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Original article

EVALUATION OF HEMODYNAMIC AND BIOMARKER CHANGES IN PATIENTS UNDERGOING SURGICAL AORTIC VALVE REPLACEMENT

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Abstract: **Background:** Aortic stenosis (AS) is a systemic disease characterized by valvular obstruction, ventricular remodeling, and perioperative vulnerability to oxygen supply–demand imbalance. This study evaluated perioperative metabolic and biomarker dynamics and early postoperative outcomes in patients undergoing surgical aortic valve replacement (AVR).

Patients and Methods: A prospective observational study was conducted on 60 consecutive adults with severe AS who underwent surgical AVR at a single center. Demographics, anthropometric data, intraoperative variables, complications, and pre- and postoperative hemodynamic and laboratory parameters were evaluated. Postoperatively, the following were assessed at 6 and 24 hours: mean arterial pressure (MAP), arterial oxygen saturation (SaO_2), partial pressure of oxygen (PaO_2), pH, partial pressure of carbon dioxide ($PaCO_2$), hemoglobin (Hb), lactate, and creatine kinase–MB isoenzyme (CK-MB). Continuous data are presented as mean ± standard deviation (SD) or median (interquartile range, IQR). Paired t-tests were used to compare values between 6 and 24 hours.

Results: The mean age was 69.9 ± 7.3 years; 58.3% were male. Mean anesthesia and operation times were 151.5 ± 21.8 and 126.8 ± 20.6 minutes, respectively; mean cardiopulmonary bypass (CPB) and cross-clamp times were 78.3 ± 17.6 and 58.5 ± 16.7 minutes. Nearly half of the patients (46.7%) had no postoperative complications; others experienced bleeding (16.7%), arrhythmias requiring therapy (6.7%), permanent pacemaker implantation (8.3%), re-exploration (6.7%), infection (8.3%), respiratory failure (3.3%), or renal failure (3.3%). From 6 to 24 hours postoperatively, lactate decreased (2.34 ± 0.96 → 1.87 ± 0.98 mmol/L; $p = 0.006$) and CK-MB declined (52.5 ± 34.2 → 39.0 ± 30.8 U/L; $p = 0.001$), while Hb increased (103.5 ± 10.1 → 120.1 ± 22.9 g/L; $p < 0.001$). pH decreased modestly (7.396 ± 0.057 → 7.365 ± 0.065; $p = 0.015$). MAP, SaO_2, PaO_2, and $PaCO_2$ showed no significant changes. The median hospital stay was 7 days (IQR 6–8).

Conclusions: In patients undergoing surgical AVR for AS, early postoperative trends demonstrated an improving metabolic profile (lower lactate) and biomarker normalization (CK-MB) with stable oxygenation, alongside low-to-moderate complication rates and a consistent 7-day median stay. Integrating perioperative oxygen-balance markers and cardiac biomarkers with imaging and left ventricular hypertrophy (LVH) assessment may refine timing and risk stratification for intervention. Prospective studies with standardized imaging and longer follow-up are warranted to link early metabolic recovery with ventricular remodeling and clinical outcomes.

Keywords: aortic stenosis, aortic valve replacement, lactate, creatine kinase–MB isoenzyme, biomarkers.

INTRODUCTION

Aortic stenosis (AS) is one of the most common and clinically significant valvular diseases, with incidence rising in parallel with aging populations and comorbid cardiovascular conditions (1, 2). The 2021

ESC/EACTS Guidelines emphasize timely diagnosis, accurate risk stratification, and balancing surgical and transcatheter aortic valve replacement (TAVR) options (1). The disease is increasingly recognized as a systemic process involving valve calcification, ventricular remodeling, and vascular alterations—often referred to as the "triumvirate" of valve, ventricle, and vessel (3).

Left ventricular hypertrophy (LVH), a hallmark of chronic pressure overload in AS, carries prognostic implications beyond valvular obstruction (4, 5). While surgical or transcatheter intervention can promote regression, recovery is variable, and higher preoperative left ventricular mass index (LVMI) has been associated with residual hypertrophy and adverse outcomes (6).

Advances in multi-modality imaging provide detailed evaluation of AS severity and myocardial adaptation. Echocardiography remains the cornerstone for grading, while computed tomography (CT) calcium scoring is indispensable for TAVR planning (7). Cardiovascular magnetic resonance (CMR) adds prognostic value by detecting diffuse fibrosis and extracellular matrix remodeling (8).

