Mechanical Aortic Valve Replacement is Associated with Improved Survival for End-Stage Renal Disease Patients on Dialysis

Objective: Despite the increasing number of end-stage renal disease (ESRD) patients on dialysis with aortic valve disease, the long-term impacts of mechanical (mechAVR) versus bioprosthetic aortic valve replacement (bioAVR) in this population have not been fully elucidated. To address this, we sought to evaluate the long-term outcomes of bioAVR vs mechAVR in chronic dialysis patients.

Methods: In this retrospective study, we utilized administrative ICD-9 and ICD-10 diagnosis and procedure codes to identify CMS patients who underwent isolated bioAVR or mechAVR +/- CABG between 1/1/2012 to 12/31/2020. Long-term hospitalization data were linked to their index operation. The primary outcome was mortality, while secondary outcomes included LOS, reintervention, and MACE (composite of death, stroke, and acute MI). Univariable and multivariable regression models, adjusted for CHF, HTN and Charlson Score were used to analyze the outcomes.

Results: 4,408 underwent bioAVR and 2,051 underwent mechAVR. MechAVRs decreased from a high of 346 in 2012 to 95 in 2020 while bioAVRs declined from 607 in 2017 to 330 in 2020 (Fig 1A). MechAVR patients were younger (61 [52,65] vs 65 [59,65], p<0.001), with higher rates of HTN (88 v 83% p<0.001) and peripheral vascular disease (70% vs 80%, p<0.001) but were less likely to have CHF (34% vs 42%,p<0.001). LOS was higher in bioAVRs - median LOS 12 days IQR [8,19] vs mechAVR 11 days IQR [7,18] p=0.012. Perioperative bleeding was more common in bioAVRs (54% v 48%, p<0.001). There was no difference in reintervention rates (bioAVR 3.4% vs mechAVR 3.7%, p=0.60). Median survival was significantly lower in bioAVRs compared to mechAVRs (p<0.001) (Fig. 1B) [31.3 mo (95%CI 30.1, 32.9) vs 37.5 mo (95%CI 34.0, 40.4) p<0.001]. After multivariable cox regression for mortality, mechAVR was associated with increased survival HR 0.90 (95%CI 0.85, 0.96) p=0.001. Subgroup analysis for patients younger and older than 50 showed survival benefit for mechAVR patients (p=0.006 and p=0.005, respectively) (Fig 1C).

Conclusions: Among patients with ESRD on dialysis undergoing SAVR, mechAVR is associated with greater long-term survival (median follow up time 33 mo IQR [16, 67]) despite similar reintervention rates. This survival advantage persisted in both multivariable and subgroup analyses, including younger and older patients. These findings suggest that mechAVR may provide a better survival benefit for patients with ESRD on dialysis at time of SAVR.

