

Background: High-volume centers (case load >2.000 per year) with dedicated heart valve teams and several well-trained endoscopic surgeons have shown excellent long-term results of minimally invasive mitral valve surgery (MIMVS). There is, however, very little information on procedure quality and long-term repair results of patients treated in smaller centers. This study aimed to investigate whether MIMVS can be performed in a small center with the same quality as in a high-volume center.

Methods: Between 01/2011 and 12/2020 a total of 563 patients underwent endoscopic mitral valve repair, operated on by a single surgeon. Of those, 256 patients (45%) had concomitant surgery, mainly tricuspid repair and rhythm surgery. The remaining 307 patients formed the study population of isolated endoscopic mitral valve repair (MVR). Data were obtained from an institutional database. All surviving patients were contacted, and the latest available echo studies were analyzed. The focus of this study was long-term durability of repair results (Kaplan-Meier analysis). In addition, potential influences of confounding factors, like MV pathology, surgical access, complexity of repair, or mode of aortic occlusion on re-intervention probability were analyzed (binary logistic regression and Cox regression).

Results: Average case load was 56 patients per year reflecting a low-volume center. Patients median age at the time of surgery was 59.9 ± 12.3 years (73% males). MV pathology was structural in 83% and functional in 17%. Surgical access was periareolar in 70% and transaxillary in 30%. A transthoracic clamp was used in 70 cases (31%) and intra-aortic balloon occlusion (IntraClude®) was used in 153 cases (69%). In-hospital mortality was 1.3%. Median follow-up was 5.8 years. Twenty-three patients (10.3%) died during follow-up, of those, 5 patients (2.2%) from cardiovascular reasons. Kaplan-Meier analysis revealed event-free survival (e.g., survival without higher degree MV insufficiency or MV re-intervention) of 97.5% at 5 years and 94.3% at 10 years. Potential confounding factors (MV pathology, surgical access, complexity of repair, mode of aortic occlusion) had no statistically significant influence on long-term results.

Conclusion: Immediate and long-term results (survival and durability of MV repair) were excellent and in line with those published by authors representing big heart valve centers. Given adequate training and a continuous case load of at least 1-2 patients per week, a single MV surgeon should be able to achieve compelling results, irrespective of the complexity of repair. This study could demonstrate that adequate outcome in MIMVS can be achieved at low-volume centers as well.

