Al-Azhar International Medical Journal

Volume 4 | Issue 10 Article 26

2023

Section: Cardiology

Assessment of Left Atrial Remodeling and Fibrillation after Transcatheter Vs. Surgical Aortic Valve Replacement

Abdallah Elsayed Abdelwahed
Cardiology Department, Faculty of Medicine, Al-Azhar University, Cairo, Egypt, Abdullahabdou94@gmail.com

Yasser Ahmed Sadek
Cardiology Department, Faculty of Medicine, Helwan University, Cairo, Egypt

Kamal Ahmed Marghany
Cardiology Department, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

How to Cite This Article

Abdelwahed, Abdallah Elsayed; Sadek, Yasser Ahmed; and Marghany, Kamal Ahmed (2023) "Assessment of Left Atrial Remodeling and Fibrillation after Transcatheter Vs. Surgical Aortic Valve Replacement," *Al-Azhar International Medical Journal*: Vol. 4: Iss. 10, Article 26.
DOI: https://doi.org/10.58675/2682-339X.1985

ORIGINAL ARTICLE

Assessment of Left Atrial Remodeling and Fibrillation After Transcatheter Versus Surgical Aortic Valve Replacement

Abdallah Elsayed Abdelwahed [a,*], Yasser Ahmed Sadek [b], Kamal Ahmed Marghany [a]

[a] Cardiology Department, Faculty of Medicine, Al-Azhar University, Cairo, Egypt
[b] Cardiology Department, Faculty of Medicine, Helwan University, Cairo, Egypt

Abstract

Background: **Atrial fibrillation (AF) is common following the surgical aortic valve replacement (SAVR).**
Aim of the research: **To evaluate left atrial (LA) remodeling and fibrillation following transcatheter aortic valve implantation (TAVI) versus SAVR.**
Methodology: **This prospective cohort observational research was carried out on 60 cases with severe aortic stenosis (AS) diagnosed by conventional echocardiography and have sinus rhythm, 30 cases who are eligible for TAVI and 30 cases are eligible for SAVR.**
Results: **P wave max, P wave min and P dispersion were significantly reduced in week 4 compared to the baseline in TAVI (*P* value < 0.001). Mean gradient, max gradient, index max LA volume, and index min LA volume were significantly reduced in week 4 compared to baseline in TAVI and SAVRs, with more reduction in TAVI. Aortic valve area was significantly increased in week 4 compared to baseline in TAVI and SAVRs, with more increase in TAVI. P dispersion had a significant positive correlation with Index max LA volume, Index min LA volume, and cases who developed AF. AF cases have prolonged P dispersion and increased index LA volume max and index LA volume min compared to baseline data, indicating negative LA remodeling and AF prediction after SAVR more than TAVI.**
Conclusion: **ECG and echocardiographic parameters were considerably lower following TAVI than SAVR. In early postoperative AS, TAVI is safer than SAVR, but both have similar AF.**

Keywords: Fibrillation, LA remodeling, Transcatheter aortic valve implantation

1. Introduction

In the developed world, aortic stenosis (AS) is the most prevalent valvular cardiac disease. Approximately 7% of the over-65 population suffer from degenerative AS.[1] Without valve replacement, the prognosis of cases with symptomatic severe AS is poor.[1]

Surgical aortic valve replacement (SAVR) has been the standard of care for severe symptomatic AS for a long time. Those with severe AS are typically elderly, frailer, and have a number of comorbidities. Consequently, a significant number of AS cases do not qualify for SAVR. Transcatheter aortic valve implantation (TAVI) is now recognized as a therapeutic option for severe symptomatic AS, replacing SAVR in some cases with high-intermediate (or, more recently, low) risk for SAVR.[2]

In severe cases of AS, left atrial (LA) enlargement and dysfunction are linked to worsening symptoms, returning heart failure following aortic valve replacement, and developing Atrial fibrillation (AF) shortly after surgery.[2,3]

Reportedly, structural remodeling of the atrium caused by AS improves after TAVI due to the reduction in pressure excess.[4]

AF is a prevalent arrhythmia with a 37% lifetime incidence for people older than 55.[5] AF is also linked

Accepted 6 June 2023.
Available online 30 November 2023

* Corresponding author at: 5 Hassan Zaghmour Street, El-Montazah, Alexandria, 21919, Egypt.
E-mail address: Abdullahabdou94@gmail.com (A.E. Abdelwahed).

https://doi.org/10.58675/2682-339X.1985

to substantial cardiovascular morbidity and mortality.[6] After open heart surgery, such as SAVR and, has been identified as a common complication.[1]

The purpose of the research is to assess the LA remodeling and fibrillation after transcatheter Vs. surgical aortic valve replacement.

