



Temporal Trends In Minimally Invasive Surgical Aortic Valve Replacement At A Veterans Affairs Medical Center

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Introduction

Minimally invasive aortic valve replacement (MIAVR) offers reduced surgical trauma, faster recovery, and shorter hospital stays compared to full sternotomy. However, concerns persist about longer cardiopulmonary bypass (CPB) times and smaller valve sizes due to limited exposure. Evaluating how outcomes change with experience is important to assess MIAVR's safety and broader applicability.

We analyzed trends in MIAVR at a single center over 13 years, comparing early (2011–2016) and later (2017–2024) cohorts. We assessed changes in operative times, valve size selection, and conversion to sternotomy, along with long-term survival. Findings reflect the evolution of MIAVR technique and its impact on outcomes.

Objectives

- **To evaluate temporal trends** in operative efficiency, valve size use, and conversion rates among patients undergoing MIAVR between 2011 and 2024.
- **To compare long-term survival** between early and late MIAVR cohorts to assess durability and clinical outcomes over time.

Methods



Patients: miSAVR patients at SFVAHCS between January 2011 and July 2024.



RedCap Database: STS-PROM risk calculation variables, outcomes, and surgical techniques



Data Collection: Retrospective review medical records in CPRS inputted in RedCap



Data Analysis: Analyze data in R to assess trends and outcomes

Results

	Early (2011-2016)	Late (2017-2024)	p
n	35	83	
Age (mean (SD))	69.15 (9.56)	66.70 (9.63)	0.216
Male Sex (%)	34 (100.0)	79 (96.3)	0.626
Preoperative Creatinine (mean (SD))	1.05 (0.20)	1.16 (0.33)	0.077
Cross Clamp Time (mean (SD))	107.21 (158.32)	85.75 (124.18)	0.471
Cardiopulmonary Bypass Time (mean (SD))	148.85 (153.69)	108.88 (123.74)	0.174
Aortic Valve Implant Size (mean (SD))	23.24 (2.45)	25.91 (2.00)	<0.001
Hypertension (%)	28 (80.0)	67 (80.7)	
Diabetes (%)	12 (34.2)	29 (34.9)	
BSA (mean (SD))	2.09 (0.25)	2.11 (0.25)	0.688
Smoking History (%)	27 (77.1)	67 (80.7)	

Table 1. Comparison of Patient Characteristics Amongst Patients Undergoing miSAVR

