

Prognostic value of right ventricular remodeling and function in patients undergoing concomitant aortic and mitral valve surgery

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Introduction

- Patients who undergo concomitant aortic and mitral surgery have poor postoperative clinical outcomes.
- Whilst current guidelines focus on left ventricular (LV) function and dimensions as indications for surgery,¹ little is known regarding the importance of right ventricular (RV) remodeling in these patients.
- This study aims to evaluate the predictive value of RV remodeling on long-term survival following concomitant aortic and mitral valve surgery.

Methods

- A total of 160 patients who underwent concomitant aortic and mitral valve surgery between November 2012 and January 2020 were included.
- Patients were evaluated with preoperative transthoracic echocardiography to assess RV size (measured by tricuspid annulus [TA] diameter) and RV systolic function (measured by tricuspid annular plane systolic excursion [TAPSE]).
- Patients were divided into four RV remodeling patterns:
 - **Type 1:** normal RV size and systolic function
 - **Type 2:** dilated RV (TA diameter >35 mm) with normal systolic function
 - **Type 3:** RV systolic dysfunction (TAPSE <17 mm) with normal RV size
 - **Type 4:** dilated RV with systolic dysfunction
- Adverse event was defined as a composite of hospitalization for heart failure and all-cause death.

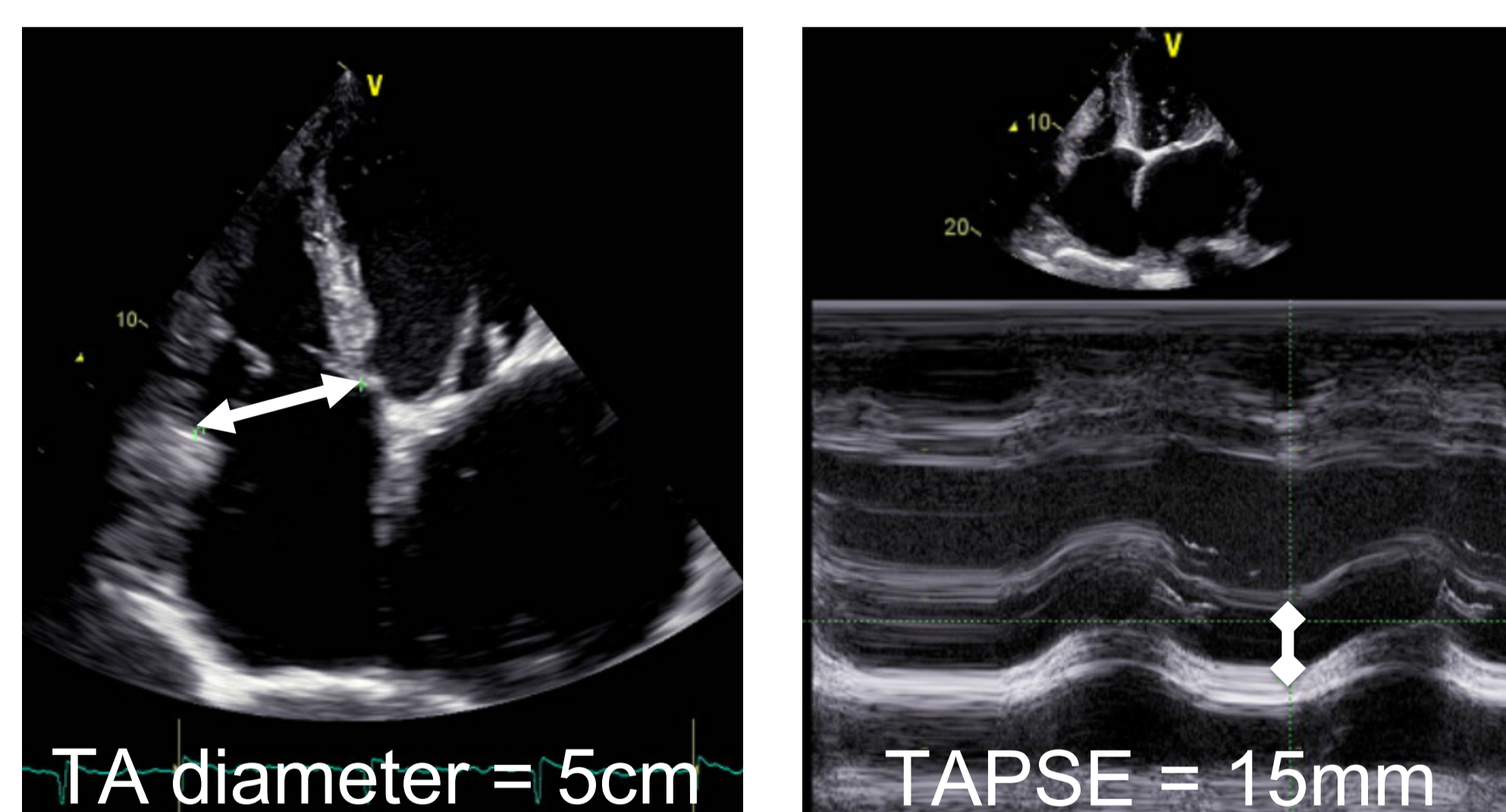


Figure: Measurements of TA diameter (left) and TAPSE (right)

Figure 2. Kaplan-Meier Analysis for Adverse Events According to 4 Types of RV Remodeling in Patients Undergoing Concomitant Aortic and Mitral Valve Surgery