2. Patients and methods

This prospective cohort observational research was carried out on 60 cases with severe AS diagnosed by conventional echocardiography and have sinus rhythm, 30 cases who are eligible for TAVI and are not suitable for SAVR with mean age >70 years old and 30 cases are eligible for SAVR and are not Suitable for TAVI with mean age >65 years old at the Cardiology Departments of Al-Azhar University, Helwan University, and National heart institute hospitals from June 2022 to December 2022.

Participants all gave their informed consent, and the research was given approval by the Al-Azhar University School of Medicine's Ethics Committee.

Exclusion criteria included cases with AF prior to research, cases who refused consenting to participate in the research, cases with Prior pacemakers' implantation, 'Valve in a valve' procedures for prior failed surgical bio prosthesis, prior Aortic Valve Replacement, cases with congenital heart diseases, cases with advanced chronic kidney diseases and cases with recent stroke or myocardial infarction within 6 months duration.

All cases were subjected to the followings: full history taking, thorough clinical examination, blood tests: Na, K and Complete blood count, electrocardiography (ECG): prior ECGs were revised for underlying rhythm disturbances and conduction abnormalities, baseline 12-lead ECG was obtained and documented within 72 h before the procedure, all cases were placed on continuous ECG monitoring for a minimum of 48 h after the procedure, with daily 12-lead ECG until hospital discharge, periodic ECGs were conducted every week for one month after the procedure and all follow-up ECGs were analyzed for new-onset AF as well as P-wave duration and dispersion.

2.1. 12 Leads ECG procedure

Until the first medical contact (FMC), a standard 12-lead ECG was obtained daily per ESC 2017 guidelines. On hospital admission, all patients had limb leads I, II, III, aVR, aVL, and aVF checked, while some patients also had chest leads V7–V9 placed to look for signs of posterior wall and right ventricular infarction.

2.2. Transthoracic echocardiography (TTE)

Routine data were collected (such as assessment of LV size and function, valvular function, and pulmonary artery pressure). Assessment of LA function, as follows: indexed LA volume max (LAVI-max), indexed LA volume min (LAVI-min), and indexed pre-A volume (LAVI-pe-A, the volume before atrial contraction).

LA volumes were measured by biplane Simpsons' method at baseline and within one month after aortic valve replacement. Standard transducer positions were used to obtain echocardiographic images of the parasternal long-axis and short-axis and apical two-chamber and four-chamber views. Vivid 9, General Electric Healthcare (GE Vingmed, Norway) utilized a phased-array transducer with a variable-frequency (1.7–4 MHz) harmonic M5S transducer. Left ventricle (LV) dimensions and wall thickness, ejection fraction (EF), and LA diameter and volume were estimated according to the guidelines of the American Society of Echocardiography. It was done mainly to diagnose structural heart disease causing arrhythmias, valvular heart disease as mitral valve prolapses and AS, severe LV dysfunction, pericardial effusion, pulmonary hypertension, and hypertrophic cardiomyopathy.

2.3. Statistical analysis

Using version 20.0 of the IBM SPSS software program, data was analyzed. (Armonk, NY: IBM Corp). Quantitative and percentage descriptions of qualitative data were provided. The Shapiro-Wilk test was utilized to confirm the distribution's normality. The range (minimum and maximum), mean, standard deviation, median, and interquartile range were used to describe quantitative data. (IQR). At the 5% significance level, the derived results were deemed significant.

Chi-square test for categorical variables and Student t-test for normally distributed quantitative variables were used to compare between groups.

3. Results

Age was significantly higher in the TAVI compared to SAVR (P-value = 0.009). There was no significant difference between the two studied groups regarding sex and smoking (Table 1).

