

# Mitral Valve Repair versus Mechanical Valve Replacement in a Predominant Rheumatic Population: 14-Year Outcomes and New Insights from a Central African Centre

Charles Mve Mvondo<sup>1,2,3</sup>, Laurence Carole Ngo Yon<sup>2,3</sup>, Valerie Ndob<sup>4</sup>, Amos Ela Bella<sup>2</sup>, Zéphanie Kobe Folkabo<sup>2</sup>, Fabrice Arroye Betou<sup>3</sup>, Jean Claude Ambassa<sup>1</sup>, Cabral Tantchou Tchoumi<sup>1</sup>, William Ngatchou Djomo<sup>5</sup>, Louis Richard Njock<sup>3</sup>

<sup>1</sup>Division of Cardiac Surgery, Shisong Cardiac Center, Kumbo, Cameroon

<sup>2</sup>Division of Thoracic and Cardiovascular Surgery, Yaoundé General Hospital, Yaoundé, Cameroon

<sup>3</sup>Department of Surgery, Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaoundé, Cameroon

<sup>4</sup>Department of Internal Medicine, Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaoundé, Cameroon

<sup>5</sup>Department of Surgery, Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon

Email: mmvondocarlo@yahoo.fr

**How to cite this paper:** Mve Mvondo, C., Ngo Yon, L.C., Ndob, V., Ela Bella, A., Kobe Folkabo, Z., Arroye Betou, F., Ambassa, J.C., Tantchou Tchoumi, C., Ngatchou Djomo, W. and Njock, L.R. (2026) Mitral Valve Repair versus Mechanical Valve Replacement in a Predominant Rheumatic Population: 14-Year Outcomes and New Insights from a Central African Centre. *World Journal of Cardiovascular Surgery*, 16, 43-55.

<https://doi.org/10.4236/wjcs.2026.164006>

**Received:** March 16, 2026

**Accepted:** March 30, 2026

**Published:** April 2, 2026

Copyright © 2026 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

## Abstract

**Background:** Although non-thrombogenic surgery is advocated over mechanical replacement in underserved populations, long term comparative data have been scarce in the medical literature. Our paper reviews the outcomes of mechanical mitral replacement (MVR) versus repair (MVr) in a Central African institution over a 14-year period. **Patients and Methods:** We retrospectively analyzed patients undergoing mitral valve surgery between February 2010 and December 2024. Patients were grouped as mechanical MVR or MVr. Patient's demographics and clinical variables were analyzed. Kaplan-Meier analyses assessed overall survival and freedom from reoperation, hemorrhagic events, neurologic events, and recurrent mitral dysfunction. Groups were compared with the log-rank test. Baseline heterogeneity was assessed using  $p$ -values and standardized mean differences (SMD). **Results:** a total of 231 patients were included (MVR,  $n = 150$  vs MVr,  $n = 81$ ). The median age (years) at surgery was 27.1 (16.5 - 40.0) and 31.0 (16.0 - 40.6) years for MVR and MVr respectively ( $p = 0.65$ ). There was female predominance with a sex ratio of 0.76. Rheumatic disease was the predominant etiology in both groups (MVR: 80.6% vs MVr: 76.5%,  $p = 0.34$ ). Mitral regurgitation (MR) was the commonest lesion in MVr group (97.5% vs 68.7%). The 30-day mortality was 5.1% ( $n = 12/231$ ; MVR = 8/150, 5.3%; MVr = 4/81, 4.9%). Follow-up represented approximately 1585 patient-years. Kaplan-Meier overall survival at 5 and 10

years was  $83.6 \pm 2.8\%$  and  $74.6 \pm 2.7\%$  after mechanical MVR versus  $87.3 \pm 4.5\%$ , and  $78.1 \pm 5.2\%$  after MVr ( $p = 0.29$ ). Freedom from reoperation at 5 and 10 years was  $98.8 \pm 1.8\%$  and  $97.1 \pm 2.4\%$  after MVR versus  $97.2 \pm 2.6\%$  and  $95.1 \pm 2.9\%$  after MVr. Freedom from hemorrhagic events at 5 and 10 years was  $78.7 \pm 7.2\%$  and  $72.0 \pm 3.0\%$  after MVR versus  $97.1 \pm 7.6\%$  after MVr. Freedom from stroke at 5 and 10 years was  $94.2 \pm 6.8\%$  and  $87.8 \pm 2.1\%$  after MVR versus  $100\%$  after MVr. In the MVr group, freedom from recurrent mitral dysfunction (MR > 2+ or > moderate stenosis) at 5, and 10 years was  $97.1 \pm 1.8\%$ , and  $76.7 \pm 3.1\%$ , respectively. **Conclusions:** Mitral repair, when compared to mechanical replacement seems to provide better outcomes in terms of survival and valve related events even in a predominant rheumatic population.

### Keywords

Mitral Valve Repair, Mitral Replacement, Mechanical Valve, Rheumatic Heart Disease, Anticoagulation, Sub-Saharan Africa

---

## 1. Introduction

Mitral valve disease is the commonest indication for valve surgery in rheumatic etiology, affecting a countless number of young patients in developing countries [1] [2]. Although controversial, mitral valve repair (MVr) and biological prostheses have been promoted in underserved populations where the risks from inadequate anticoagulation intake [3] [4] after mechanical mitral replacement (MVR) were thought to be prohibitive.