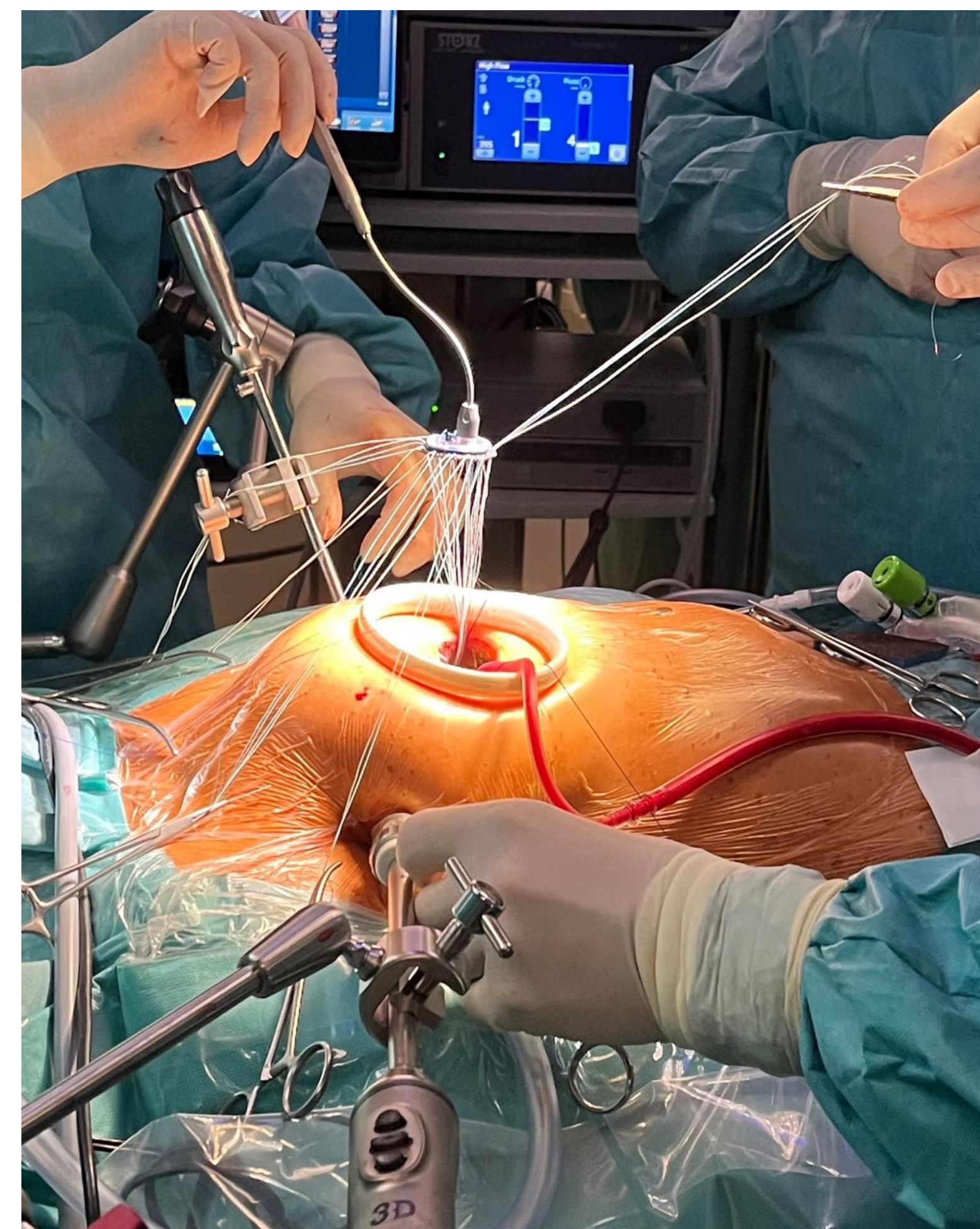


Figure 1: Standard surgical approach for 3D endoscopic mitral valve repair; periareolar access