Clinical history (DM, Hypertension, NYHA score, previous stroke, COPD, AFIB, peripheral vascular disease, myocardial infarction, PCI, and CKD), BSA, and laboratory investigations (HB, Na, & K) were insignificantly different between the two studied groups.

Table 1. Sociodemographic factors of the studied cases.

	TAVI ($n = 30$)	SAVR ($n = 30$)	P value
Age			
Mean ± SD	74.67 ± 4.253	71.93 ± 3.805	**0.009***
Sex			
Female	17 (56.7%)	14 (46.7%)	0.438
Male	13 (43.3%)	16 (53.3%)	
Smoking			
No	16 (53.3%)	11 (36.7%)	0.194
Yes	14 (46.7%)	19 (63.3%)	

*Significant as P value ≤ 0.05.
SAVR, Surgical Aortic Valve Replacement; TAVI, Transcatheter Aortic Valve Implantation.

Table 2. Clinical history, BSA and laboratory investigations of the studied cases.

	TAVI ($n = 30$)	SAVR ($n = 30$)	P value
DM			
No	14 (46.7%)	15 (50.0%)	0.769
Yes	16 (53.3%)	15 (50.0%)	
Hypertension			
No	11 (36.7%)	10 (33.3%)	0.787
Yes	19 (63.3%)	20 (66.7%)	
NYHA score			
I	22 (73.3%)	23 (76.7%)	0.494
II	7 (23.3%)	7 (23.3%)	
III	1 (3.3%)	0 (0.0%)	
Previous stroke			
No	28 (93.3%)	26 (86.7%)	0.671
Yes	2 (6.7%)	4 (13.3%)	
COPD			
No	14 (46.7%)	12 (40.0%)	0.602
Yes	16 (53.3%)	18 (60.0%)	
Afib			
No	30 (100.0%)	30 (100.0%)	–
Peripheral vascular disease			
No	25 (83.3%)	26 (86.7%)	0.720
Yes	5 (16.7%)	4 (13.3%)	
Myocardial infarction			
No	22 (73.3%)	16 (53.3%)	0.108
Yes	8 (26.7%)	14 (46.7%)	
PCI			
No	23 (76.7%)	19 (63.3%)	0.260
Yes	7 (23.3%)	11 (36.7%)	
CKD			
No	28 (93.3%)	26 (86.7%)	0.671
Yes	2 (6.7%)	4 (13.3%)	
BSA			
Mean ± SD	1.87 ± 0.09	1.85 ± 0.08	0.282
HB			
Mean ± SD	11.93 ± 1.437	12.20 ± 1.324	0.449
Na			
Mean ± SD	136.77 ± 4.125	135.03 ± 3.368	0.117
K			
Mean ± SD	3.520 ± 0.4029	3.500 ± 0.3620	0.935

Afib, AF; BSA, Body surface area; CKD, Chronic kidney disease; COPD, Chronic obstructive pulmonary disease; DM, Diabetes mellitus; HB, Haemoglobin; K, Potassium, Na, Sodium; NYHA, New York Heart Association; PCI, Percutaneous coronary intervention; SAVR, Surgical Aortic Valve Replacement; TAVI, Transcatheter Aortic Valve Implantation.

Regarding history of Stroke and myocardial infarction, patients with event history had the event more than 1 year ago, All CKD patients were stage 1 and stage 2, All patients with peripheral vascular disease were classified as Grade 1 Peripheral vascular disease and the site of PVD was below knee level and didn't affect TAVI access site (Table 2).

Baseline ECG readings (P wave max, P wave min and P dispersion) were insignificantly different between the two studied groups. Baseline echocardiography (LVEF %, mean gradient, Index max LA volume, Index min LA volume, AV area, PASP, AR and MR) were insignificantly different between the two studied groups. Max gradient was significantly reduced in TAVI compared to SAVR (P-value = 0.011).

Regarding Aortic Regurgitation it was trivial to mild degree of Aortic Regurgitation and regarding MR it was insignificant mitral regurgitation (Table 3).

P wave max, P wave min and P dispersion were significantly reduced in week 4 in comparison to the baseline reading in TAVI (P-value <0.001), while no significant difference was found in P wave max, P wave min and P dispersion between baseline and

Table 3. Baseline ECG and echocardiography of the studied cases.