However, despite the potential advantages of MVr over MVR, including low operative risk, low thrombogenicity and a better survival [5] [6], suboptimal results in rheumatic heart disease (RHD) patients have limited his acceptance in the surgical communities [7] [8]. In fact, with the exception of few specialized centers reporting improved outcomes with heterogenous techniques of MVr in rheumatic patients [9]-[11], the rate of MVr in RHD remains globally low and has scarcely improved over the past decades [12] [13], due to the complexity of repair techniques and the progressive nature of RHD which strongly impacts the repair durability.

On the other hand, unexpected data with new generation mechanical prosthesis in developing countries [14]-[16] have re-centered the debate, questioning as to whether accurate prosthesis selection and educational policies improving patient's compliance could overcome the unpredictability in rheumatic MVr.

The current study reviews the outcomes of Mechanical Mitral replacement versus repair in our institution over a 14-year period.

## 2. Patients and Methods

From February 2010 and December 2024, a total of two hundred and thirty-one

(n = 231) patients had undergone mitral valve surgery at our institution. One hundred and fifty (MVR, n = 150) had mechanical mitral replacement whereas eighty-one had mitral repair (MVr, n = 81). Patients with associated procedures for tricuspid disease (organic or functional) were included whereas those with concomitant aortic valve surgery, coronary disease, aortic aneurysms were excluded from the study.

### **2.1. Endpoints**

The primary endpoint was all-cause mortality. Secondary endpoints included: re-operation, hemorrhagic (major bleeding requiring hospitalization, transfusion, or causing death) and neurologic events (stroke or transient ischemic attack) and recurrent mitral valve dysfunction. Recurrent mitral dysfunction was defined as: mitral regurgitation > moderate ( $\geq 2+$ ) or mitral stenosis with mean gradient  $\geq 8$  mmHg.

All endpoints were adjudicated based on clinical records and echocardiographic findings.

### **2.2. Ethical Approval**

This study was approved by the Institutional Review Board of the Shisong Cardiac Center. Given the retrospective nature of the study and the use of anonymized data, the requirement for individual informed consent was waived.

### **2.3. Preoperative Assessment and Indication for Surgery**

All the patients underwent two-dimensional transthoracic echocardiography at the time of their admission. The routine echocardiography evaluation included the assessment of cardiac parameters (ventricular dimensions and contractility, pulmonary hypertension, etc...) and accurate analysis of mitral valve anatomy and function to define the valve etiology and orient the surgical approach. The indications for Mitral surgery were made following a case discussion by a joint team of Cardiologists, cardiac surgeons and anesthesiologists. Considering the socio-cultural nature of our environment, the patient global compliance was assessed through inclusive discussions with patients and family before each surgical procedure.

### **2.4. Surgical Technique**

A standard median sternotomy was performed in all the patients. Cardiopulmonary Bypass was established through a conventional ascending aorta and selective bi-caval cannulation. Cardioplegic solutions (warm blood or crystalloid) for myocardial protection were chosen based on surgeon's preference. Following a standard left atriotomy, a careful valve analysis was performed and the decision to repair or not the valve was taken by the senior surgeon. Basically, the choice between MVr and MVR was based on a combination of anatomical, clinical, and contextual factors. MVr was preferentially attempted in patients with predominant mi-

tral regurgitation, preserved leaflet mobility and limited calcification and favorable subvalvular apparatus. MVR was favored in cases with severe leaflet fibrosis or calcification such as mixed lesions and severe stenosis with advanced rheumatic involvement with restricted mobility. Failed repair attempts (conversion from MVr to MVR intraoperatively) were analyzed within the MVR group according to an intention-to-treat principle.

Mechanical valves models and prosthetic rings (flexible, semirigid, rigid) were chosen based mainly on availability at the time of the procedure.

The ventriculo-annular continuity was preserved in MVR by leaving the posterior mitral leaflet whenever possible or by implanting artificial PTFE chords. MVr techniques included: prosthetic ring annuloplasty, artificial PTFE chords implantation, commissurotomy, leaflet shaving, leaflet pericardial patch enlargement, papillary muscle splitting and secondary chords cutting.

Intra-operative Trans-esophageal Echocardiography was used in all the cases. Residual MR  $\leq 2$  was tolerated in patients who had MVr whereas detected intraoperative perivalvular leak required aggressive correction in MVR patients.

## 2.5. Follow-Up

A postoperative anticoagulation regimen with acenocumarol (Sintrom<sup>®</sup>) was recommended in all the patients. The anticoagulation was initiated whenever possible from the first postoperative day with a targeted International Normalized Ratio (INR) between 2.5 and 3.5 for MVR and 2.0 to 3.0 for MVr patients. Concomitantly, a bridging anticoagulant therapy was started with subcutaneous injections of low-molecular weight heparin (Clexane, SANOFI: 60 - 100 UI/kg twice daily) until the targeted INR was reached or as substitute therapy in cases oral anticoagulation was not immediately achievable (*i.e.* patients with prolonged mechanical ventilation). Oral anticoagulation was recommended for three months after discharge in MVr patients whereas lifelong anticoagulation was strictly advocated to MVR group. In the MVr group, however, anticoagulation was prolonged beyond 3 months in those with atrial fibrillation (6.4% in the MVr group at follow-up).

Transthoracic echocardiograms were performed at discharge in all the cases and during follow-up in our institution. Patients living in remote areas were reviewed during our external screening campaigns or by collaborating physicians and cardiologists. A monthly INR control was recommended in all the patients whenever possible.