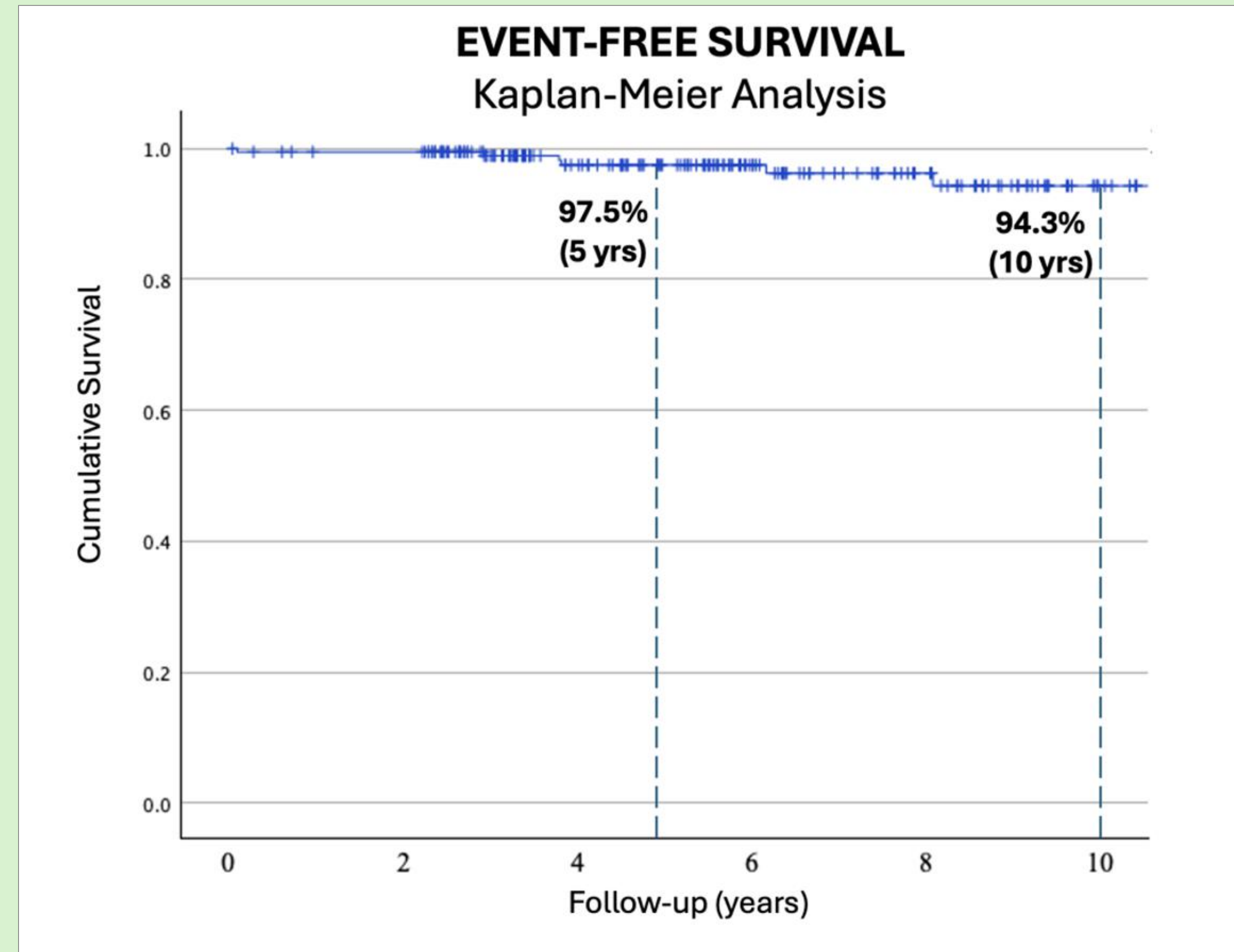


Figure 2: Kaplan-Meier estimate for event-free survival after endoscopic MV repair

