Surgery, The Heart Center, Rigshospitalet, Copenhagen University Hospital, Copenhagen, Denmark. Dr. De Backer is a proctor for St. Jude Medical. Dr. Søndergaard is a proctor for and has received research grants from Medtronic and St. Jude Medical. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Manuscript received October 20, 2015; revised manuscript received February 4, 2016, accepted February 11, 2016.

replacement (TAVR). Since the first TAVR procedure performed by Cribier et al. (3) in 2002, the therapeutic management strategy for patients with severe AS has been revolutionized, especially for inoperable and high-risk patients (4-7). Recently, the number of TAVR procedures worldwide surpassed 200,000—the rate of TAVR is highest in Northwestern Europe with more than 50,000 TAVR procedures performed in Germany alone (8,9). In accordance, Scandinavian countries have been early adopters of this new technology and have played a pioneering role in introducing this technology to lower risk patients (10). In this update, we study the choice of treatment for patients with severe AS in the era of TAVR in Eastern Denmark (2005 to 2015), with additional focus on the potential impact of TAVR on SAVR.

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METHODS

In Eastern Denmark, all SAVR and TAVR procedures are registered in the WebPATS East Denmark Heart Registry—registration is linked to reimbursement. All data are reported using standardized electronic data entry and are self-adjudicated by the sites. Mortality data were obtained from Landspatientregisteret and Danmarks Statistik (Copenhagen, Denmark). The indication for SAVR or TAVR is made at a daily heart team meeting. All referring hospitals in Eastern Denmark (population 2.6 million) participate in a daily video conference call centralized at Rigshospitalet and discuss potential cases for cardiac surgery, TAVR as well as complex percutaneous coronary intervention with a senior cardiac surgeon, interventional cardiologist, and noninvasive cardiologist. The aforementioned procedures are performed only at Rigshospitalet, Copenhagen University Hospital. Because rates of TAVR in Scandinavia are among the highest worldwide, we believe that these real-world data may provide useful information for physicians involved in aortic valve replacement (AVR) around the world. In this report, we give an overview of the evolution of SAVR and TAVR in the period 2005 to 2015, a period during which TAVR was introduced and saw fast growth.

Categorical variables are reported as absolute values and percentages. Continuous variables are expressed as mean ± SD. Categorical variables were compared using chi-square or Fisher exact tests and continuous variables using Student *t* tests or Mann-Whitney *U* tests, as appropriate. All tests were 2-sided, and p values <0.05 were considered to indicate statistical significance. Kaplan-Meier survival curves were compared using the log-rank test. A multivariate Cox proportional hazards regression model was used to adjust for any confounding variables between the groups. The analyses were conducted using SPSS version 20.0 (IBM, Armonk, New York).

RESULTS

Between 2005 and 2015, a total of 5,149 SAVR procedures were performed in Eastern Denmark. Of these, 3,810 procedures were isolated SAVR (62.3%) or SAVR in combination with

ABBREVIATIONS AND ACRONYMS

AS = aortic valve stenosis

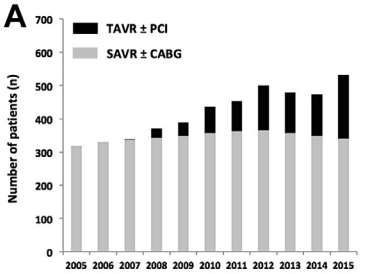
AVR = aortic valve replacement

SAVR = surgical aortic valve replacement

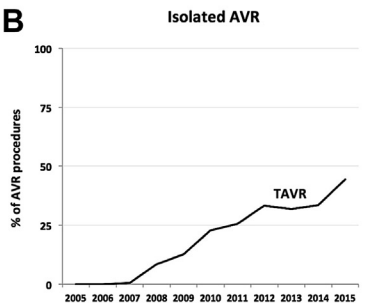
STS = Society of Thoracic Surgeons

TAVR = transcatheter aortic valve replacement

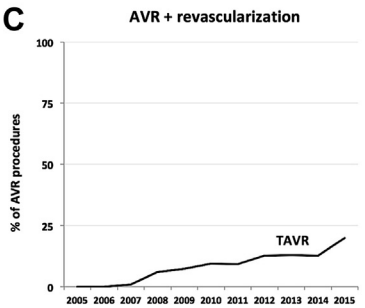
FIGURE 1 Transcatheter and Surgical Aortic Valve Replacement in Eastern Denmark



Year	All SAVR	All TAVR	% TAVR
2005	319	0	0
2006	330	0	0
2007	337	2	0.6
2008	343	28	7.6
2009	348	42	10.8
2010	357	80	18.3
2011	362	91	20.1
2012	366	134	26.8
2013	357	122	25.5
2014	348	126	26.6
2015	343	196	36.4



Year	Isolated SAVR	Isolated TAVR	% TAVR
2005	206	0	0
2006	211	0	0
2007	216	1	0.5
2008	217	20	8.4
2009	221	32	12.7
2010	224	66	22.8
2011	223	77	25.7
2012	229	114	33.2
2013	216	101	31.9
2014	210	106	33.5
2015	202	161	44.4



Year	SAVR + CABG	TAVR + PCI*	% TAVR
2005	113	0	0
2006	119	0	0
2007	121	1	0.8
2008	126	8	6.0
2009	127	10	7.3
2010	133	14	9.5
2011	139	14	9.2
2012	137	20	12.7
2013	141	21	13.0
2014	138	20	12.7
2015	141	35	19.9

Trends in **(A)** overall aortic valve replacement (AVR), **(B)** isolated AVR, and **(C)** AVR plus revascularization in the period 2005 to 2015, as measured for the transcatheter AVR (TAVR) and surgical AVR (SAVR) groups. **(A)** Total number of procedures per year. **(B,C)** Percentage of annual procedures performed with the TAVR technology. *Combined TAVR and percutaneous coronary intervention (PCI) with no more than 3 months between the 2 procedures. CABG = coronary artery bypass graft surgery.