Data were retrospectively collected from institutional surgical registries, operative reports, hospital medical records, and echocardiographic databases. Follow-up data were obtained through outpatient visits, institutional echocardiographic evaluations, external outreach campaigns, and communication with referring cardiologists. The median follow-up duration was approximately 7.0 years; follow-up represented 1,585 patient-years. Follow-up completeness was 89%. Patients lost to follow-up (11%) were censored at the date of last contact. Variables with missing data were analyzed using available-case analysis without imputation,

given the retrospective design. Sensitivity analyses confirmed that missingness did not materially alter outcome estimates.

## 2.6. Statistical Analysis

Continuous variables were summarized as median [interquartile range] and compared using the Mann-Whitney U test. Categorical variables were summarized as n (%) and compared using the chi-square test or Fisher's exact test, as appropriate. Kaplan-Meier methods were used to estimate time-to-event outcomes, with comparisons by the log-rank test. In addition to *p*-values, standardized mean differences (SMDs) were reported to quantify baseline imbalance between the groups, as SMDs provide a sample-size independent measure of heterogeneity and help identify clinically meaningful differences.

To account for baseline differences, multivariable Cox proportional hazards models were constructed for survival and major adverse events, adjusting for clinically relevant covariates including age, sex, NYHA class, atrial fibrillation, lesion type, and concomitant tricuspid surgery. Proportional hazards assumptions were verified using Schoenfeld residuals.

## 3. Results

### 3.1. Patients and Operative Data

Of the 231 patients of the study, 91 were male with a sex ratio of 0.76. The mean age of the whole cohort was 29.1 years (IQR, 16.1 - 40.6). The mean ages in MVR and MVr groups were 27.1 (IQR, 16.5 - 40.0) and 31.0 (IQR, 16.0 - 40.7) years respectively (*p* = 0.65). Rheumatic disease was the commonest etiology in both groups (MVR: 80.6% vs MVr: 76.5%, *p* = 0.34). Mitral regurgitation was the predominant lesion with a higher rate in MVr group (97.5 % vs 68.0 %) (Table 1 & Table 2).

**Table 1.** Patient's demographics.

Variable	MVR (n = 150)	MVr (n = 81)	<i>p</i> value	SMD
Age (years), median (IQR)	27.1 (16.5 - 40.0)	31 (16.0 - 40.6)	0.653	-0.1007748
Male Sex, n (%)	61 (40.7)	30 (37.0)	0.667	0.24391352
BSA (m <sup>2</sup> ), median (IQR)	1.6 (1.4 - 1.8)	1.7 (1.3 - 1.9)	0.862	0.18735912
Rheumatic etiology, n (%)	126 (80.6)	62 (76.5%)	0.341	0.67855217
Mitral lesion, n (%)				
Mitral regurgitation	102 (68.0)	79 (97.5)		
Mitral stenosis	25(16.6)	1 (1.2)		
Mixed lesion	23 (15.3)	1 (1.2)		
NYHA Class ≥ III	131 (87.3)	47 (58.0)	0.362	-
LVEF, %, median, (IQR)	63.3 (50.1 - 73.2)	59.6 (50.1 - 74.1)	0.5220	-0.110201
LVEDD (mm), median, (IQR)	52.0 (45.3 - 64.0)	52.9 (50.2 - 64.8)	0.322	-0.2200115

## Continued

LVEDD (mm), median, (IQR)	32.0 (27.5 - 39.6)	33.0 (27.0 - 45.0)	0.542	-0.2869756
PAPs (mmHg), median, (IQR)	65.8 (55.5 - 80.0)	72.3 (61.5 - 85.5)	0.275	-0.2947328
Atrial Fibrillation, n (%)	31 (22.6)	6 (10.3)	0.05	
Previous Cardiac Surgery	2 (1.3)	-	-	
EuroScore II, mean $\pm$ SD	1.58 $\pm$ 0.7	1.77 $\pm$ 0.7	0.21	

Note: MVR: mitral replacement; MVr: mitral repair; BSA: body surface area; NYHA: New York Heart Association; LVEF: left ventricular ejection fraction; LVEDD: left ventricular end diastolic diameter; LVEDD: left ventricular end systolic diameter; PAPs: pulmonary artery pressure in systole.

Table 2. Operative data.

Variable	MVR (n = 150)	MVr (n = 81)	p-value	SMD
CPB Time (min) median (range)	112.7 (65.1 - 139.0)	132.0 (95.2 - 175.0)	<0.001	-0.5554469
X-Clamp Time (min), median (range)	72 (32.5 - 98.5)	63.3 (50.1 - 132.2)	<0.001	-0.5916949
Concomitant tricuspid valve surgery, n (%)	63/150 (42%)	46/81 (56.7%)	0.643	
Complications				
<i>Chest reexploration for bleeding</i>	14 (9.3)	5 (6.1)		
<i>LCOS</i>	31 (20.6)	16 (19.7)		
Mechanical, ventilation, mean $\pm$ SD	9.7 $\pm$ 9.4 hours	11.3 $\pm$ 12.0 hours	0.551	
ICU Stay (days), median (range)	2.6 (1.9 - 6.0)	2.5 (1.8 - 5.5)	0.904	
Hospital Stay, days	15.9 (6.0 - 22.1)	16.3 (7.1 - 20.8)	0.475	
30-day Mortality, n (%)	8 (5.3%)	4 (4.9%)	-	

Note: MVR: mitral replacement; MVr: mitral repair; CPB: cardiopulmonary bypass; X-clamp: cross-clamp. ICU: intensive care unit.