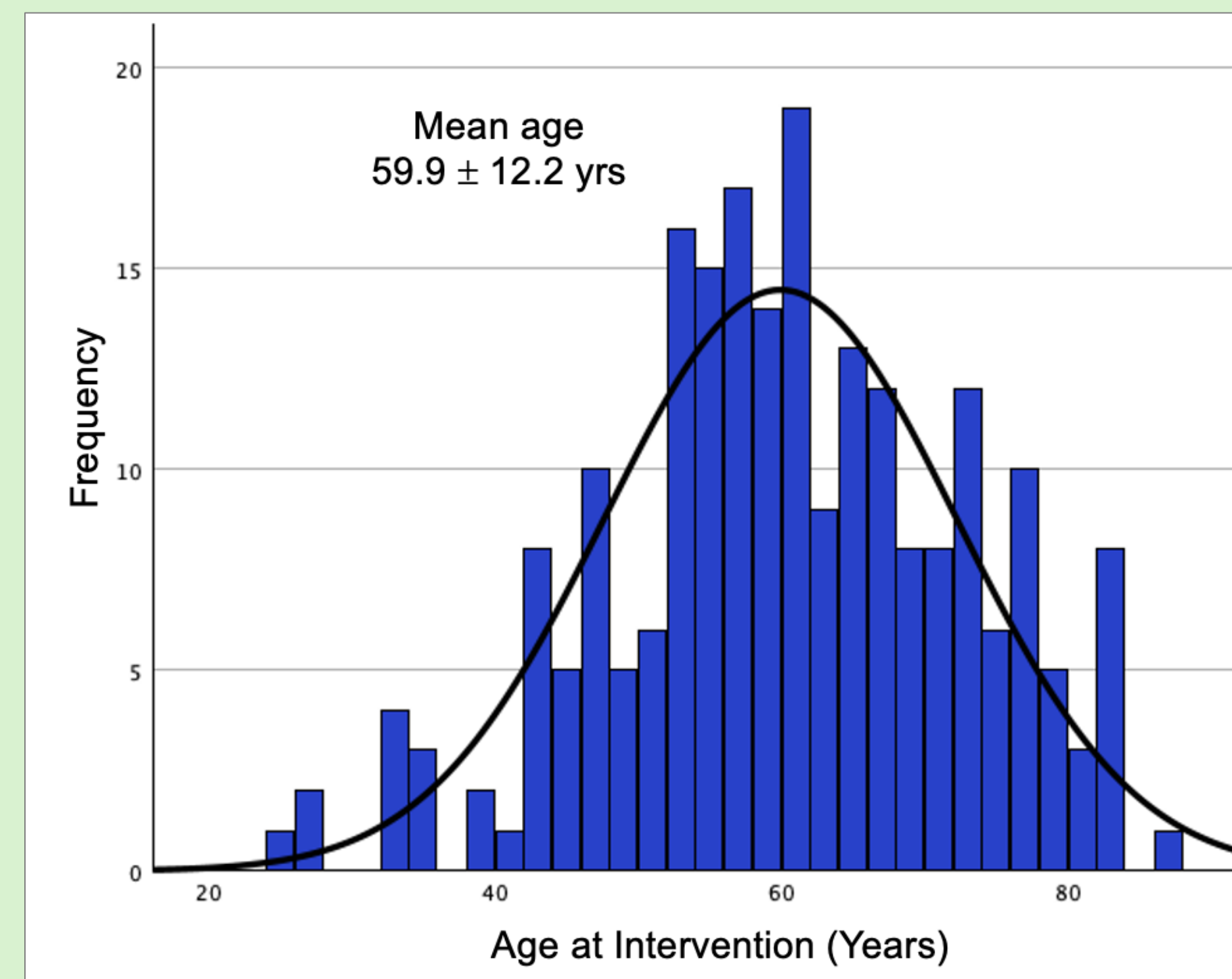


Figure 3: Age distribution at the time of surgical intervention

Predictors of the probability of re-intervention		
	Odds Ratio (95% CI)	p-value
MV Pathology		
Prolaps	4,508 (0,711-28,582)	0,279
Barlow-Valve	4,099 (0,654-25,675)	0,132
Surgical Variables		
Surgical Access	1,856 (0,301-11,429)	0,505
Mode of Aortic clamping	1,805 (0,197-16,489)	0,601
Complexity of Repair	0,568 (0,061-5,297)	0,620

Figure 4: Results of logistic regression (Cox analysis). None of the tested variables proved to have an influence on the probability of re-intervention

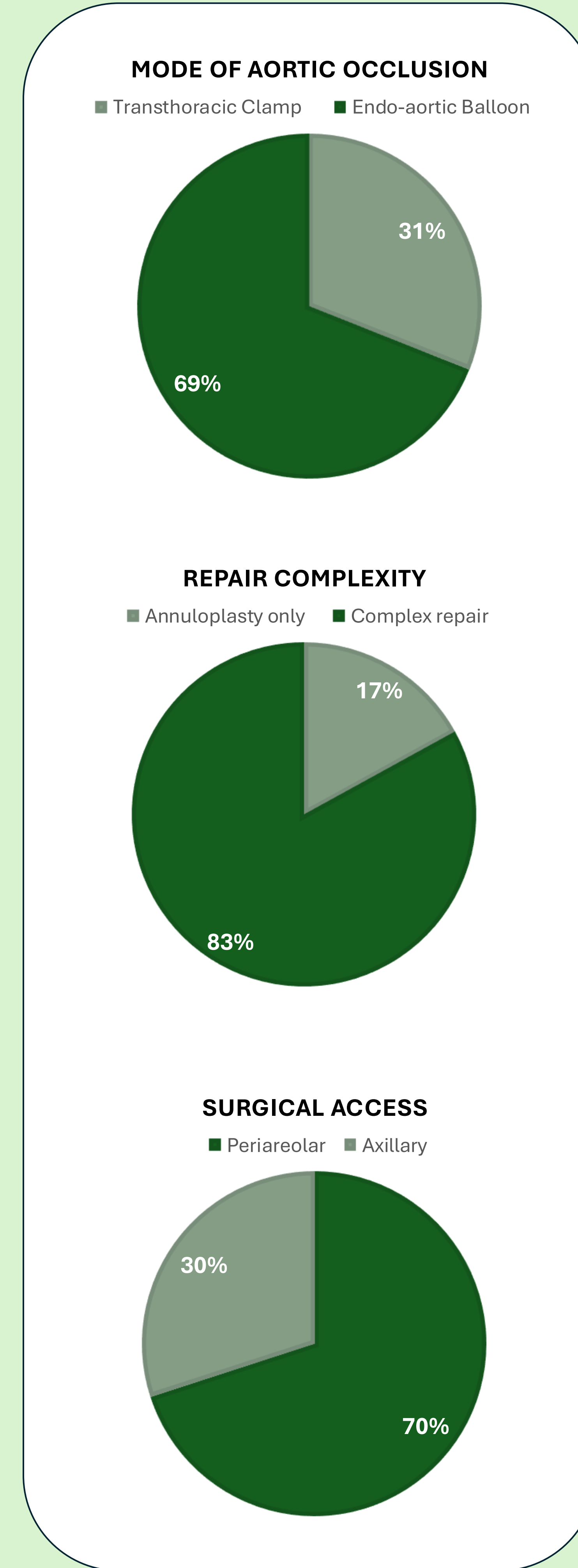


Figure 5: Surgical Variables