Studied variables (ECG & Echo)	TAVI ($n = 30$)	SAVR ($n = 30$)	P value
Max P wave			
Mean ± SD	127.97 ± 5.810	127.97 ± 5.810	1
Min P wave			
Mean ± SD	70.63 ± 6.167	70.63 ± 6.167	1
P wave dispersion			
Mean ± SD	57.47 ± 8.178	57.47 ± 8.178	1
LVEF %			
Mean ± SD	64.40 ± 7.605	61.97 ± 5.209	0.114
Mean gradient			
Mean ± SD	51.23 ± 18.049	53.17 ± 14.657	0.206
Max gradient			
Mean ± SD	83.717 ± 30.1278	89.467 ± 18.0129	**0.011***
Index max LA volume			
Mean ± SD	48.87 ± 8.097	50.77 ± 7.050	0.348
Index min LA volume			
Mean ± SD	25.97 ± 5.014	25.97 ± 5.014	1
AV area			
Mean ± SD	0.7063 ± 0.18348	0.6360 ± 0.13531	0.054
PASP			
Mean ± SD	44.1 ± 20.537	48.23 ± 18.619	0.239
AR			
No	15 (50%)	13 (43.3%)	1
Yes	15 (50%)	17 (56.7%)	
MR			
No	13 (43.3%)	13 (43.3%)	1
Yes	17 (56.7%)	17 (56.7%)	

*Significant as P value ≤ 0.05.
AR, Aortic regurgitation; AV, Aortic valve; LA, Left atrium; LVEF, Left ventricular ejection fraction; MR, Mitral regurgitation; PASP, Pulmonary arterial systolic pressure; SAVR, Surgical Aortic Valve Replacement; TAVI, Transcatheter Aortic Valve Implantation.

week 4 reading in SAVR. LVEF % and PASP were insignificantly different between baseline and week 4 reading in both groups. Mean gradient, max gradient, index max LA volume and index min LA volume were significantly reduced in week 4 reading compared to baseline reading in TAVI and SAVRs, with more reduction in TAVI. AV area was significantly increased in week 4 reading compared to baseline reading in TAVI and SAVRs, with more increase in TAVI (Table 4).

In the first, second, third and fourth week, P wave max and P dispersion were significantly reduced in TAVI compared to SAVR, while P wave min was insignificantly different between both groups in first, second and third week but was significantly reduced in TAVI compared to SAVR in the fourth week. No cases suffered from AF in the first week in both groups. AF was insignificantly different between both groups in the second, third and fourth week (Table 5).

In the fourth week, index min LA volume an index maxes LA volume, were significantly more reduced in TAVI compared to SAVR, while LVEF %, Mean gradient, Max gradient, AV area and PASP were insignificantly different between both groups. AR and MR were insignificantly different between both groups (Table 6).

P dispersion had significant positive correlation with Index max LA volume, Index min LA volume and cases who developed AF. Cases who developed AF are noted to have prolonged P dispersion and also increased index LA volume max and index LA volume min after Procedure compared to baseline data, which is an indicator as negative LA remodeling and AF predictor after the procedure, which occurs after SAVR more than after TAVI (Fig. 1).

4. Discussion

In the current research, baseline ECG readings (P wave max, P wave min and P dispersion) were insignificantly different between the TAVI and

Table 4. Comparison of the baseline and fourth week ECG of the studied cases.