Table 3. Surgical data.

MVR (n = 150)	MVr (n = 81)
<i>Prosthetic valves sizes:</i>	
(1) 23 mm (5/10, 3.3%)	
(2) 25 mm (118/150, 78.6%)	
(3) 27 mm (21/150, 14.0%)	
(4) 31 mm (6/150, 4.0%)	
<i>Valve repair techniques:</i>	
	(1) Ring annuloplasty: 78/81 (96.2%)
	(2) Leaflet patch enlargement :14/81 (17.2%)
	(3) Commissurotomy: 10/81 (12.3%)
	(4) Artificial chord implantation: 12/81 (14.8%)
<i>Prosthetic valves models:</i>	
(1) On-X valves: 141/150 (97.8%)	
(2) Others: 9/150 (2.1%)	
<i>Chordal preservation/reimplanation:</i>	
(1) 71.3%	
<i>Type of ring annuloplasty:</i>	
	(1) Rigid/Semi-rigid: 52/78 (66.6%)
	(2) Flexible: 22/78 (28.2%)
	(3) Pericardial band: 4/78 (5.1%)
<i>Failed MVr attempt:</i>	
(1) 12/150 (8.0 %)	

The On-X mechanical valve model was implanted in 97.8 % (n = 141/150 patients) of the patients who underwent MVR, with 98.2% all the valves' sizes being of adult size ( $\geq 25$  mm). Prosthetic valves sizes extracted from operative descriptions are reported in **Table 3**.

An annuloplasty technique was used in 96.2% (n = 78/81) of patients in the MVr group. Ring models were: rigid or semi-rigid (66.6%) (Carpentier-Edwards, Medtronic Future Band), flexible (28.2%) (MRS system, Vascutek) and pericardial band (5.1%).

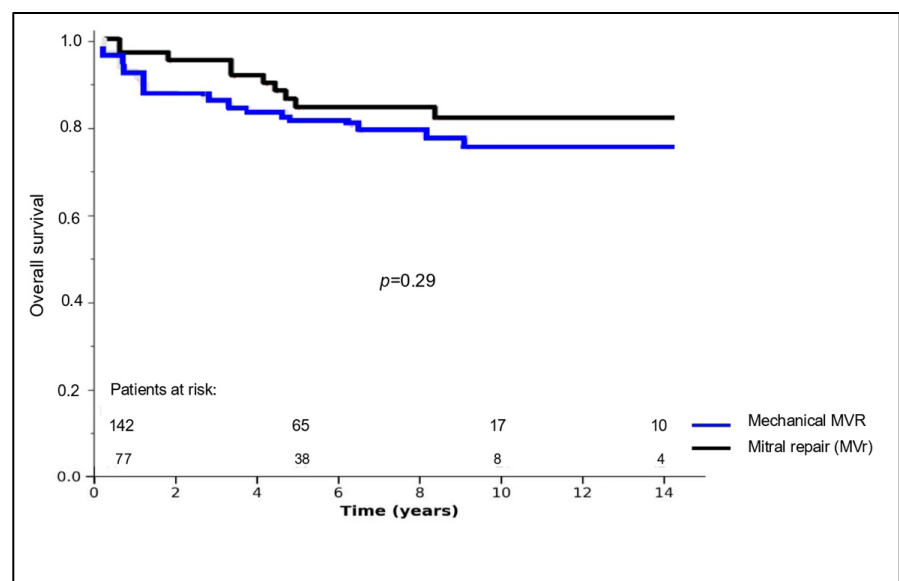
Concomitant tricuspid procedures were identified in 109 patients (44.1%), and were more frequent in the MVr group (46/81, 56.7%) than in the MVR group (63/150, 42.0%).

The median cardiopulmonary bypass and cross-clamping duration for MVR were 112.7 (65.1 - 139.0) and 72 (32.5 - 98.5) minutes, and 132.0 (95.2 - 175.0) and 63.3 (50.1 - 132.2) minutes for MVr respectively.

### 3.2. In Hospital Outcomes

The 30-day mortality for the whole cohort was 5.1 % (12/231; MVR = 8/150, 5.3%; MVr = 4/81, 4.9%). The commonest cause of death was postoperative low cardiac output syndrome occurring in seven patients (MVR = 4; MVr = 3). Other causes of death were pneumonia (n = 2), acute renal failure (n = 1), pulmonary embolism (n = 1) and sudden death (n = 1). No significant differences were found between the groups regarding the intensive care unit (2.6 vs 2.5 days,  $p = 0.90$ ) and hospital stay (15.9 vs 16.3,  $p = 0.47$ ).

### 3.3. Late Outcomes



**Figure 1.** Kaplan-Meier estimate of overall survival.

The survival rates at 5 and 10-year were  $83.6 \pm 2.8\%$  and  $74.6 \pm 2.7\%$  for MVR

and  $87.3 \pm 4.5\%$  vs  $78.1 \pm 5.2\%$  for MVr respectively (Figure 1). No significant differences were detected at Log-rank test between groups ( $p = 0.29$ ). The estimate 5 and 10 year freedom from reoperation rates were  $98.8 \pm 1.8\%$  and  $97.1 \pm 2.4\%$  in the MVR group and  $97.2 \pm 2.6\%$  and  $95.1 \pm 2.9\%$  in the MVr group ( $p = 0.06$ ) (Figure 2).

