Table 1.
Baseline characteristics for patients with atrial fibrillation and on long-term anticoagulation among nonagenarians vs patients <90 years old

	Unmatched			Propensity matched		
	Nonagenarians(77,451)	Age < 90(764,044)	P. value	Nonagenarians (77,451)	Age < 90 (77,451)	P. value
Women	63.7	46.2	<0.001	63.7	62.9	=0.001
Iron deficiency anemia	20.2	17.2	<0.001	20.2	20.3	=0.61
Heart failure	27.3	20.0	<0.001	27.3	28.1	=0.001
Chronic lung disease	17.8	23.0	<0.001	17.8	18.4	=0.004
Coagulopathy	5.6	5.4	=0.03	5.6	5.7	=0.23
Depression	7.3	8.6	<0.001	7.3	7.7	=0.001
Diabetes mellitus	14.5	24.4	<0.001	14.5	15.0	=0.008
Hypertension	66.3	64.8	<0.001	66.3	67.2	=0.001
Chronic liver disease	0.5	1.7	<0.001	0.5	0.5	=0.48
Metastatic cancer	0.7	1.3	<0.001	0.7	0.8	=0.38
Obesity, BMI ≥30	2.2	14.3	<0.001	2.2	2.3	=0.16
Peripheral vascular disease	10.4	10.4	=0.94	10.4	10.7	=0.04
Psychiatric disorder	1.8	2.4	<0.001	1.8	1.9	=0.22
Pulmonary hypertension	5.8	4.4	<0.001	5.8	5.9	=0.52
Chronic kidney disease	24.9	20.8	<0.001	24.9	24.6	=0.17
Solid tumor without metastasis	1.7	1.9	<0.001	1.7	1.9	=0.02
Valvular heart disease	12.2	7.7	<0.001	12.2	12.5	=0.13

Values presented in %, or (#). Chi-Square test was used to compare between groups.

Ahmed Elkaryoni, MD[ag]
Kirolos Barssoum, MD[b]
Amr F. Barakat, MD[c]
Islam Y. Elgendy, MD[d]
Mahmoud Elsayed, MD[e]
Adel Muhanna, MD[f]
Anne Arnason, MD[g]
Islam Shatla, MD[f]
Amir Darki, MD, MSc[ag]
Alan P. Wimmer, MD[fh]*

[a] Division of Cardiovascular Disease, Loyola University Medical Center, Loyola Stritch School of Medicine, Maywood, Illinois
[b] Department of Internal Medicine, Rochester General Hospital, Rochester, New York
[c] Division of Cardiovascular Disease, Heart and Vascular Institute, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania
[d] Divison of Cardiovascular disease, Weill Cornell Medicine-Qatar, Doha, Qatar
[e] Divison of Cardiovascular disease, Allegheny General Hospital, Pittsburgh, Pennsylvania
[f] Department of Internal Medicine, University of Missouri-Kansas City, Kansas City, Missouri
[g] Loyola Stritch School of Medicine, Maywood, Illinois
[h] Division of Cardiovascular Disease, Saint Luke's Mid America Heart Institute, Kansas City, Missouri
27 October 2020

1. Chao TF, Liu CJ, Lin YJ, Chang SL, Lo LW, Hu YF, Tuan TC, Liao JN, Chung FP, Chen TJ, Lip G, Chen SA. Oral anticoagulation in very elderly patients with atrial fibrillation: a nationwide cohort study. *Circulation* 2018; 138:37–47.
2. January CT, Wann LS, Calkins H, Chen L, Cigarroa J, Cleveland J, Ellinor P, Ezekowitz M, Field M, Furie K, Heidenreich P, Murray K, Shea J, Tracy C, Yancy C. 2019 AHA/ACC/HRS focused update of the 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation. *J Am Coll Cardiol* 2019;74:104–132.
3. Alnsasra H, Haim M, Senderey AB, Reges O, Leventer-Roberts M, Arnson Y, Leibowitz M, Hoshen M, Avgil-Tsadok M. Net clinical benefit of anticoagulant treatments in elderly patients with nonvalvular atrial fibrillation: experience from the real world. *Hear Rhythm* 2019;16:31–37.
4. Sharma M, Cornelius VR, Patel JP, Davies JG, Molokhia M. Efficacy and harms of direct oral anticoagulants in the elderly for stroke prevention in atrial fibrillation and secondary prevention of venous thromboembolism: systematic review and meta-analysis. *Circulation* 2015; 132:194–204.
5. Nationwide Readmission Database (NRD). Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality, Rockville, MD.

https://doi.org/10.1016/j.amjcard.2020.11.001

Single Anti-platelet Versus Dual Anti-platelet Therapy After Transcatheter Aortic Valve Implantation: A Meta-Analysis of Randomized Trials