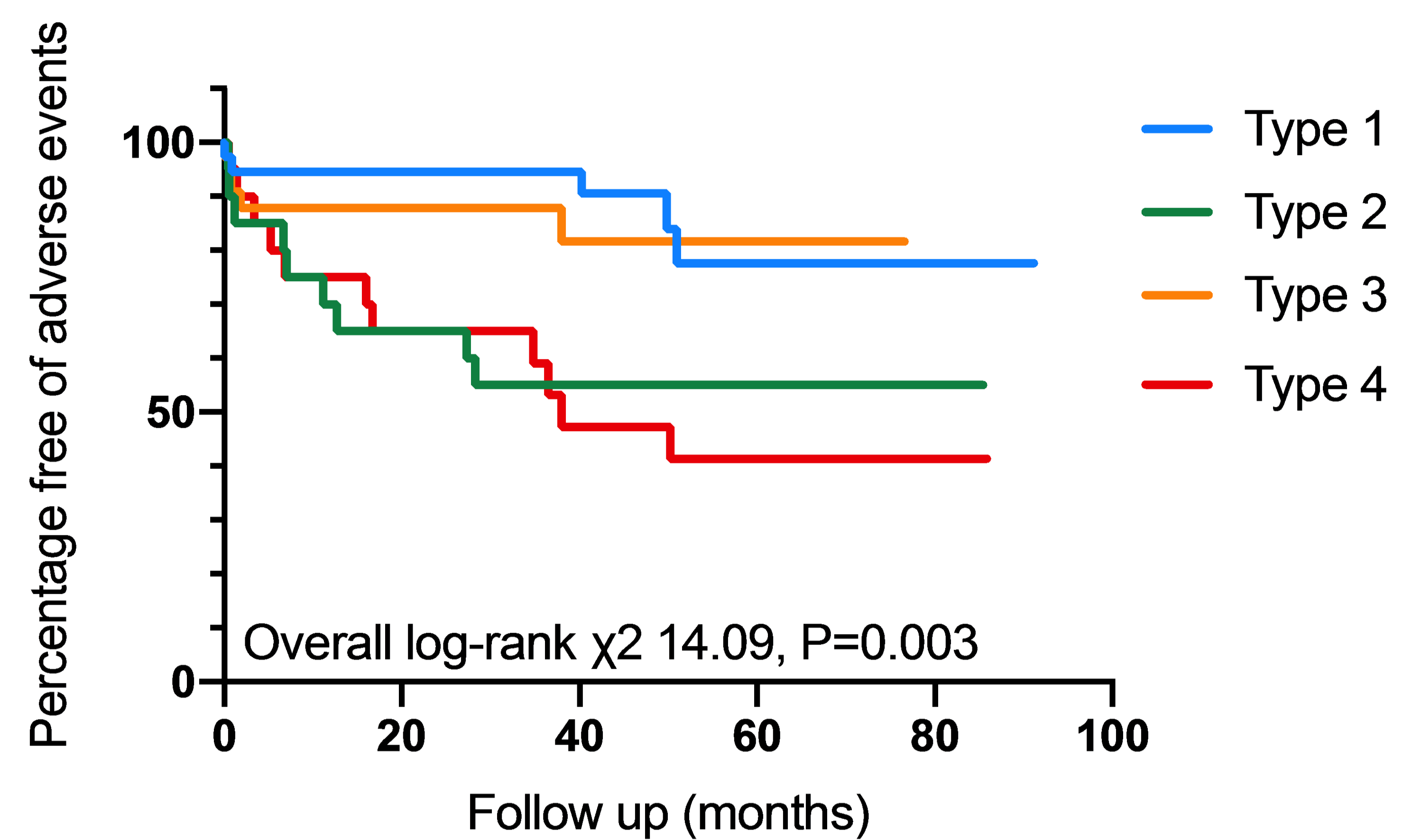