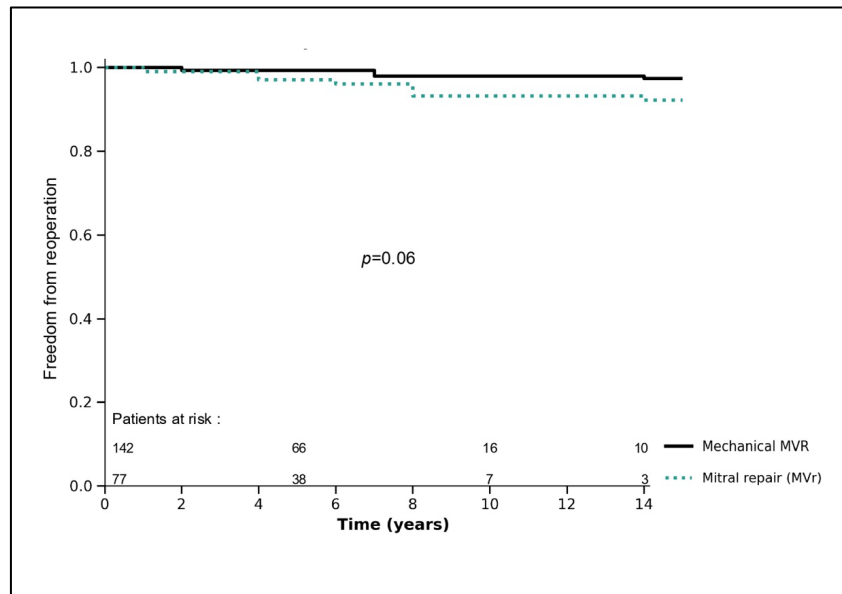


Figure 2. Kaplan-Meier estimate of freedom from reoperation.

The 5 and 10-year overall freedom from hemorrhagic events was  $78.7 \pm 7.2$  and  $72.0 \pm 3.0\%$  for MVR, and  $97.1 \pm 7.6\%$  (5 and 10-year) for MVr respectively ( $p < 0.001$ ) (Figure 3). The 5 and 10-year freedom from stroke was  $94.2 \pm 6.8$  and  $87.8 \pm 2.1\%$  for MVR, and 100% (5 and 10-year) for MVr respectively (Figure 4).

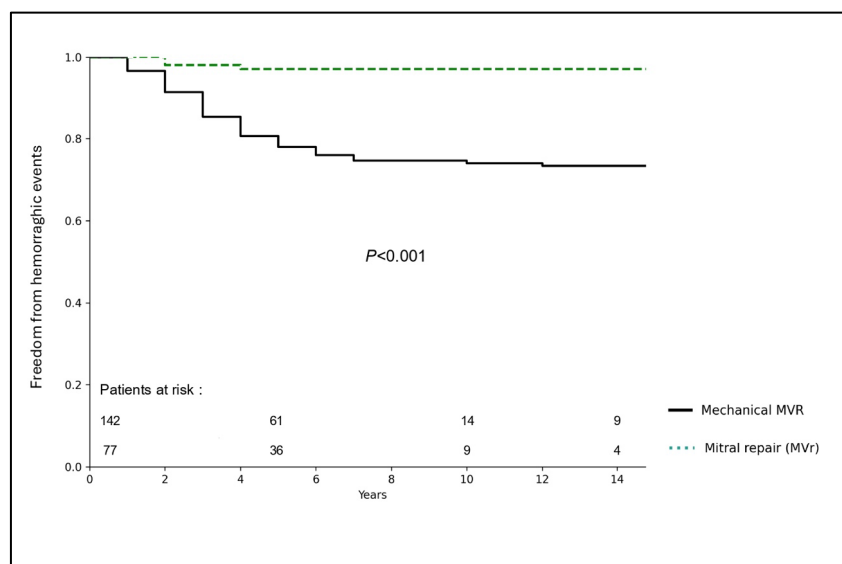
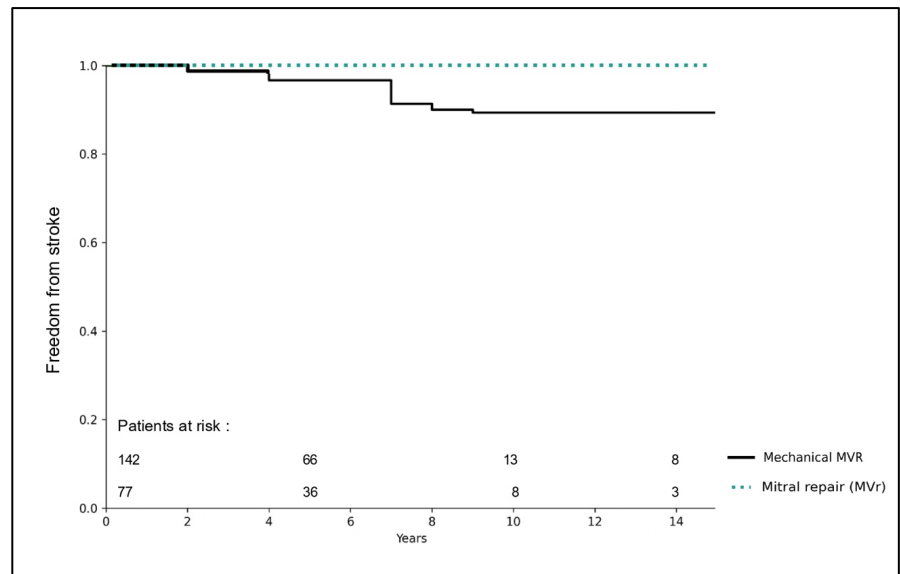


