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BRIEF REPORT

Variability in Antithrombotic Therapy Regimens Peri-TAVR: A Single Academic Center Experience

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ABSTRACT

Introduction: The aim of this study was to describe peri-procedural antithrombotic use in patients undergoing transcatheter aortic valve replacement (TAVR) at a single academic medical center.

Methods: Retrospective collection of antiplatelet and anticoagulant use during the index hospitalization for all patients undergoing TAVR at our institution from April 2009 through March 2014.

Results: Of a total of 255 patients undergoing the procedure, 132 (51%) had an indication for anticoagulation pre-TAVR and 92 (70% of those with an indication) were on treatment. On discharge, 106 patients (44% of total surviving to discharge, 73% of those surviving with an indication for anticoagulation) were treated with oral anticoagulation. Of these patients, 89 (84%) were discharged on aspirin and an oral anticoagulant without clopidogrel. Only 122 (51% of total patients) were discharged on the regimen of aspirin and clopidogrel alone.

Conclusion: Peri-procedural antithrombotic regimens vary greatly following TAVR. More than half of patients have an indication for anticoagulation following the procedure. Most patients at our institution who require anticoagulation are discharged on aspirin and an oral anticoagulant, though the optimal regimen requires further investigation.

Keywords: Anticoagulation; Antithrombotic therapy; Atrial fibrillation; Dual antiplatelet therapy (DAPT); Stroke; Structural heart disease; Transcatheter aortic valve replacement (TAVR); Transfemoral aortic valve implantation (TAVI); Triple therapy

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INTRODUCTION

Current guidelines call for lifelong aspirin (acetylsalicylic acid; ASA) with consideration of up to 6 months of clopidogrel following transcatheter aortic valve replacement (TAVR) [1]. Recently, small studies have questioned the necessity of dual antiplatelet therapy (DAPT) following the procedure [2]. Furthermore, many patients receiving TAVR have a pre-existing indication for oral anticoagulation (OAC), most commonly atrial fibrillation (AF) [3]. To date, there have been little data formally addressing the optimal combination of antiplatelet and anticoagulant medications after TAVR, particularly in patients with an indication for OAC.

A 2012 expert consensus document supported by the American College of Cardiology (ACC) and Society of Thoracic Surgeons (STS) suggests treating these patients with ASA and an anticoagulant, omitting clopidogrel [4]. The 2014 ACC/American Heart Association (AHA) valvular disease guidelines give a IIb recommendation for 6 months of treatment with ASA and clopidogrel after TAVR, but do not comment on patients with an indication for anticoagulation [1]. Current European Society of Cardiology (ESC) guidelines state that in TAVR patients with AF, a single antiplatelet combined with an anticoagulant is generally used but treatment decisions should be made based on the perceived bleeding risk of an individual patient [5]. Actual treatment patterns in clinical practice are unknown and are likely to vary by physician and institution [6]. Therefore, we assessed the current practice of antithrombotic treatment following TAVR at a single, large academic center.

METHODS

We performed manual chart review of all patients undergoing TAVR from April 2009 through March 2014 at Brigham and Women's Hospital in Boston, MA, USA. Pre-TAVR antithrombotic regimens were obtained from admission medication reconciliations or prior clinic notes when possible. Post-procedural medications were obtained from the hospital's electronic medication administration log and patient discharge summaries. Additional data were collected using the electronic medical record. Events were classified according to Valve Academic Research Consortium (VARC) definitions [7]. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964, as revised in 2013. Informed consent was obtained from all patients for being included in the study.

RESULTS

Of 255 total patients (mean age 81 years, 48% female), 169 (66%) had transfemoral, 44 (17%) had transapical, and 42 (16%) had an alternative access site TAVR (Table 1). One hundred and thirty-one (51%) patients had an indication for OAC pre-TAVR, of which 122 (48%) had AF and $CHADS_2$ (congestive heart failure, hypertension, age, diabetes, stroke) score >1, 6 (2%) had a history of deep vein thrombosis/pulmonary embolism, and 3 (1%) had other indications. Of patients with an indication for OAC, 92 (70%) were on OAC prior to the procedure, the majority (88%) of whom were treated with warfarin. Twenty-nine (11%) of the total cohort were on DAPT prior to