Biomarkers complement imaging in perioperative management. Lactate and creatine kinase–MB (CK-MB) reflect metabolic and myocardial recovery after intervention, while troponin and multimarker strategies predict adverse outcomes (9, 10). Perioperative studies further highlight the importance of maintaining oxygen supply–demand balance and myocardial protection during anesthesia and cardiopulmonary bypass (11, 12).

Finally, landmark trials and meta-analyses have refined the timing of intervention, particularly in asymptomatic severe AS. Evidence suggests that earlier AVR in selected patients improves outcomes (13, 14). In this context, surgical AVR continues to provide reliable results with acceptable complication rates, while TAVR expands treatment options for both high- and low-risk patients (15, 16).

PATIENTS AND METHODS

This was a prospective descriptive study that included 60 consecutive patients with severe aortic stenosis (AS) who underwent surgical aortic valve replacement (AVR) at the Clinic for Cardiac Surgery, Acibadem-Sistina Hospital, Skopje, North Macedonia, between October 2024 and April 2025. Patients were eligible if they were 18 years of age or older, had echocardiographically confirmed severe AS, and had complete perioperative documentation. Those undergoing concomitant major cardiac procedures or those with incomplete data were excluded.

Data were obtained from institutional medical records, anesthesia charts, surgical protocols, and laboratory reports. The data collector was blinded to perioperative management and the clinical course of the patients. Demographic information included age and sex, while baseline clinical and anthropometric characteristics comprised weight, height, body mass index (BMI), and American Society of Anesthesiologists (ASA) classification. Intraoperative variables included anesthesia and operation duration, cardiopulmonary bypass (CPB) and cross-clamp times, lowest hemoglobin (Hb), hematocrit (Hct), and body temperature during CPB, norepinephrine requirements, cardioplegia regimen, transfusion requirements, cardiac rhythm changes, and number of defibrillations required.

All patients underwent full sternotomy with cardiopulmonary bypass, with the flow rate set to 2.2–2.4 L/min/BSA, using cold blood cardioplegia administered at 15- to 20-minute intervals to achieve cardiac arrest and protect the myocardium during surgery. Postoperative complications were also recorded, including bleeding, re-exploration, arrhythmias, permanent pacemaker implantation, infections, respiratory failure, and renal failure.

Preoperative echocardiographic and laboratory measurements included aortic valve area (AVA), interventricular septal and posterior wall thickness, peak velocity (Vmax), Hb, Hct, arterial oxygen saturation (SaO_2), arterial partial pressure of oxygen (PaO_2), pH, arterial partial pressure of carbon dioxide ($PaCO_2$), lactate, and creatine kinase–MB isoenzyme (CK-MB). Postoperative hemodynamic and laboratory data were recorded at 6 and 24 hours after surgery, including mean arterial pressure (MAP), SaO_2, PaO_2, pH, $PaCO_2$, Hb, lactate, and CK-MB. The length of hospital stay (LOS) was also analyzed.

A detailed description of the surgical technique will be added once provided by the surgical team and will include the approach to cannulation, prosthetic valve implantation, cardioplegia administration, and weaning from CPB.

Continuous variables were summarized as mean ± standard deviation (SD), median with interquartile range (IQR), and minimum–maximum values. The normality of distribution was assessed using the Shapiro–Wilk test. Comparisons between sexes were performed using the Mann–Whitney U test, while changes between postoperative values at 6 and 24 hours were analyzed using the paired t-test. Categorical variables were expressed as frequencies and percentages. A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 60 patients with severe aortic stenosis undergoing surgical aortic valve replacement during the study period were included. The results are presented in six structured tables, covering demographic

Table 1. *Demographics by sex*

Variable	Male (N = 35)	Female (N = 25)	Total (N = 60)
Age, years (Mean ± SD)	68.34 ± 7.51	71.96 ± 6.65	69.85 ± 7.33
Median (IQR)	69 (64–74)	73 (68–77)	70 (66–75)
Min–Max	49–80	54–80	49–80

data, baseline anthropometric and clinical characteristics, operative and intraoperative parameters, postoperative complications, preoperative echocardiographic and laboratory values, and postoperative hemodynamic and laboratory outcomes.

The cohort consisted of 35 men (58.3%) and 25 women (41.7%), with a mean age of 70 years (range: 49–80). No significant sex differences were observed in age distribution (Table 1).

Baseline anthropometric and clinical characteristics showed an overweight cohort (mean BMI: 28 kg/m^2), with all patients classified as ASA III (Table 2).