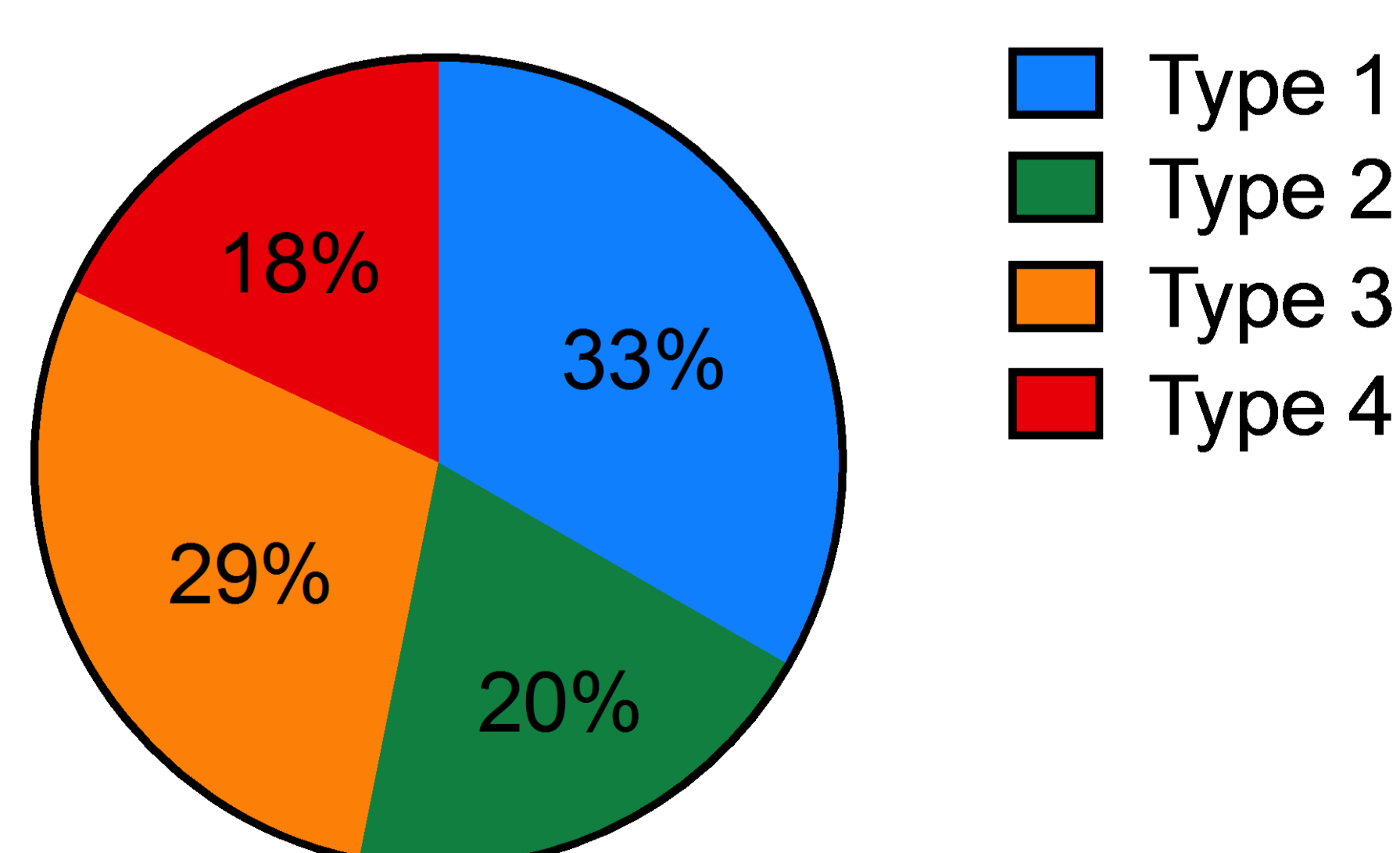


