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Letter to the Editor

Incidence and impact of new-onset atrial fibrillation on transcatheter mitral valve repair

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Transcatheter mitral valve repair (TMVr) has been approved, in the United States, for the treatment of degenerative mitral valve regurgitation (MR) in certain high surgical risk or inoperable patients. In a recent study by Jabs et al., the in-hospital outcomes (at 12 months) of pre-existing atrial fibrillation (Afib) did not differ considerably from those with sinus rhythm in regard to either major adverse cardiac and cerebrovascular event (MACCE) rates or clinical improvements [1]. However, it should be noted that Afib is a frequently encountered adverse outcome in the TMVr procedure [1] and is, in general, a marker for advanced heart failure [2]. While previous studies compared the outcomes of pre-existing Afib, there lacks information comparing the outcomes of NOAF in patients with TMVr. Therefore, the objective of this study is to compare in-hospital outcomes in patients with and without NOAF undergoing TMVr.

The study cohorts were derived from the 2012–2014 United States National Inpatient Sample Database, which has been described earlier [3]. First, all adult patients (≥18 years) who underwent TMVr were identified using the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) procedural code 35.97, which is specific for mitral valve repair (N = 2580) [3]. NOAF was then identified using the ICD-9-CM diagnostic code 427.3 in the secondary diagnosis field, which was used previously (N = 1475) [4]. Afterwards, patients were divided into two groups: those with NOAF and those without NOAF. MACCE rates were calculated using the codes utilized by Smilowitz et al. [5] Additionally, cost-to-charge ratio (CCR) files, provided by the sponsor, were merged with the total cost to calculate the final cost used in this analysis. The severity of co-morbid conditions was defined using the Deyo modification of Charlson's co-morbidity index (CCI). A student *t*-test was then used to compare the continuous variables, whereas, the chi-square test was used to compare the categorical variables. Finally, a multivariate logistic regression analysis was performed to estimate odds ratios for outcomes of interest, while adjusting for potential confounders: age, gender, race and Elixhauser comorbidities.

Of the 2580 TMVr patients, 57.2% developed NOAF (Table 1). The mean age was significantly higher in these NOAF patients (76.5 vs. 69.9 years, P ≤0.001) and consisted of significantly more Caucasians. Additionally, the NOAF group had significantly more diabetes, renal failure, and peripheral vascular disease; whereas, obesity was higher in those without NOAF. The proportion of females was also higher in the group without NOAF (55.7% vs. 40.3%, P = 0.04). It should be noted that a greater burden of comorbidities was present in the group with NOAF and is reflected by the "CCI ≥3" variable (51.2% vs. 45.3%, P < 0.001). In-hospital mortality, the primary outcome of this study, was comparable between the groups after the adjusted analysis (Adjusted odds ratio (AOR): 1.00, 95% Confidence Interval (CI): 0.62–1.61, P = 0.99). Furthermore, no differences existed between adjusted (AOR: 1.32, CI: 0.82–2.13, P = 0.25) MACCE rates. It was also noted that less patients without NOAF were discharged to home (52.2% vs. 66.5%, P < 0.001). Finally, the median length of stay was longer (5 vs. 4 days, P < 0.001) for those with NOAF, which subsequently translated into a higher median hospitalization cost ($42,125 vs. $38,598, P < 0.001).

This study demonstrated an important association between NOAF and TMVr with the largest till date TMVr study population. The frequency of NOAF was much higher (57.2%) than TMVr patients without NOAF; however, no major differences regarding adverse events were noted between the groups. In-hospital mortality in those with NOAF was within an acceptable range when compared to a previous study [1]. Although no differences between the groups existed in-hospital mortality or MACCE rates, it should be noted that less patients with NOAF were sent to the home, had longer lengths of stay, and higher associated cost. These differences may be explained by either the greater burden of pre-procedural comorbidities, the development of NOAF, or the late presentation in the NOAF group [2]. Additionally, Velu et al. explained that patients with Afib may remain more symptomatic following the TMVr procedure, which may help explain the association to greater resource utilization, as demonstrated in this study [2].

This study is limited by the absence of clinical presentation, pre- and post-TMVr echocardiographic parameters, and the etiology of MR (degenerative or functional). However, using MitraClip for TMVr is only approved, in the US, for degenerative MR. Additionally, certain unmeasured confounders were not available and, therefore, could not be accounted for.

In conclusion, NOAF, a commonly encountered adverse outcome after TMVr procedure, was not found to significantly alter any in-hospital outcomes. However, NOAF was associated with greater resource utilization. Therefore, what remains to be investigated, is whether NOAF is truly an independent factor that affects the resource utilization or pre-procedural risk profile in those undergoing the TMVr procedure.

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Table 1
Demographics, baseline characteristics and in-hospital outcomes associated with transcatheter mitral valve repair: Stratified by presence or absence of new-onset atrial fibrillation.

Variables	TMVr with NOAF (N = 1475)	TMVr without NOAF (N = 1105)	P value
Age, years	76.5 ± 11.2	69.9 ± 15.1	< 0.001
Females	595 (40.3)	490 (55.7)	0.041
Race			
Caucasians	1025 (69.5)	715 (64.7)	
African American	65 (4.4)	80 (7.2)	0.002
Others	385 (26.1)	310 (28.1)	
Charlson's comorbidity Index			
0	150 (10.2)	180 (16.3)	
1	280 (19.0)	245 (22.2)	< 0.001
2	290 (19.7)	180 (16.3)	
≥3	755 (51.2)	500 (45.3)	
Elixhauser comorbidities			
Hypertension	990 (67.1)	755 (66.3)	0.52
Diabetes mellitus	355 (24.1)	215 (19.5)	0.005
Liver disease	60 (4.1)	45 (4.1)	0.99
Obesity	95 (6.4)	105 (9.5)	0.004
Renal Failure	504 (41.0)	395 (35.8)	0.007
Chronic pulmonary disease	340 (23.1)	265 (24.0)	0.58
Peripheral vascular disease	175 (11.9)	95 (8.6)	0.007
In-hospital outcomes			
Adjusted in-hospital mortality[a]	Odds Ratio: 1.00 Confidence Interval: 0.62–1.61		0.99
Adjusted MACCE[a]	Odds Ratio: 1.32 Confidence Interval: 0.82–2.13		0.25
Discharges to home	770 (52.2)	735 (66.5)	< 0.001
Length of stay, median, days	5 (2–8)	4 (2–8)	< 0.001
Hospitalization cost, median, US$	$42,125 ($29,220–$60,542)	$38,598 ($27,625–$52,038)	< 0.001

Abbreviations: MACCE, major adverse cardiac and cerebrovascular events; NOAF, new-onset atrial fibrillation.
Continuous variables were expressed as a mean ± standard deviation (SD) or median (interquartile range), and categorical variables were expressed as the frequency and percentage.
[a] Adjusted for age, gender, race, and Elixhauser comorbidities in multivariate logistic regression model.

Conflict of interest

The authors have no conflicts of interest to declare.

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