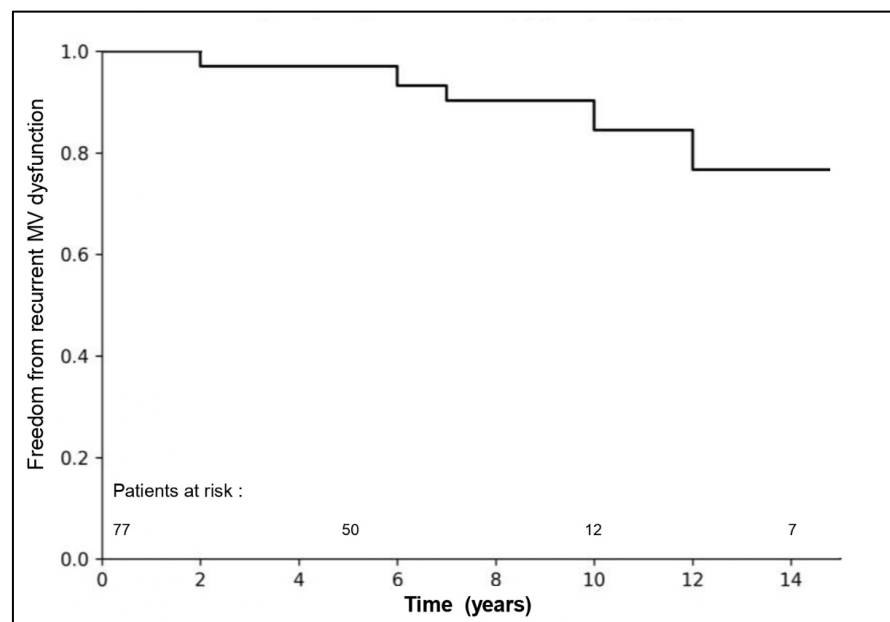
Figure 3. Kaplan-Meier estimate of freedom from hemorrhagic events.



**Figure 4.** Kaplan-Meier estimate of freedom from stroke.

### 3.4. Echocardiography and Functional Results at Follow-Up

The overall freedom from mitral dysfunction (MR > 2+ or > moderate stenosis) in MVR patients was  $97.1 \pm 1.8\%$  and  $76.7 \pm 3.1\%$  at 5 and 10-year respectively (**Figure 5**).



**Figure 5.** Kaplan-Meier freedom from recurrent mitral dysfunction (regurgitation > 2+ or > mild stenosis) in MVR group.

### 3.5. Multivariate Analysis

On multivariable Cox regression analysis (**Table 4**), there was no significant difference in long-term survival between MVR and MVR (hazard ratio [HR] 0.88,

95% confidence interval [CI] 0.54 - 1.42;  $p = 0.60$ ). MVr was associated with a significantly lower risk of hemorrhagic events (HR 0.32, 95% CI 0.18 - 0.71;  $p = 0.003$ ) and neurologic events (HR 0.41, 95% CI 0.19 - 0.89;  $p = 0.02$ ).

**Table 4.** Multivariate Cox regression analysis.

Outcome	HR (MVr vs MVR)	95% CI	p-value
Overall survival	0.88	0.54 - 1.42	0.60
Hemorrhagic events	0.32	0.18 - 0.71	0.003
Stroke	0.41	0.19 - 0.89	0.02
Reoperation	1.68	0.72 - 3.92	0.23

#### 4. Discussion

This study reports long-term comparative outcomes of MVR versus MVr in a predominantly rheumatic population in a sub-Saharan institution. The main findings are that long-term survival was broadly comparable between strategies, while MVR carried a higher burden of anticoagulation-related events, and MVr showed late structural failure in a subset of patients, leading to a higher reoperation rate.

In our experience, the surgical option was determined by both valvular lesions and context-specific constraints [14]. Replacement was frequently performed in patients with more advanced remodeling and mixed lesions, while repair cohorts are often more anatomically favorable as those with pure valvular regurgitation with preserved leaflets pliability. MVr rates were also affected by the limited ability to guarantee timely access to redo surgery, largely due to financial and sociocultural barriers. In this context, replacement may be preferred as a risk-averse strategy to reduce late valve failure and reoperation. As is the case for degenerative MR, the volume of MVr also depended on surgeon expertise in rheumatic valve surgery [17] [18]. This was particularly seen in the early period of our program, where some visiting teams with limited experience to rheumatic repair techniques had almost none performed MVr as compared to others. Lastly but not the least, favorable reports from MVR series from underserved communities [15] [16], have potentially influenced our surgical strategy. In fact, contemporary results from our earlier experience that supported the practicability of mechanical prostheses in carefully managed patients has certainly reinforced confidence in their implantation in our population [14].

Operative mortality was 5.3 % and 4.9% after MVR and MVr respectively. Although that was similar to various series from LMICS reporting in-hospital mortality rates between 6.7% and 10.8% [7] [19], lower rates [20] were reported in high volume SSA institutions (2.6%) as from the STS and EACTS databases [13] [21]. Beside team expertise, cross-study comparison in mortality rates should consider substantial differences in baseline risk profile as patients in LMICS despite being younger, often present late, with advanced heart failure and other comorbidities such as anemia and malnutrition [22] [23].