Transcatheter aortic valve replacement (TAVR) has revolutionized the management of patients with severe symptomatic aortic stenosis and has been expanded to low surgical risk patients.[1] Dual antiplatelet therapy (DAPT) with aspirin and clopidogrel for 6 months is recommended after TAVR in patients without an indication for chronic anticoagulation. This recommendation is based on observational studies and consensus opinion.[2] A recent multicenter randomized controlled trial (RCT) has challenged these recommendations.[3] The aim of this meta-analysis of RCTs was to evaluate the efficacy and safety of single antiplatelet therapy (SAPT) versus DAPT after TAVR.

A computerized search of MEDLINE, SCOPUS, and Cochrane databases was performed without language restrictions through October 1, 2020 for RCTs comparing SAPT versus DAPT after TAVR. A protocol for this meta-analysis was prospectively registered at PROSPERO (CRD42019143329). The study design, baseline characteristics, intervention strategies, and clinical outcomes were extracted by 2 independent investigators (A.E and R.T). Discrepancies between investigators were resolved by consensus. The safety outcomes included life-threatening or major bleeding, and any bleeding. The efficacy outcomes included all-cause mortality, myocardial infarction (MI), and major stroke. Outcomes were reported at the longest follow-up. The quality of the included trials was assessed using the RoB2 tool. Data were pooled using random-effects model using inverse variance methods. Heterogeneity across trials was assessed by I^2 statistics. Publication bias was not assessed due to the small

number of included trials (<10). Statistical analyses were conducted using RevMan 5.0 software (Cochrane Collaboration, Oxford, United Kingdom).

The final analysis included 4 RCTS,[3-6] with a total of 1,086 patients. The weighted follow up was 9.2 months. Trans-femoral access was used in 93.3%. Aspirin represented SAPT in all studies, while the DAPT regimen consisted of aspirin and clopidogrel in all studies, except in the SAT-TAVI trial where ticlopidine was allowed.[5] The TAVR valves were exclusively balloon expandable in 2 RCTs,[5,6] self-expandable in 1 RCT,[4] and 1 trial allowed both types.[2] Aside from the open label design in 3 of the 4 RCTs,[3,4,6] all trials were deemed to be of low risk of bias in all other domains.

All outcomes were available for analysis in the 4 studies, except for any bleeding events that was not reported in 1 study.[6] Compared with DAPT, SAPT was associated with lower incidence of life-threatening or major bleeding (5.4% vs 10.6%; risk ratio [RR] 0.51, 95% confidence interval [CI] 0.33 to 0.79, p = 0.01; $I^2 = 0\%$) and any bleeding (14.7% vs 24.2%; RR 0.61; 95% CI 0.46 to 0.80; p = 0.01; $I^2 = 0\%$). There was no significant difference between SAPT and DAPT in the incidence of