Operative parameters demonstrated mean anesthesia and operation times of approximately 150 and 127 minutes, respectively. Cardiopulmonary bypass (CPB) and cross-clamp durations averaged 78 and 59 minutes. The lowest hemoglobin and hematocrit values on bypass were 9 g/dL and 27%, respectively (Table 3).

Table 2. *Baseline anthropometric and clinical characteristics of 60 patients*

Variable	Total (N = 60)
BMI, kg/m^2 (Mean ± SD)	28.16 ± 3.96
Median (IQR)	28.2 (24.9–31.2)
Weight, kg (Mean ± SD)	80.27 ± 13.15
Median (IQR)	81 (70.3–89.8)
Height, cm (Mean ± SD)	168.67 ± 8.02
Median (IQR)	168 (164–175.8)

BMI – Body Mass Index;SD – Standard Deviation;IQR – Interquartile Range.

Table 3. *Operative and intraoperative continuous parameters*

Variable	Mean ± SD	Range
Anesthesia time, min	151.5 ± 21.8	110–195
Operation time, min	126.8 ± 20.6	88–179
CPB time, min	78.3 ± 17.6	46–127
Cross-clamp time, min	58.5 ± 16.7	24–100
Lowest Hb on CPB, g/dL	8.95 ± 1.22	6.3–12.5
Lowest Hct on CPB, %	27.2 ± 3.6	19–37
Lowest temperature, °C	35.1 ± 0.4	34.3–36.2
Norepinephrine dose, µg/kg/min	125.0 ± 203.0	0–987.5

CPB – Cardiopulmonary Bypass; Hb – Hemoglobin;Hct – Hematocrit; °C – Degrees Celsius; µg/kg/min – Micrograms per kilogram per minute; SD – Standard Deviation.

Categorical intraoperative findings, including cardioplegia regimens, transfusion requirements, rhythm changes, and defibrillation needs, are summarized in Table 4.

Nearly half of the patients (46.7%) had an uncomplicated postoperative course. The most common complications were bleeding (16.7%), arrhythmias (6.7%), and infections (8.3%), while respiratory and renal failure were rare (3.3% each). Details are shown in Table 5. The distribution of age, BMI, body weight, height, anesthesia and operation duration, CPB, and cross-clamp times is illustrated in Figure 1.

Table 4. *Operative and intraoperative categorical parameters*

Variable	Category	n (%)
Cardioplegia doses	2	6 (10.0)
	3	24 (40.0)
	4	24 (40.0)
	5	6 (10.0)
RBC transfusion	0	41 (68.3)
	1	17 (28.3)
	2	2 (3.3)
FFP transfusion	0	44 (73.3)
	1	16 (26.7)
Cryoprecipitate	0	50 (83.3)
	1	10 (16.7)
Platelet transfusion	0	56 (93.3)
	1	4 (6.7)
Rhythm	Sinus rhythm (SR)	40 (66.7)
	Pacemaker (PM)	12 (20.0)
	Atrial fibrillation (AF)	8 (13.3)
Defibrillation	0	22 (36.7)
	1	23 (38.3)
	2	8 (13.3)
	≥ 3	7 (11.7)

Table 5. *Postoperative complications*

Complication	n (%)
None	28 (46.7)
Bleeding	10 (16.7)
Re-exploration	4 (6.7)
Permanent pacemaker	5 (8.3)
Arrhythmia (Amiodarone/Cardioversion)	4 (6.7)
Respiratory failure	2 (3.3)
Infection	5 (8.3)
Renal failure	2 (3.3)