At follow-up, major adverse events—particularly hemorrhage and stroke—were more frequent after MVR, emphasizing the clinical impact of anticoagulation exposure in low-resource settings and the need for structured monitoring systems. Although patient adherence may be higher than traditionally assumed, socioeconomic barriers and inconsistent INR surveillance remain major challenges [3] [4].

MVr avoids lifelong anticoagulation, but durability in rheumatic disease remains limited. Indeed, freedom from reoperation appeared lower compared to MVR. However, this does not reflect the repair durability which might be shorter than reported, giving a limited access to Redo surgery. In fact, freedom from valvular dysfunction (recurrent MR2+ or MS) was a better indicator and reported more higher occurrence as compared to reoperation. Recurrent dysfunction following MVr was mainly due to progressive rheumatic activity with fibrosis, leaflet restriction, and late stenotic evolution as previously described by others [24]. That was worsened by the absence of postoperative antibiotic prophylaxis strategy in the majority of MVr patients. Others factors for late failure were annular growth-related mismatch—especially in younger patients with the use of rigid rings that could have contributed to late functional stenosis.

Overall, these findings support a repair-oriented strategy whenever anatomically feasible, particularly in young rheumatic populations, but only within programs able to ensure long-term surveillance and timely reintervention. When redo access is uncertain, procedural decision-making must integrate not only valve anatomy but also the realistic feasibility of follow-up and rescue pathways.

This study is limited by its retrospective, single-center, non-randomized design, with potential selection bias. Several baseline and echocardiographic variables were incompletely captured, and prosthesis characteristics were inconsistently reported from operative free-text descriptions.

In conclusion, in this predominantly rheumatic population, mitral valve repair and mechanical replacement achieved comparable long-term survival. However, MVr was associated with significantly fewer anticoagulation-related complications, at the expense of increased late valve dysfunction. Surgical decision-making should therefore balance anatomical feasibility with the capacity for long-term follow-up and reintervention.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- [1] Abdu, S.M., Kassaw, A.B., Tareke, A.A., Mankelkl, G., Belete, M., Bihonegn, M.D., *et al.* (2024) Prevalence and Pattern of Rheumatic Valvular Heart Disease in Africa: Systematic Review and Meta-Analysis, 2015-2023, Population Based Studies. *PLOS ONE*, **19**, e0302636. <https://doi.org/10.1371/journal.pone.0302636>
- [2] Simpson, M.T., Kachel, M., Neely, R.C., Erwin, W.C., Yasin, A., Patel, A., *et al.* (2023) Rheumatic Heart Disease in the Developing World. *Structural Heart*, **7**, Article ID:

100219. <https://doi.org/10.1016/j.shj.2023.100219>
- [3] Zilla, P., Human, P. and Pennel, T. (2024) Mechanical Valve Replacement for Patients with Rheumatic Heart Disease: The Reality of INR Control in Africa and Beyond. *Frontiers in Cardiovascular Medicine*, **11**, Article 1347838. <https://doi.org/10.3389/fcvm.2024.1347838>
- [4] Chalachew, T., Yadeta, D. and Tefera, E. (2019) Factors Associated with Sub-Optimal Control of Anticoagulation in Patients with Prosthetic Heart Valves Taking Oral Anticoagulants in a Sub-Saharan African Setting. *Cardiovascular Journal of Africa*, **30**, 317-320. <https://doi.org/10.5830/cvja-2019-024>
- [5] Lazam, S., Vanoverschelde, J., Tribouilloy, C., Grigioni, F., Suri, R.M., Avierinos, J., *et al.* (2017) Twenty-Year Outcome after Mitral Repair versus Replacement for Severe Degenerative Mitral Regurgitation: Analysis of a Large, Prospective, Multicenter, International Registry. *Circulation*, **135**, 410-422. <https://doi.org/10.1161/circulationaha.116.023340>
- [6] Fu, J., Li, Y., Zhang, H., Han, J., Jiao, Y., Du, J., *et al.* (2021) Outcomes of Mitral Valve Repair Compared with Replacement for Patients with Rheumatic Heart Disease. *The Journal of Thoracic and Cardiovascular Surgery*, **162**, 72-82.e7. <https://doi.org/10.1016/j.jtcvs.2020.01.053>
- [7] Lee, H., Chang, F., Yeh, J., Tung, Y., Wu, V.C., Hsieh, M., *et al.* (2024) Mitral Valve Repair vs. Replacement by Different Etiologies—A Nationwide Population-Based Cohort Study. *Circulation Journal*, **88**, 568-578. <https://doi.org/10.1253/circj.cj-23-0640>
- [8] Shibata, M., Kim, K., Ono, Y., Kim, H.R., Kim, H.J., Yoo, J.S., *et al.* (2025) Risk of Reoperation Following Rheumatic Mitral Repair: Long-Term Longitudinal Analysis. *The Journal of Thoracic and Cardiovascular Surgery*. <https://doi.org/10.1016/j.jtcvs.2025.09.049>
- [9] Dillon, J., Yakub, M.A., Kong, P.K., Ramli, M.F., Jaffar, N. and Gaffar, I.F. (2015) Comparative Long-Term Results of Mitral Valve Repair in Adults with Chronic Rheumatic Disease and Degenerative Disease: Is Repair for “Burnt-Out” Rheumatic Disease Still Inferior to Repair for Degenerative Disease in the Current Era? *The Journal of Thoracic and Cardiovascular Surgery*, **149**, 771-779. <https://doi.org/10.1016/j.jtcvs.2014.08.066>
- [10] El Oumeiri, B., Boodhwani, M., Glineur, D., De Kerchove, L., Poncelet, A., Astarci, P., *et al.* (2009) Extending the Scope of Mitral Valve Repair in Rheumatic Disease. *The Annals of Thoracic Surgery*, **87**, 1735-1740. <https://doi.org/10.1016/j.athoracsur.2009.03.009>
- [11] Chotivatanapong, T. (2019) Rheumatic Mitral Valve Repair: A Physiologic and Dynamic Approach. *Indian Journal of Thoracic and Cardiovascular Surgery*, **36**, 7-11. <https://doi.org/10.1007/s12055-019-00860-9>
- [12] Nkomo, V.T., Gardin, J.M., Skelton, T.N., Gottdiener, J.S., Scott, C.G. and Enriquez-Sarano, M. (2006) Burden of Valvular Heart Diseases: A Population-Based Study. *The Lancet*, **368**, 1005-1011. [https://doi.org/10.1016/s0140-6736\(06\)69208-8](https://doi.org/10.1016/s0140-6736(06)69208-8)
- [13] Gammie, J.S., Chikwe, J., Badhwar, V., Thibault, D.P., Vemulapalli, S., Thourani, V.H., *et al.* (2018) Isolated Mitral Valve Surgery: The Society of Thoracic Surgeons Adult Cardiac Surgery Database Analysis. *The Annals of Thoracic Surgery*, **106**, 716-727. <https://doi.org/10.1016/j.athoracsur.2018.03.086>
- [14] Mve Mvondo, C., Pugliese, M., Ambassa, J.C., Giamberti, A., Bovio, E. and Dailor, E. (2018) Mechanical Heart Valve Replacement in a Low-Middle Income Region in the Modern Era: Midterm Results from a Sub-Saharan Center. *The Thoracic and Cardio-*