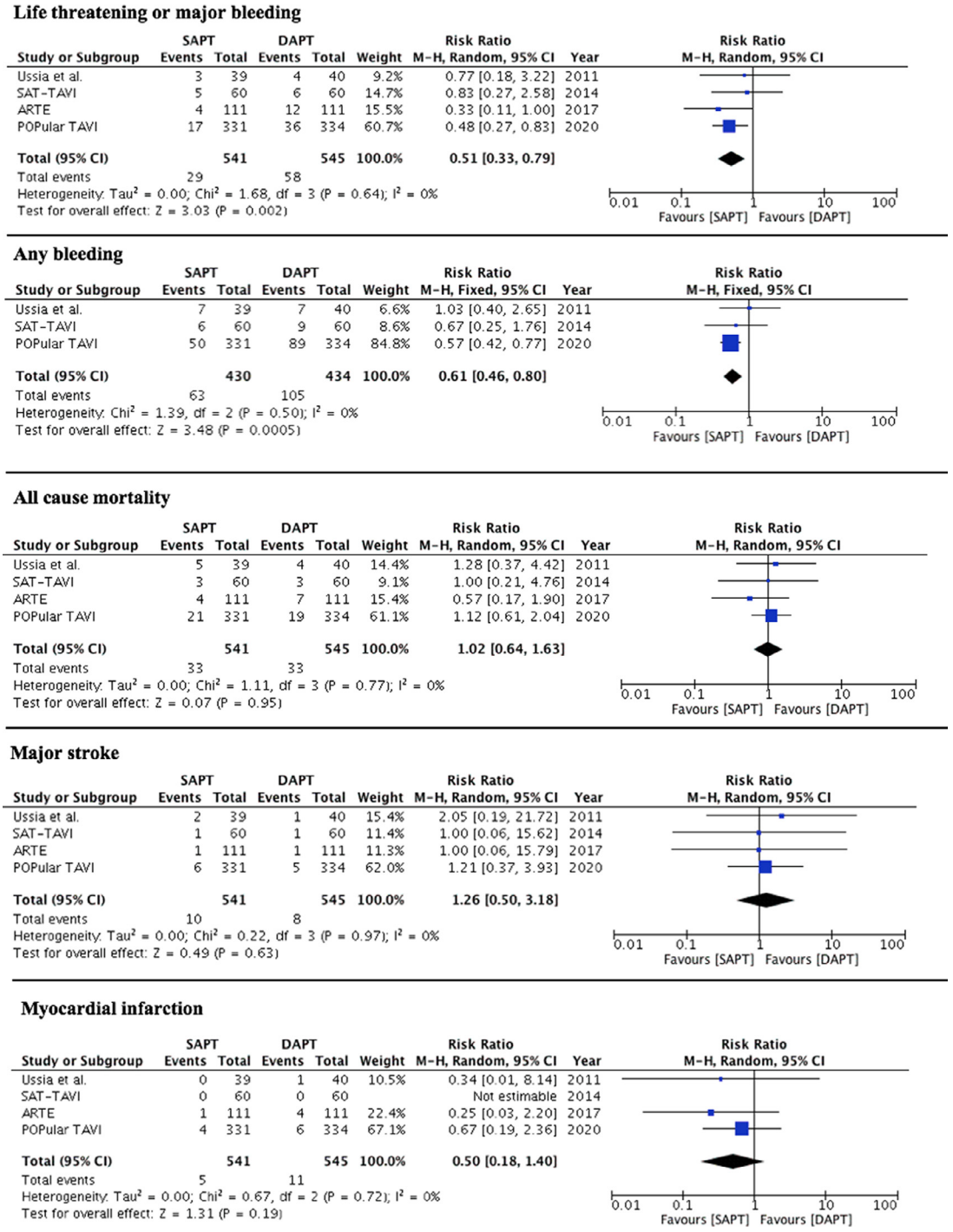

Figure 1. Forest plot for life-threatening or major bleeding, any bleeding, all-cause mortality major stroke and myocardial infarction.

all-cause mortality (6.1% vs 6.1%; RR 1.02, 95% CI 0.64 to 1.63, p = 0.95, $I^2 = 0\%$), MI (0.9% vs 2.0%; RR 0.50, 95% CI 0.18 to 1.40, p = 0.19, $I^2 = 0\%$), and major stroke (1.8% vs 1.5%; RR 1.26, 95% CI 0.50 to 3.18, p = 0.63, $I^2 = 0\%$) (Figure 1).

In this meta-analysis of 4 RCTs including 1,086 patients predominately undergoing transfemoral TAVR, SAPT was associated with lower incidence of life-threatening or major bleeding and any bleeding, without an increased risk of ischemic events including all-cause mortality, MI and major stroke at a mean of 9.2 months. There was no evidence of statistical heterogeneity for all outcomes.

Various antithrombotic protocols have been evaluated post-TAVR in order to minimize ischemic and hemorrhagic complications in TAVR patients. While several RCTs have evaluated the use of SAPT versus DAPT post-TAVR, however; none of these trials were adequately powered to detect differences in individual outcomes.[3-6] The present analysis included the most updated RCTs and constitutes the totality of available randomized data on this topic. We demonstrated that aspirin alone offers a safer profile compared with DAPT post TAVR without an increased risk of ischemic events. This analysis is limited by the lack of patient-level data as well as data on subclinical valve thrombosis, which warrants further investigation.

Disclosures

All the authors have no conflicts of interest to disclose.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relations that could have appeared to influence the work reported in this study.

Ayman Elbadawi, MD[a]
Ravi Thakker, MD[b]
Ahmed A. Abuzaid, MD[c]
Wissam Khalife, MD[a]
Sachin S. Goel, MD[d]
Syed Gilani, MD[a]
Mirvat Alasnag, MD[e]
Islam Y. Elgendy, MD[f]*

[a] Department of Cardiovascular Medicine, University of Texas Medical Branch, Galveston, Texas
[b] Division of Internal Medicine, University of Texas Medical Branch, Galveston, Texas
[c] Division of Cardiology, University of California San Francisco, San Francisco, California
[d] Department of Cardiology, Houston Methodist DeBakey Heart and Vascular Center, Houston, Texas
[e] Cardiac Center-King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia
[f] Division of Cardiology, Weill Cornell Medicine-Qatar, Doha, Qatar