ECG	baseline median (IQR)	week 4 median (IQR)	*P* value
Max p wave			
TAVI	128.5 (9)	110 (6)	**<0.001***
SAVR	128.5 (9)	127 (12)	0.358
Min p wave			
TAVI	70 (11)	66.5 (10)	**<0.001***
SAVR	70 (11)	70 (11)	0.564
P wave dispersion			
TAVI	58 (14)	50.5 (14)	**<0.001***
SAVR	58 (14)	58.5 (16)	0.265
LVEF %			
TAVI	65 (12)	68 (12)	0.425
SAVR	60 (9)	62.5 (5)	0.078
Mean gradient			
TAVI	48 (24)	9.5 (10)	**<0.001***
SAVR	50.5 (21)	11 (7)	**<0.001***
Max gradient			
TAVI	79 (44.3)	18 (14.5)	**<0.001***
SAVR	91 (27.5)	22 (15.5)	**<0.001***
Index max LA volume			
TAVI	49 (14)	41 (12)	**<0.001***
SAVR	50 (11)	49.5 (12)	**0.008***
Index min LA volume			
TAVI	25.5 (7)	21 (6)	**<0.001***
SAVR	25.5 (7)	24 (9)	**<0.001***
AV area			
TAVI	0.69 (0.28)	1.76 (0.44)	**<0.001***
SAVR	0.65 (0.26)	1.5 (0.5)	**<0.001***
PASP			
TAVI	38 (28)	36.5 (13)	0.485
SAVR	42 (24)	42 (24)	1

*Significant as *P* value ≤ 0.05.
ECG, Electrocardiogram; SAVR, Surgical Aortic Valve Replacement; TAVI, Transcatheter Aortic Valve Implantation.

Table 5. ECG of the studied groups in the four weeks after procedures.

	TAVI (*n* = 30)	SAVR (*n* = 30)	*P* value
Max P wave			
Mean ± SD	124.3 ± 5.383	128 ± 6.086	**0.006***
Min P wave			
Mean ± SD	69.5 ± 6.101	70.7 ± 6.171	0.353
P wave dispersion			
Mean ± SD	52.8 ± 6.332	57.5 ± 8.186	**0.020***
AF			
No (N (%))	30 (100.0%)	30 (100.0%)	–
Max P wave			
Mean ± SD	121.97 ± 5.732	127.27 ± 6.612	**0.001***
Min P wave			
Mean ± SD	66.93 ± 5.753	70.63 ± 6.245	**0.016***
P wave dispersion			
Mean ± SD	55.03 ± 7.712	56.47 ± 9.085	0.534
AF			
ccNo (N (%))	29 (96.7%)	27 (90%)	0.612
Yes (N (%))	1 (3.3%)	3 (10%)	
Max P wave			
Mean ± SD	122.3 ± 6.109	127.53 ± 6.862	**0.002***
Min P wave			
Mean ± SD	66.97 ± 5.762	70.6 ± 6.218	**0.018***
P wave dispersion			
Mean ± SD	55.33 ± 7.739	56.77 ± 9.317	0.52
AF			
No (N (%))	27 (90%)	26 (86.7%)	0.688
Yes (N (%))	3 (10%)	4 (13.3%)	
Max P wave			
Mean ± SD	112.93 ± 8.094	127.77 ± 7.074	**<0.001***
Min P wave			
Mean ± SD	65.13 ± 5.882	70.57 ± 6.328	**0.002***
P wave dispersion			
Mean ± SD	47.8 ± 9.053	57.03 ± 9.485	**0.001***
AF			
No	26 (86.7%)	23 (76.6%)	0.317
Yes	4 (13.3%)	7 (23.3%)	

*Significant as *P* value £0.05.
SAVR, Surgical Aortic Valve Replacement; TAVI, Transcatheter Aortic Valve Implantation.

Table 6. ECHO of the studied cases in the fourth week after the procedures.

	TAVI ($n = 30$)	SAVR ($n = 30$)	P value
LVEF %			
Mean ± SD	65.8 ± 7.893	63 ± 4.5	0.146
Mean gradient			
Mean ± SD	11.2037 ± 4.74766	14.36 ± 8.7	0.231
Max gradient			
Mean ± SD	21.183 ± 8.2718	25.86 ± 13.37	0.139
Index min LA volume			
Mean ± SD	22.13 ± 4.833	24.93 ± 5.132	**0.034***
Index max LA volume			
Mean ± SD	40.1 ± 8.002	49.4 ± 7.185	**<0.001***
AV area			
Mean ± SD	1.7 ± 0.28	1.58 ± 0.37	0.123
PASP			
Mean ± SD	43.47 ± 15.745	48.23 ± 18.61	0.239
AR			
No	15 (50%)	13 (43.3%)	0.605
Yes	15 (50%)	17 (56.7%)	
MR			
No	11 (36.7%)	13 (43.3%)	0.598
Yes	19 (63.3%)	56.7%)	

*Significant as P value ≤ 0.05.
AR, Aortic regurgitation; AV, Aortic valve; LA, Left atrium; LVEF, Left ventricular ejection fraction; MR, Mitral regurgitation; PASP, Pulmonary arterial systolic pressure; SAVR, Surgical Aortic Valve Replacement; TAVI, Transcatheter Aortic Valve Implantation.