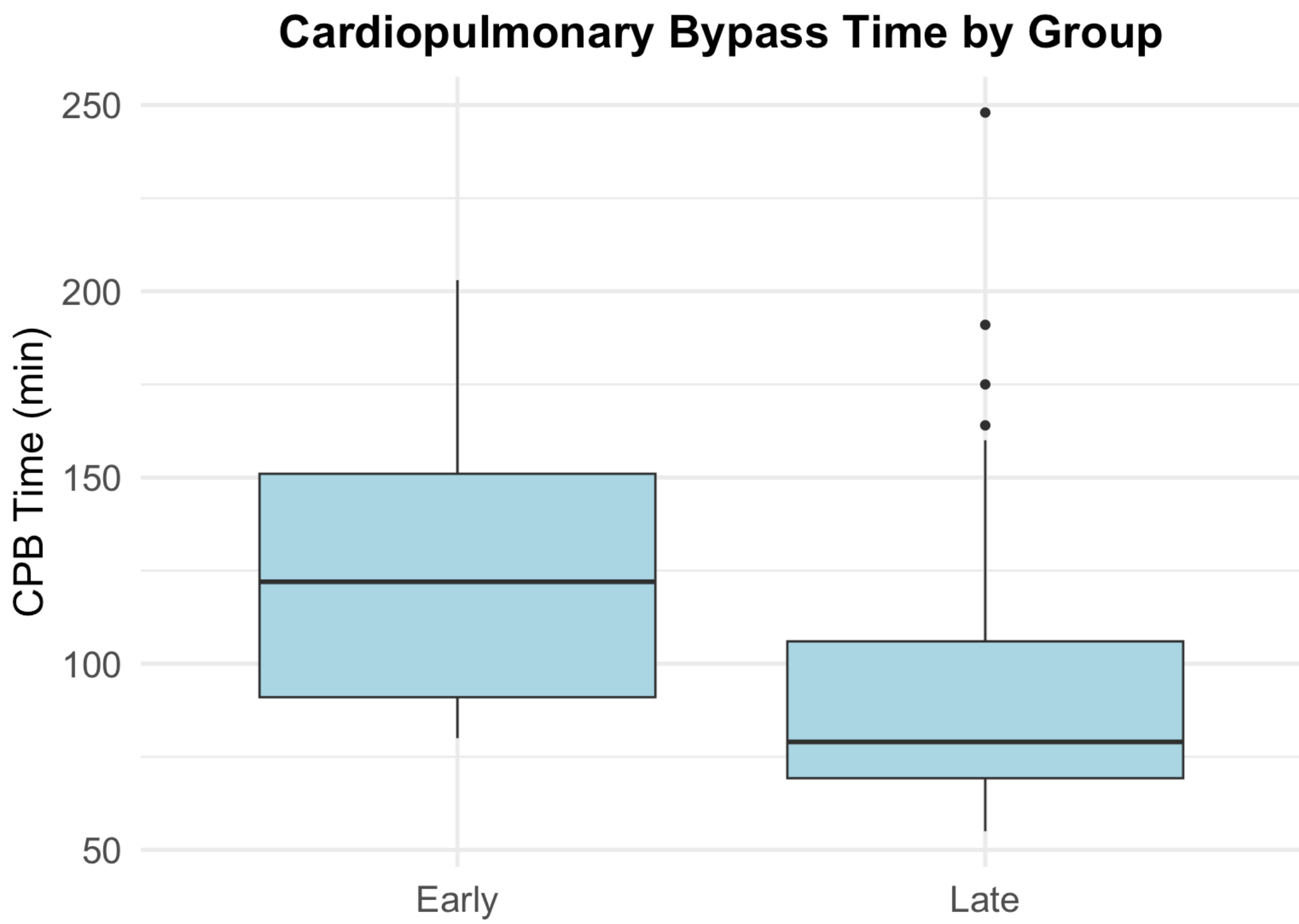


Figure 1. Cardiopulmonary bypass time for early and late group.

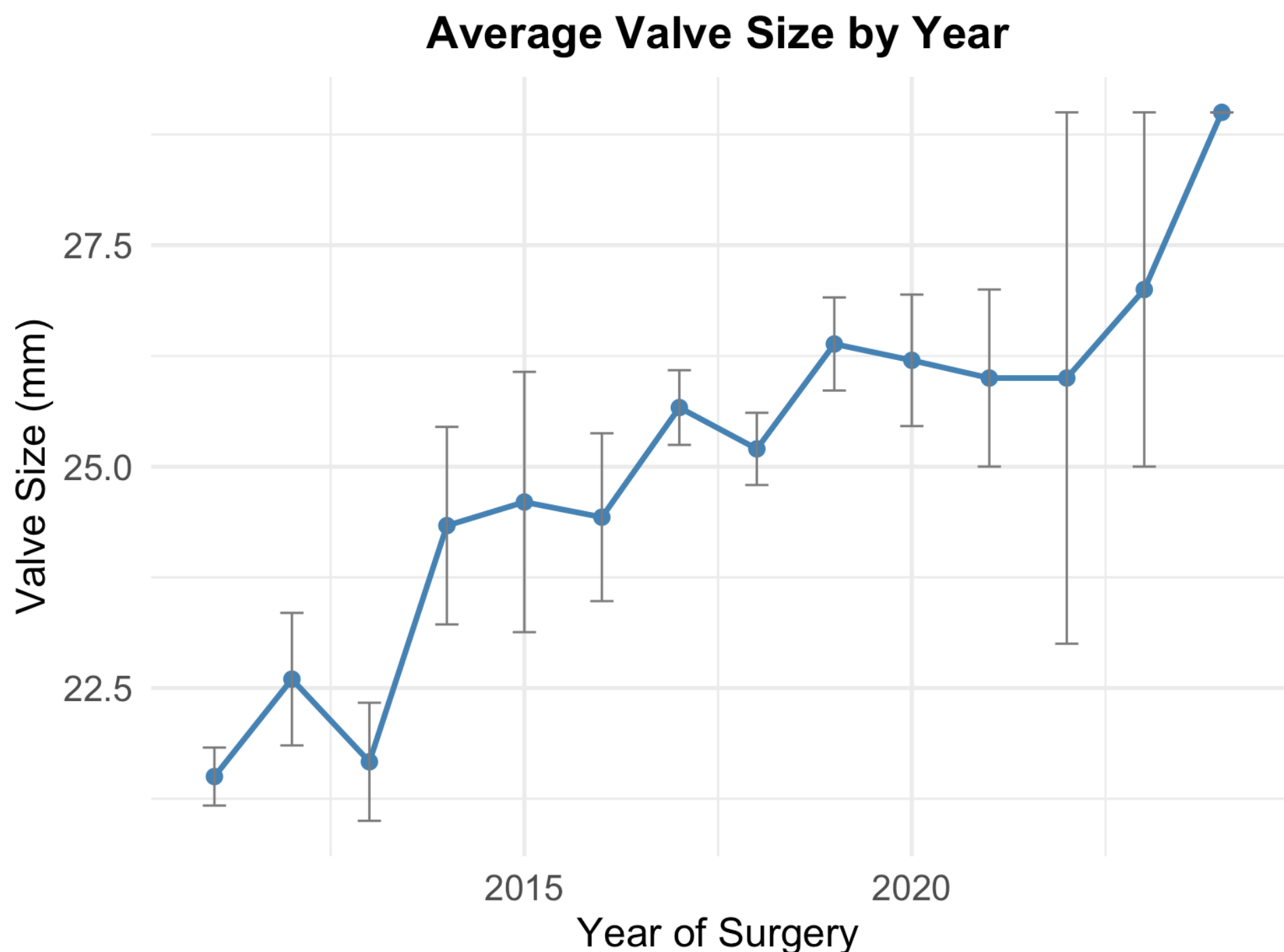


Figure 2. Average valve size in millimeters for each full year.