25 October 2020

1. Elgendy IY, Mahmoud AN, Gad MM, Elbadawi A, Rivero F, Alfonso F. Transcatheter or surgical aortic valve replacement for low surgical risk patients: meta-analysis of randomized trials. *JACC Cardiovasc Interv* 2019;12:1399–1401.
2. Abuzaid A, Ranjan P, Fabrizio C, Felpel K, Chawla R, Topic T, Elgendy IY. Single antiplatelet therapy versus dual anti-platelet therapy after transcatheter aortic valve replacement: a meta-analysis, structural heart. Am J Cardiol. 2018;2:408-418.
3. Brouwer J, Nijenhuis VJ, Delewi R, Hermanides RS, Holvoet W, Dubois CL, Frambach P, De Bruyne B, van Houwelingen GK, Van Der Heyden JA. Aspirin with or without clopidogrel after transcatheter aortic-valve implantation. *N Engl J Med* 2020;383:1447–1457.
4. Ussia GP, Scarabelli M, Mulè M, Barbanti M, Sarkar K, Cammalleri V, Immè S, Aruta P, Pistritto AM, Gulino S. Dual antiplatelet therapy versus aspirin alone in patients undergoing transcatheter aortic valve implantation. *Am J Cardiol* 2011;108:1772–1776.
5. Stabile E, Pucciarelli A, Cota L, Sorropago G, Tesorio T, Salemme L, Popusoi G, Ambrosini V, Cioppa A, Agrusta M. SAT-TAVI (single antiplatelet therapy for TAVI) study: a pilot randomized study comparing double to single antiplatelet therapy for transcatheter aortic valve implantation. *Int J Cardiol* 2014;174:624–627.
6. Rodés-Cabau J, Masson J-B, Welsh RC, del Blanco BG, Pelletier M, Webb JG, Al-Qoofi F, Généreux P, Maluenda G, Thoenes M. Aspirin versus aspirin plus clopidogrel as antithrombotic treatment following transcatheter aortic valve replacement with a balloon-expandable valve: the ARTE (Aspirin Versus Aspirin+ Clopidogrel Following Transcatheter Aortic Valve Implantation) randomized clinical trial. *JACC Cardiovasc Interv* 2017;10:1357–1365.

https://doi.org/10.1016/j.amjcard.2020.11.002

Impact of Atrial Fibrillation in Aortic Stenosis (From the United States Readmissions Database)

Even though atrial fibrillation (AF) is present in more than 30% of patients with aortic stenosis (AS),[1] it is typically not included in the decision-making algorithm for the timing or need for aortic valve replacement (AVR), either by transcatheter (TAVR) or surgical (SAVR) approaches.[2] Therefore, we aimed to compare patient characteristics, and in-hospital and 6-month in-hospital outcomes of AS patients with and without AF who underwent AVR and no-AVR from a nationwide population-based registry.

We used the publicly available Nationwide Readmissions Database 2016 to 2017, developed by Healthcare Cost and Utilization Project for this retrospective study.[3] The dataset uses unique patient linkages which aids in following patients during a calendar year. We used the International Classification of Diseases-10th revision codes to identify AS patients ≥ 18 years of age, and without endocarditis, and categorized them into AS with AF and AS without AF cohorts. Treatment strategies identified were TAVR, SAVR, and no-AVR. In-hospital complications such as mortality, stroke, acute kidney injury, major bleeding requiring transfusion (bleeding), pacemaker implantation, and in-hospital mortality within 6 months of being discharged alive were compared in the 2 cohorts. We used the weight variable provided by the Nationwide Readmissions Database to present national estimates of the results.

Of 740,978 eligible AS patients, 40.4% had AF at the time of admission to the hospital. TAVR, SAVR, and no-AVR were done in 7%, 9.3%, and 83.7% of AS with AF patients respectively (Table 1). Similarly, majority (84.4%) of AS without AF patients were managed with no-AVR. AS patients with AF were older than those without AF. Of note, congestive heart failure was most frequently found in patients who underwent TAVR in both AS with and without AF cohorts. In-hospital mortality was significantly higher for AS with than without AF patients who underwent TAVR (1.7% vs 1.1%; odds ratio [OR]: 1.394; 95% confidence interval [CI]: 1.138 to 1.707; p < 0.001) and no-AVR (6.0% vs 3.8%; OR: 1.344; 95% CI: 1.301 to 1.388; p < 0.001). Complications such as acute kidney injury and bleeding were significantly worse for AS with than without AF patients who underwent TAVR, SAVR, or no-AVR. Of patients discharged alive, a significantly more number of AS with AF patients died in-hospital during any readmission within 6 months. A multivariate regression analysis with adjustment for age, gender, heart failure, previous valve