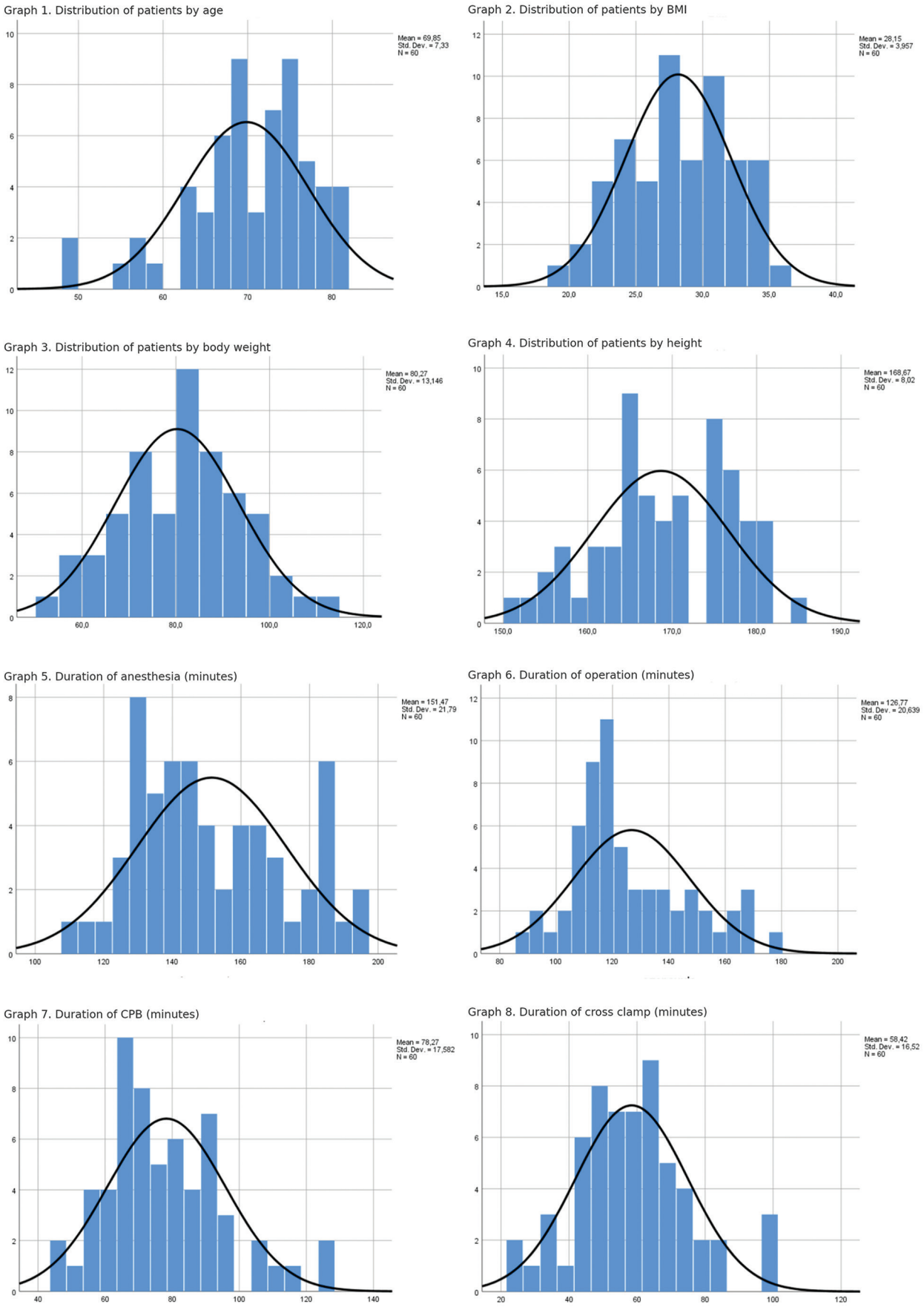

Figure 1. *Histogram distribution of demographic and intraoperative variables*

Table 6. *Preoperative echocardiographic and laboratory parameters*

Variable	Mean ± SD	Median (IQR)	Min–Max
AVA, cm^2	0.713 ± 0.142	0.75 (0.60–0.80)	0.5–0.9
IVSd, mm	11.35 ± 4.00	10.0 (7.25–15.0)	6–18
Posterior wall, mm	10.90 ± 3.25	10.0 (8.0–14.0)	6–22
Vmax, m/s	4.717 ± 0.246	4.75 (4.60–4.90)	4.2–5.2
Hemoglobin, g/L	128.97 ± 18.63	131.0 (115.0–140.8)	81–170
Hematocrit, %	38.01 ± 4.93	38.3 (34.6–42.1)	27.4–48
SaO_2, %	95.23 ± 2.12	95.0 (95.0–96.0)	87–99
PaO_2, mmHg	79.27 ± 8.75	80.6 (72.9–85.6)	59.1–96.5
pH	7.388 ± 0.048	7.395 (7.350–7.428)	7.27–7.48
$PaCO_2$, mmHg	38.39 ± 3.95	38.8 (35.1–41.2)	30.4–47.4
Lactate, mmol/L	1.077 ± 0.441	1.0 (0.7–1.4)	0.4–2.3
CK-MB, U/L	52.62 ± 19.41	53.0 (36.3–64.0)	18–97

AVA – Aortic Valve Area; IVSd – Interventricular Septal Thickness in Diastole; Vmax – Peak Aortic Jet Velocity; Hb – Hemoglobin; Hct – Hematocrit; SaO_2 – Arterial Oxygen Saturation; PaO_2 – Partial Pressure of Oxygen in Arterial Blood; pH – Hydrogen Ion Concentration (acid–base balance); $PaCO_2$ – Partial Pressure of Carbon Dioxide in Arterial Blood; CK-MB – Creatine Kinase–Myocardial Band Isoenzyme; SD – Standard Deviation; IQR – Interquartile Range.