- vascular Surgeon*, **68**, 99-106. <https://doi.org/10.1055/s-0038-1666873>
- [15] Edwin, F., Aniteye, E., Tettey, M.M., Tamatey, M. and Frimpong-Boateng, K. (2011) Outcome of Left Heart Mechanical Valve Replacement in West African Children—A 15-Year Retrospective Study. *Journal of Cardiothoracic Surgery*, **6**, Article No. 57. <https://doi.org/10.1186/1749-8090-6-57>
- [16] Williams, M.A. and van Riet, S. (2006) The On-X Heart Valve: Mid-Term Results in a Poorly Anticoagulated Population. *Journal of Heart Valve Disease*, **15**, 80-86.
- [17] Chikwe, J., Toyoda, N., Anyanwu, A.C., Itagaki, S., Egorova, N.N., Boateng, P., *et al.* (2017) Relation of Mitral Valve Surgery Volume to Repair Rate, Durability, and Survival. *Journal of the American College of Cardiology*, **69**, 2397-2406. <https://doi.org/10.1016/j.jacc.2017.02.026>
- [18] Yousef, S., Singh, S., Mullan, C.W., Dey, P., Mori, M., Brooks, C., *et al.* (2021) Relationship of Surgeon Experience and Outcomes of Surgery for Degenerative Mitral Valve Disease. *Journal of Cardiac Surgery*, **36**, 2621-2627. <https://doi.org/10.1111/jocs.15583>
- [19] Chen, S., Chen, C., Chien-Chia Wu, V., Chou, A., Cheng, Y., Chang, S., *et al.* (2022) Mitral Valve Repair versus Replacement in Patients with Rheumatic Heart Disease. *The Journal of Thoracic and Cardiovascular Surgery*, **164**, 57-67.e11. <https://doi.org/10.1016/j.jtcvs.2020.07.117>
- [20] Portella, G., Chatenoud, L., Gatti, S., Salvati, A.C., Asta, L., Lentini, S., *et al.* (2025) Rheumatic Valve Surgery in Sudan: Results in 7,449 Patients at the Salam Centre for Cardiac Surgery. *Journal of the American College of Cardiology*, **85**, 88-92. <https://doi.org/10.1016/j.jacc.2024.09.1232>
- [21] Bridgewater, B., Kinsman, R., Walton, P., Gummert, J. and Kappelein, A.P. (2010) The 4th European Association for Cardio-Thoracic Surgery Adult Cardiac Surgery Database Report. *Interactive Cardio Vascular and Thoracic Surgery*, **12**, 4-5. <https://doi.org/10.1510/icvts.2010.251744>
- [22] Mokitimi, N., van der Donck, K., Moutlana, H. and Chakane, P.M. (2021) Profile of Adult Patients Presenting for Rheumatic Mitral Valve Surgery at a Tertiary Academic Hospital. *Cardiovascular Journal of Africa*, **32**, 31-36. <https://doi.org/10.5830/cvja-2021-024>
- [23] Desta, T.T., Gezachew, A. and Eshetu, K. (2023) Descriptive Analysis of Rheumatic Heart Disease Related Complications in Pediatric Patients at Tertiary Hospital, Addis Ababa, Ethiopia. *Pediatric Health, Medicine and Therapeutics*, **14**, 45-57. <https://doi.org/10.2147/phmt.s396854>
- [24] Chauvaud, S., Fuzellier, J., Berrebi, A., Deloche, A., Fabiani, J. and Carpentier, A. (2001) Long-Term (29 Years) Results of Reconstructive Surgery in Rheumatic Mitral Valve Insufficiency. *Circulation*, **104**, I-12-I-15. <https://doi.org/10.1161/hc37t1.094707>