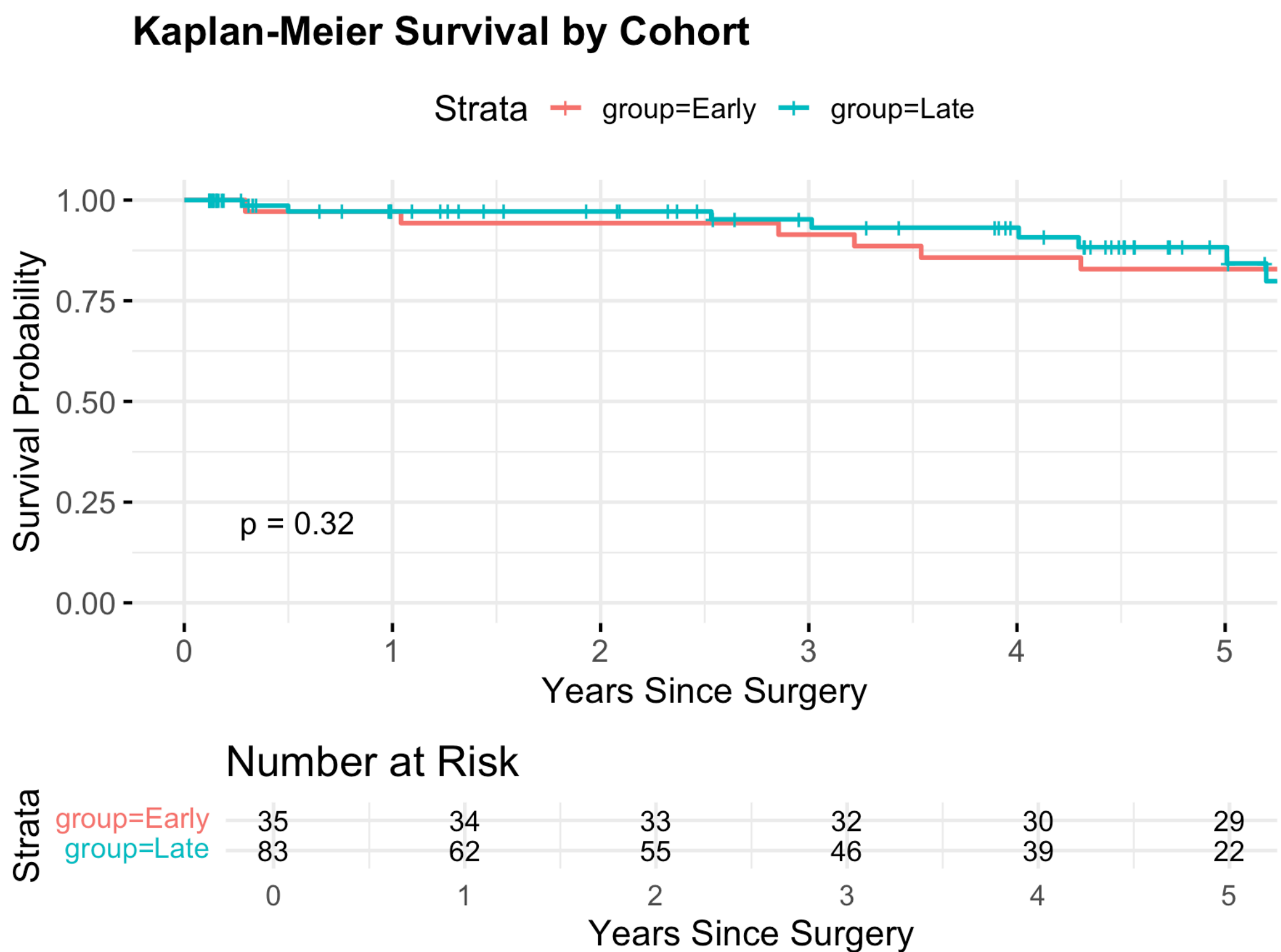


Figure 3. Kaplan-Meier Survival comparing early and late time periods.

Discussion

Our analysis shows a significant increase in the use of larger aortic valve prostheses (≥ 25 mm) in the later MIAVR cohort. This trend likely reflects both improved operative planning and a more proactive approach to root enlargement when appropriate.

- **Improved preoperative imaging and sizing protocols** may have enabled surgeons to better anticipate annular dimensions and plan for larger valve implantation.
- **Operative efficiency trends:** Although early cases had longer CPB and cross-clamp times, these differences narrowed over time and were not statistically significant in later years.

These adaptations represent the natural evolution of surgical expertise and institutional confidence with MIAVR over time. Importantly, the increased valve size in the later cohort may translate to improved long-term valve performance, reduced transvalvular gradients, and better patient-prosthesis matching. Future studies should explore quality-of-life outcomes and cost-effectiveness.

References

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