Table 7. *Postoperative hemodynamic, laboratory, and outcome parameters*

Variable	6h Post-op (Mean ± SD / Median [IQR])	24h Post-op (Mean ± SD / Median [IQR])	Min–Max	p value
MAP, mmHg	79.3 ± 10.2 / 77.5 (72.3–87.0)	81.8 ± 9.9 / 80.0 (75–88)	63–110 / 65–105	0.120 (ns)
Lactate, mmol/L	2.34 ± 0.96 / 2.15 (1.7–3.0)	1.87 ± 0.98 / 1.7 (1.0–2.5)	0.7–5.2 / 0.5–4.5	0.006
CK-MB, U/L	52.5 ± 34.2 / 50.5 (39–73)	39.0 ± 30.8 / 39.0 (27–56.8)	26–163 / 20–158	0.001
Hb, g/L	103.5 ± 10.1 / 101.5 (95–112.8)	120.1 ± 22.9 / 114.5 (101.3–141.8)	87–127 / 87–168	< 0.001
SaO_2, %	99.2 ± 0.98 / 99.0 (99–100)	99.4 ± 1.20 / 100 (100–100)	96–100 / 95–100	0.294 (ns)
PaO_2, mmHg	141.5 ± 25.4 / 143.0 (122.3–162.8)	136.0 ± 29.4 / 138.0 (110.5–155.8)	94–193 / 85–195	0.258 (ns)
pH	7.396 ± 0.057 / 7.405 (7.38–7.43)	7.365 ± 0.065 / 7.380 (7.33–7.41)	7.22–7.51 / 7.21–7.45	0.015
$PaCO_2$, mmHg	41.9 ± 2.77 / 41.8 (39.8–43.4)	42.8 ± 4.45 / 42.7 (40.6–45.3)	36.4–50.0 / 30.2–54.0	0.133 (ns)

MAP – Mean Arterial Pressure; Hb – Hemoglobin; SaO_2 – Arterial Oxygen Saturation; PaO_2 – Partial Pressure of Oxygen in Arterial Blood; pH – Hydrogen Ion Concentration; $PaCO_2$ – Partial Pressure of Carbon Dioxide in Arterial Blood; CK-MB – Creatine Kinase–Myocardial Band Isoenzyme; mmHg – Millimeters of Mercury; mmol/L – Millimoles per Liter; g/L – Grams per Liter; ns – Not Significant; SD– Standard Deviation; IQR – Interquartile Range.

Preoperative echocardiographic and laboratory parameters confirmed severe AS, with a mean valve area of 0.71 cm^2 and a Vmax of 4.7 m/s. Baseline laboratory values are presented in Table 6.

Postoperatively, lactate and CK-MB decreased significantly from 6 to 24 hours, while hemoglobin increased. Oxygenation parameters remained stable, pH showed a slight but significant decrease, and no significant changes were observed in MAP, PaO_2, SaO_2, or $PaCO^2$ (Table 7).

The mean length of stay was 7 days, with most patients discharged on days 7–8. Only a few had shorter (5–6 days) or longer (9 days) hospitalizations (Figure 2).

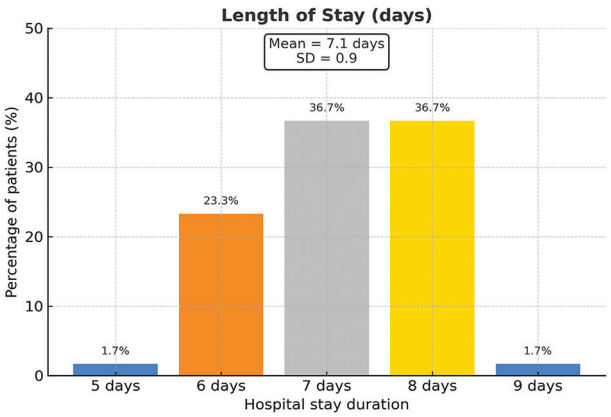

Figure 2. *Distribution of hospital stay (LOS) among patients, expressed in days (% of patients)*