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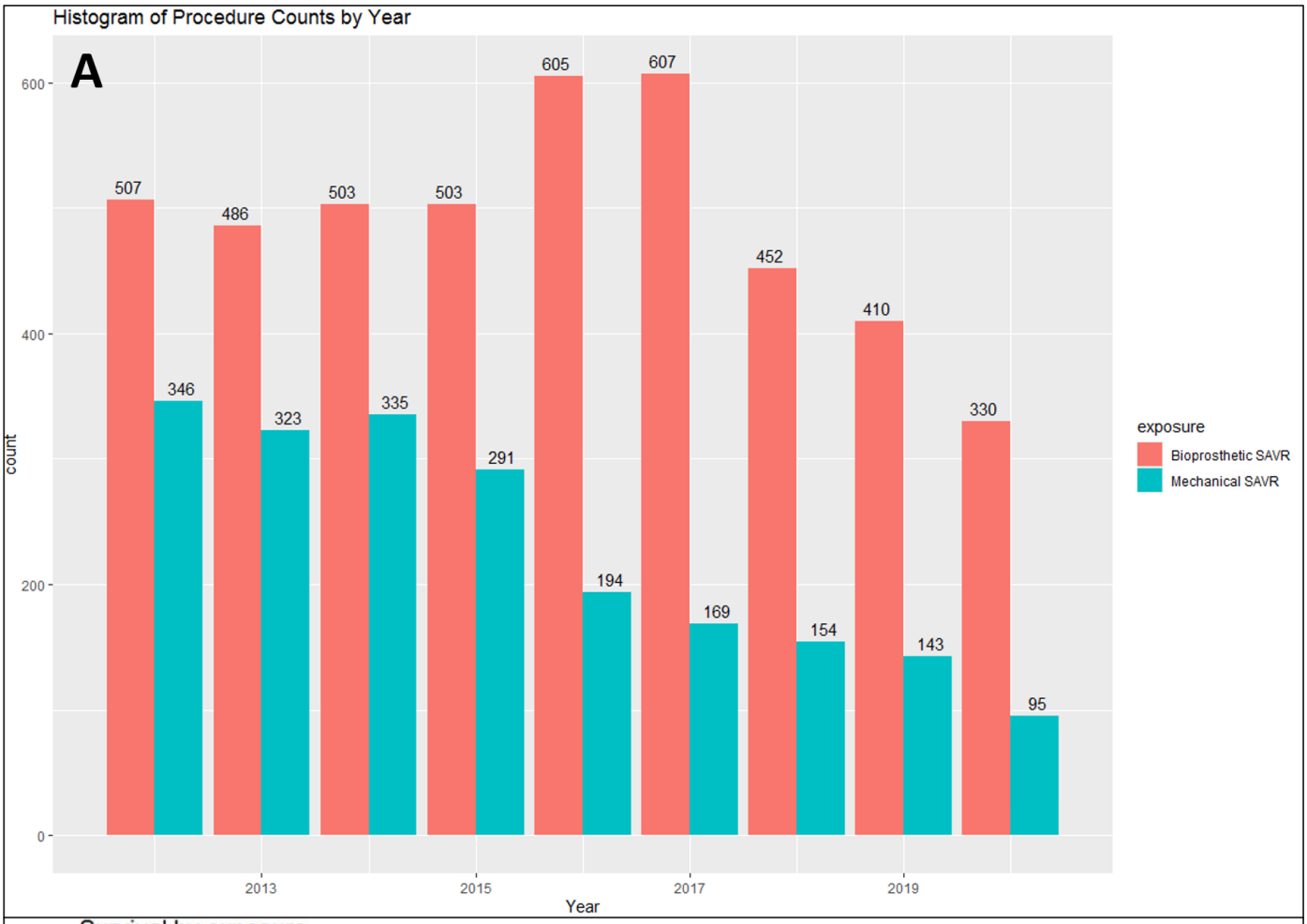
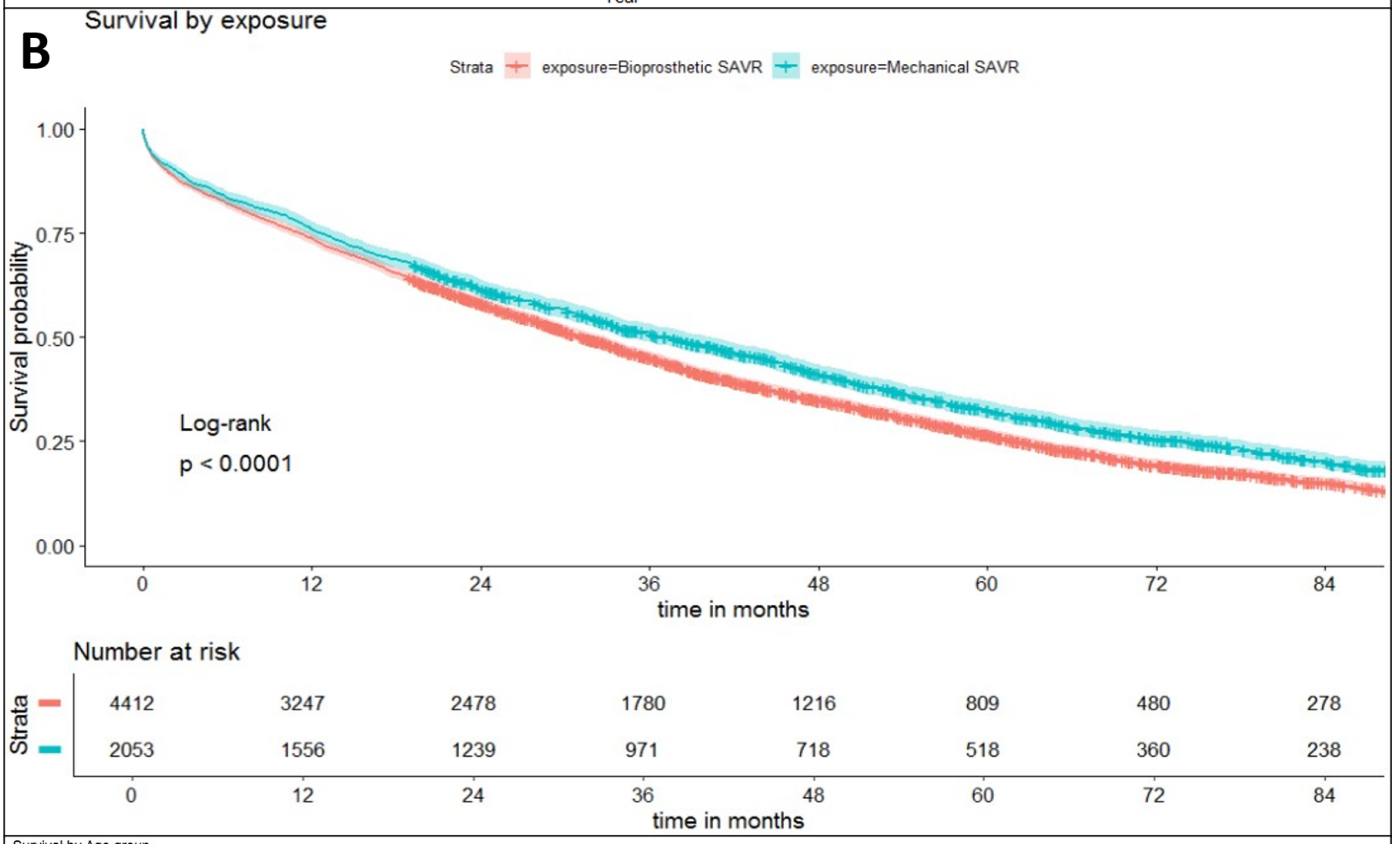
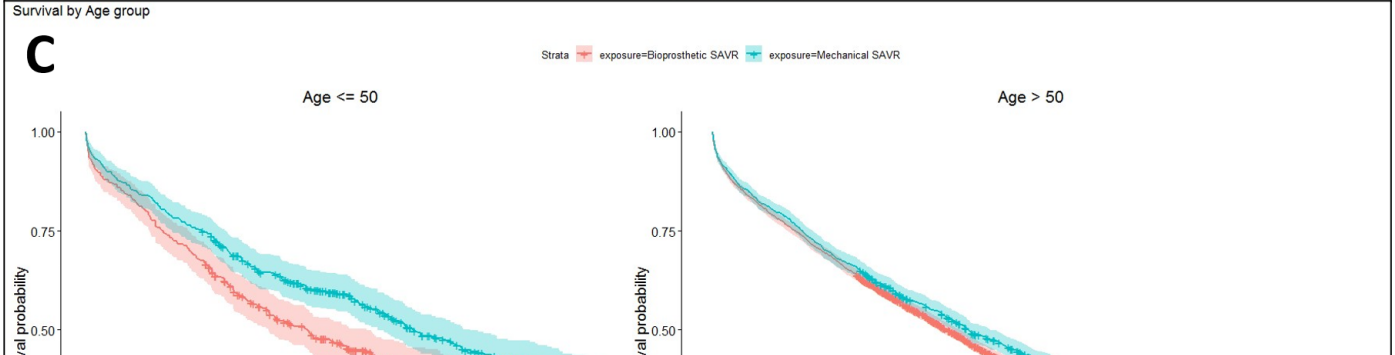

Histogram of Procedure Counts by Year
A
count
Year
exposure
Bioprosthetic SAVR
Mechanical SAVR
507
346
486
323
503
335
503
291
605
194
607
169
452
154
410
143
330
95
2013
2015
2017
2019


Survival by exposure
B
Strata
exposure=Bioprosthetic SAVR
exposure=Mechanical SAVR
Survival probability
Log-rank
p < 0.0001
time in months
Number at risk
Strata
4412 3247 2478 1780 1216 809 480 278
2053 1556 1239 971 718 518 360 238
time in months


Survival by Age group
C
Strata
exposure=Bioprosthetic SAVR
exposure=Mechanical SAVR
Age <= 50
Age > 50