Table 1. Univariate and Multivariate Cox Proportional Hazards Regression Models for Adverse Events

Variable	Univariate analysis		Multivariate analysis	
	HR (95% CI)	P value	HR (95% CI)	P value
Age	1.091 (1.038-1.147)	0.001		
Gender (Male Sex)	1.444 (0.714-2.924)	0.307		
BMI, kg/m ²	0.996 (0.985-1.007)	0.484		
Hypertension	2.165 (1.018-4.602)	0.045	1.889 (0.791-4.511)	0.152
Diabetes mellitus	0.856 (0.299-2.454)	0.773		
Atrial fibrillation	1.971 (0.689-5.643)	0.206		
LVEF, %	0.978 (0.954-1.004)	0.093		
PASP	1.015 (0.995-1.036)	0.140		
Creatinine, mg/dL	1.261 (1.027-1.550)	0.027	1.126 (0.548-2.316)	0.746
EuroSCORE II	1.041 (1.015-1.068)	0.002	1.039 (1.008-1.071)	0.013*
RV Remodeling Patterns		0.007		0.010*
Type 1 vs Type 2	4.078 (1.393-11.939)	0.010	3.940 (1.343-11.557)	0.013*
Type 1 vs Type 3	1.342 (0.388-4.644)	0.642	1.558 (0.439-5.534)	0.493
Type 1 vs Type 4	4.597 (1.595-13.246)	0.005	4.875 (1.669-14.238)	0.004*

Results

Figure 1: Distribution of RV Remodeling Patterns



Total=160

- RV dilation and dysfunction were prevalent in patients undergoing concomitant aortic and mitral valve surgery.
- Patients with advanced patterns of **RV remodeling** more commonly presented with heart failure and atrial fibrillation.
- Compared with type 1 RV remodeling, **type 2** (HR=4.08, 95% CI=1.39-11.94, P<0.05) and **4** (HR=4.597, 95% CI=1.60-13.25, P<0.05) were independently associated with long-term adverse events.

Conclusion

- RV remodeling is a common finding in patients undergoing concomitant aortic and mitral valve surgery.
- Advanced patterns of RV remodeling, characterized by RV dilation and dysfunction, are independently associated with adverse events at long-term follow-up.
- Evaluation of RV dimensions and function may thus improve risk stratification in patients undergoing double valve surgery.