SAVR. These results were also observed by Chino et al. who found that baseline ECG readings were insignificantly different between the TAVI and SAVR.[2]

According to our results, baseline echocardiography (LVEF %, mean gradient, Index max LA (LA) volume, Index min LA volume, AV area, Pulmonary arterial systolic pressure (PASP), aortic regurgitation (AR) and Mitral regurgitation (MR) were insignificantly different between the TAVI and SAVR. In accordance with our findings, Fairbairn et al. showed that baseline echocardiography (LVEF %, mean gradient, AV area, aortic regurgitation (AR) and Mitral regurgitation (MR)) were insignificantly different between the TAVI and SAVR.[2] Additionally, Leon et al. found that no significant difference regarding baseline echocardiography (aortic-valve area, mean gradient, left ventricular ejection fraction, left ventricular mass index) between the TAVR group and the surgery group.[3]

In our results, P wave max, P wave min and P dispersion were significantly reduced in week 4 in comparison to the baseline reading in TAVI (P-value <0.001), while no significant difference was found in P wave max, P wave min, and P dispersion between baseline and week 4 reading in SAVR. In accordance with our findings, Dursun et al. found that P-wave duration and PWD were significantly decreased on post-TAVR six months.[4]

In our results, LVEF % and PASP were insignificantly different between baseline and week 4 reading in the TAVI and SAVR. In accordance with our findings, Nour et al. found that LVEF % and PASP were insignificantly different between pre and post reading in the TAVI and SAVR.[5] Similarly, Truong et al. (2018 found that LVEF % was insignificantly different between the baseline and one month.[6]

In our results, mean gradient, max gradient, index max LA volume and index min LA volume was significantly reduced in week 4 reading compared to baseline reading in TAVI and SAVRs, with more reduction in TAVI. In accordance with our findings, Pouline et al. found that mean gradient, and max gradient was significantly reduced in the follow-up reading compared to the baseline reading in TAVI and SAVRs, with more reduction in TAVI.[7] Moreover, Thyregod et al. found that the mean gradient, max gradient was significantly reduced in 12 months and 3 months reading compared to baseline reading in TAVR and SAVRs, with more reduction in the TAVR group.[8]

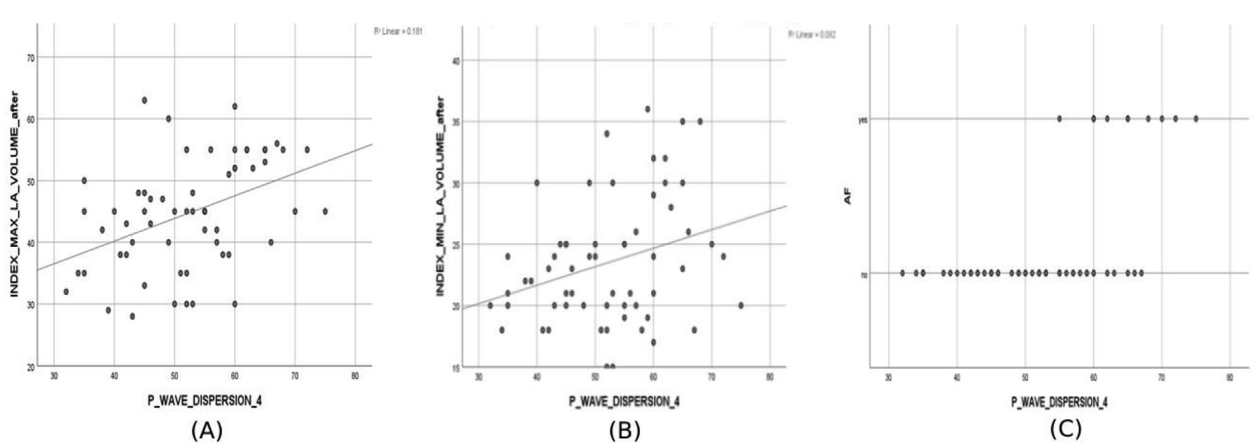

Fig. 1. Correlation between P wave dispersion of the studied cases and index max LA volume (a), index min LA volume (b) and AF (c).