Table 1 Baseline characteristics

Characteristic	Value
Age, years	80.6 ± 9.77
BMI, km/m^2	27.3 ± 6.66
White	94.9
Male	51.8
Hypertension	90.2
Diabetes	39.6
Atrial fibrillation or flutter	48.2
Permanent	38.2
Paroxysmal	45.5
n/a	16.3
$CHADS_2$ score	3.29 ± 1.05
NYHA class III/IV	93
eGFR, mL/min/1.73 m^2	57.8 ± 29.5
Dialysis	3.1
MI	21.6
PCI	29.0
CABG	36.1
Peripheral arterial disease	22.0
Cerebrovascular disease	13.3
Chronic lung disease	40.8
DVT/PE	9.0
GI Bleeding	14.9
Hemoglobin, g/dL	11.1 ± 1.78
Platelets, k/μL	201.7 ± 82.6
LVEF, %	53.8 ± 14.68
Aortic valve area, cm^2	0.66 ± 0.17
Aortic valve peak velocity, m/sec	4.29 ± 0.63
Moderate-Severe MR	39.3
Transfemoral	66.3
Transapical	17.3
Other valve access site	16.4

Values are mean ± standard deviation or percentage
BMI body mass index, *CABG* coronary artery bypass grafting, *$CHADS_2$* congestive heart failure, hypertension, age, diabetes, stroke, *DVT/PE* deep vein thrombosis/pulmonary embolism, *eGFR* estimated glomerular filtration rate, *GI* gastrointestinal, *LVEF* left ventricular ejection fraction, *MI* myocardial infarction, *MR* mitral regurgitation, *n/a* not available, *NYHA* New York Heart Association, *PCI* percutaneous coronary intervention

the procedure (most for recent coronary stenting) and 5 (2%) were receiving triple therapy with two antiplatelet agents and an anticoagulant. Complete baseline and discharge antithrombotic use is shown in Table 2.

All patients had OAC held prior to the procedure and only 12 (13%) patients on baseline OAC were bridged with a parental anticoagulant prior to TAVR. There were 155 patients (65%) who had an indication for OAC post-TAVR (including 19 with new onset AF), and of these 77 (50%) were bridged with parental anticoagulation after the procedure. Of the 145 patients with an indication for OAC who survived the initial hospitalization, 106 (73%) were discharged on an antithrombotic regimen that included an anticoagulant. Of the 16 surviving patients with new onset AF, 11 (69%) were newly started on OAC after TAVR.

In the total cohort there were 15 deaths, 13 strokes (10 ischemic, 2 hemorrhagic, and 1 unspecified) and 29 major bleeding events prior to discharge. The median time to stroke was 2 days post-procedure. Seven out of 13 patients with in-hospital stroke (5 ischemic) had longstanding AF. Of the 5 patients with

Table 2 Admission and discharge antithrombotic regimens in patients undergoing transcatheter aortic valve replacement

Admission antithrombotic regimen	Discharge antithrombotic regimen						
	SAPT[a]	DAPT[b]	OAC	SAPT + OAC	Triple[c]	Died	Total
None	4	16	0	4	1	5	30
SAPT	7	78	0	16	0	3	104
DAPT	1	21	0	4	1	2	29
OAC	0	1	2	21	7	2	33
SAPT + OAC	0	5	0	43	3	3	54
Triple	0	1	0	1	3	0	5
Total	12	122	2	89	15	15	255

ASA aspirin (acetylsalicylic acid), *DAPT* dual antiplatelet therapy, *OAC* oral anticoagulation, *SAPT* single antiplatelet therapy

[a] SAPT = ASA or P2Y12 antagonist

[b] DAPT = ASA + P2Y12 antagonist

[c] Triple = ASA + P2Y12 antagonist + OAC

ischemic stroke, three were not on baseline OAC and two had OAC held without bridging prior to the procedure. Of 106 patients discharged on OAC, 89 (84%) were treated with ASA + OAC. The most common discharge regimen for the 95 surviving patients without an indication for anticoagulation was DAPT (93%) with only 7 (7%) receiving ASA or clopidogrel alone.

Limitations

Our study was limited by retrospective collection of patient's antithrombotic regimens. In addition, the small number of events and lack of long-term follow-up precluded our ability to relate treatment medications with outcomes.

CONCLUSIONS

In conclusion, at our institution, post-procedural antithrombotic regimens in patients receiving TAVR are highly variable. Nearly two-thirds of patients had an indication for OAC post-TAVR. For patients with an indication for anticoagulation, treating physicians tended (84%) to follow consensus guidelines that suggest a regimen of ASA + OAC following the procedure. Overall, DAPT remains the most frequent antithrombotic regimen at discharge, although 7% of patients were treated with a single antiplatelet agent alone. An analysis of the German Aortic Valve Registry (GARY) found similar results with 66% of patients discharged on DAPT and 27% discharged on an anticoagulant [8]. This study showed a higher rate of triple therapy with 16% of total patients discharged on DAPT plus an anticoagulant [8]. Whether these regimens truly represent the optimal balance between bleeding and thrombosis following TAVR, particularly in patients at high risk for adverse events like those with AF, should be evaluated prospectively in future randomized trials.

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Compliance with ethics guidelines All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964, as revised in 2013. Informed consent was obtained from all patients for being included in the study.

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