In our results, the aortic valve (AV) area was significantly increased in week 4 reading compared to baseline reading in TAVI and SAVRs, with more increase in TAVI.

In accordance with our findings, Pouline et al. (2017) found that the aortic valve (AV) area was significantly increased in week 4 reading compared to baseline reading in TAVI and SAVRs, with more increase in TAVI.[7] Similarly, Leon et al. (2016) found that AV area was significantly increased in 30 days reading compared to baseline reading in TAVI and surgery groups, with more increase in TAVI.[3]

In the current research, in the second and third week, P wave max and P wave min were significantly reduced in TAVI compared to SAVR, while P dispersion was insignificantly different between the TAVI and SAVR. AF was insignificantly different between both groups (1 (3.3%) and 3 (10%) in TAVI and 3 (10%) and 4 (13.3%) in SAVR). Similarly, Jorgensen et al. found that in the second week, AF was insignificantly different between both groups ((27%) in TAVI and (25%) in SAVR.[9]

In the current research, in the fourth week, P wave max, P wave min and P dispersion were significantly reduced in TAVI compared to SAVR. AF was insignificantly different between both groups (4 (13.3%) in TAVI and 7 (23.3%) in SAVR. These results were also observed by, Chino et al. who found that the QTD and QTcD significant decreased immediately after 1 month of surgery in the TAVI versus the SAVR (P\0.001) also, TAVI more rapidly improved dispersion of spatial repolarization than SAVR.[2] Additionally, Dursun et al. found that P-wave duration and PWD were significantly decreased on post-TAVR six month ($P < 0.05$).[4]

In our research, in the fourth week, index min LA volume an index max LA volume, were significantly more reduced in TAVI compared to SAVR, while LVEF %, Mean gradient, Max gradient, AV area and PASP were insignificantly different between both groups. AR and MR were insignificantly different between both groups. Similarly, Truong et al. found that in one-month index min LA volume an index maxes LA volume, were significantly reduced in TAVR group. while LVEF % was insignificantly different between the baseline and one month.[6] In contrast to our results, Leon et al. found that AR was significantly increased in TAVR group than surgical group. This difference may be because of different sample size.[3]

In our research, P dispersion had significant positive correlation with Index max LA volume, Index min LA volume and cases who developed AF. In accordance with our findings, Gulsen et al. found that P max and P dispersion (PWD) were ECG parameters that were found to have significant correlations with new onset AF (NOAF) in univariate regression analysis.[10]

In our research, cases who developed AF are noted to have prolonged P dispersion and increased index LA volume max and index LA volume min after procedure compared to baseline data which is indicator as negative LA remodeling and AF predictor after the procedure, which occurs after SAVR more than after TAVI.

Additionally, Tsang et al. showed that LAVI-max was an accurate measure for the prediction of cardiovascular outcomes and AF.[11]

Limitations include that it was a single center research, the sample size was relatively small that increased the risk of overlooking significant differences between the two groups, Echocardiography evaluated left atrial (LA) mass and remodeling. Even though this is a well-established procedure, more information about fibrosis and cellular changes may have been gleaned from MRand a sample of cardiac tissue. Echocardiographic and ECG follow-up was limited to 4 weeks. Our study couldn't exclude patients with associated conditions as Mitral regurgitation and Aortic regurgitation but we have considered Regurgitation degree to be insignificant degrees of MR and AR. Also Patients with past history of stroke and myocardial infarction we have considered that event has occurred more than one year ago. All-cause mortality and cause of death were not recorded. Further prospective multicenter studies with larger sample size are needed.

A prolonged follow-up period may permit the detection of greater alterations in LA remodeling and a greater number of clinical events. Additional research is required to compare the long-term outcomes of TAVI and SAVR. All-cause mortality and cause of death should be recorded. Regarding AS, we suggested that TAVI is a safer option than SAVR, particularly in the early postoperative period.

4.1. Conclusion

Our findings suggest that ECG parameters (P wave max, P wave min and P dispersion) and echocardiographic parameters (index min LA volume an index max LA volume) were significantly decreased immediately after surgery in TAVI cases compared to SAVR cases. In terms of AS, TAVI is a safer option versus SAVR, especially in the early postoperative period. However, AF did not differ between TAVI and SAVR.

Authors' contribution

Abdallah Elsayed Abdelwahed: Idea formulation, data collection, analysis and writing. Yasser Ahmed Sadek: data collection and writing. Kamal Ahmed Marghany: Supervision, writing, and revision.

Financial support and sponsorship

Nil.

Conflicts of interest

Nil.

References

1. Frendl G, Sodickson AC, Chung MK, Waldo AL, Gersh BJ. 2014 AATS guidelines for the prevention and management of perioperative atrial fibrillation and flutter for thoracic surgical procedures. *J Thorac Cardiovasc Surg*. 2014;148: 153−193. https://doi.org/10.1016/j.jtcvs.2014.06.036.
2. Chino S, Yamanaka E, Takasusuki T, Hamaguchi S, Yamaguchi S. Comparison of cardiac repolarization after transcatheter aortic valve implantation and surgical aortic valve replacement: a longitudinal study. *Cardiol Ther*. 2020;9: 97−105. https://doi.org/10.1007/s40119-019-00154-6.
3. Leon MB, Smith CR, Mack MJ, Makkar RR, Svensson LG. Transcatheter or surgical aortic-valve replacement in intermediate-risk patients. *N Engl J Med*. 2016;374:1609−1620. https://doi.org/10.1056/NEJMoa1700456.
4. Dursun H, Tanriverdi Z, Colluoglu T, Kaya D. Effect of transcatheter aortic valve replacement on p-wave duration, p-wave dispersion and left atrial size. *J Geriatr Cardiol*. 2015;12: 613−629. https://doi.org/10.11909/j.issn.1671-5411.2015.06.016.
5. Nour MK, Sadek YA, Abdelaziz A, Zeineldin KH. Early critical care unit outcome with transcatheter aortic valve intervention compared to surgical aortic valve replacement in severe aortic stenosis. *Egypt J Crit Care Med*. 2022;9:70−78. https://doi.org/10.1097/EJ9.0000000000000044.
6. Truong VT, Chung E, Nagueh S, Kereiakes D, Schaaf J. Effect of transcatheter aortic valve replacement on left atrial function. *Echocardiogr*. 2018;35:1713−1720. https://doi.org/10.1111/echo.14109.
7. Poulin F, Thavendiranathan P, Carasso S, Rakowski H, Horlick EM. Left atrial phasic function and its association with atrial fibrillation in patients after transcatheter aortic valve implantation. *Can J Cardiol*. 2017;33:925−932. https://doi.org/10.1016/j.cjca.2017.04.005.
8. Thyregod HGH, Steinbrüchel DA, Ihlemann N, Nissen H, Kjeldsen BJ. Transcatheter versus surgical aortic valve replacement in patients with severe aortic valve stenosis: 1-year results from the all-comers notion randomized clinical trial. *J Am Coll Cardiol*. 2015;65:2184−2194. https://doi.org/10.1016/j.jacc.2015.03.014.
9. Jorgensen TH, Thyregod HGH, Tarp JB, Svendsen JH, Sondergaard L. Temporal changes of new-onset atrial fibrillation in patients randomized to surgical or transcatheter aortic valve replacement. *Int J Cardiol*. 2017;234:16−21. https://doi.org/10.1016/j.ijcard.2017.02.098.
10. Gulsen K, Ince O, Akgun T, Demir S, Uslu A. The effect of p wave indices on new onset atrial fibrillation after trans-catheter aortic valve replacement. *J Electrocardiol*. 2020;61:71−76. https://doi.org/10.1016/j.jelectrocard.2020.06.001.
11. Tsang TS, Abhayaratna WP, Barnes ME, Miyasaka Y, Bailey KR. Prediction of cardiovascular outcomes with left atrial size: is volume superior to area or diameter? *J Am Coll Cardiol*. 2006;47: 1018−1023. https://doi.org/10.1016/j.jacc.2005.08.077.