Table 8. *Comparative overview of key studies in AS and LVH*

Study / Year	Focus	Key Findings	Relevance to Present Study
Généreux et al., 2017 [13]	AS staging	Proposed staging classification based on extent of cardiac damage	Validates LVH as prognostic marker
Bennett et al., 2024 [4]	LVH regression	Early regression of cell and matrix hypertrophy 2 months post-AVR	Similar regression trends observed
Mahmod et al., 2024 [5]	Remodeling differentiation	Differentiates AS vs hypertension-induced LVH	Supports interpretation of heterogeneous regression
Barletta et al., 2021 [6]	Long-term remodeling	LA recovery peaks at 3 months, LV recovery up to 2 years; high LVMI predicts residual hypertrophy	Highlights prognostic role of baseline LVMI
Khuong et al., 2023 [10]	Troponin & TAVR	Elevated troponin predicts adverse outcomes	Corroborates biomarker findings
Jakobsson et al., 2019 [12]	Oxygen consumption	General anesthesia reduces VO_2; perioperative oxygen balance critical	Supports perioperative findings
Jørgensen et al., 2024 [15]	NOTION-2 trial	TAVR effective in low-risk AS patients	Provides benchmark against surgical AVR
Leon et al., 2010 [16]	Inoperable AS	TAVR improved survival vs medical therapy	Contextualizes surgical AVR vs TAVR

DISCUSSION

Our findings reinforce the concept that aortic stenosis (AS) is not only a valvular disease but a systemic disorder involving ventricular remodeling and vascular adaptation (1, 3). Preoperatively, patients exhibited marked left ventricular hypertrophy (LVH), consistent with previous imaging-based studies (4, 5). Postoperatively, early metabolic improvement was evident, including decreased lactate and CK-MB levels and improved hemoglobin, supporting effective perioperative management and myocardial recovery (9, 10).

LVH regression after aortic valve replacement (AVR) remains heterogeneous. Some studies demonstrate partial reverse remodeling within two months (4), while others indicate that asymmetric septal hypertrophy requires longer recovery trajectories. Specifically, left atrial reverse remodeling peaks at three months, whereas maximal left ventricular recovery may take up to two years. Importantly, a higher preoperative left ventricular mass index (LVMI) has been associated with residual hypertrophy and adverse long-term outcomes (6).

Imaging continues to play a central role in evaluation and follow-up. Echocardiography reliably defines severity and monitors regression (7), while computed tomography (CT) provides critical information for operative and transcatheter aortic valve replacement (TAVR) planning (7). Cardiovascular magnetic resonance (CMR) adds unique insights into myocardial fibrosis and extracellular remodeling (8). Together, multimodality imaging allows individualized treatment planning and risk stratification.

Biomarker dynamics further complement imaging. In this study, early postoperative reductions in lactate and CK-MB were observed, paralleling previous reports of improving oxygen utilization and myocardial stabilization after AVR (9, 10). Troponin and multimarker panels have also been shown to predict adverse outcomes in both surgical and TAVR settings

(10), underscoring the role of perioperative biochemical surveillance.

The balance between oxygen delivery and consumption remains critical in elderly surgical patients with AS, particularly during cardiopulmonary bypass (11, 12). Our findings of a modest pH decline with otherwise stable oxygenation indices are consistent with earlier reports showing that myocardial injury risk is linked more to metabolic stress than to oxygen desaturation (11).

From a therapeutic perspective, both surgical AVR and TAVR continue to evolve. Surgical AVR in our series demonstrated low-to-moderate complication rates and a consistent median length of stay of seven days, reflecting outcomes comparable to contemporary surgical series. TAVR trials, including NOTION-2 and landmark studies by Leon et al., confirm excellent outcomes in low-risk and inoperable patients, respectively (15, 16). By contrast, all patients in our study underwent surgical AVR at a single center. Nevertheless, frailty and cerebral perfusion remain significant predictors of poor prognosis (13, 14).

Our data support integrating biomarkers, imaging, and LVH dynamics into decision-making to optimize patient selection and timing. A comparative overview of selected landmark studies is provided in Table 8.

Taken together, this study supports an integrated approach to severe AS, combining imaging, biomarkers, and careful assessment of LVH burden. Hemodynamic stability and metabolic recovery after surgery are reassuring early endpoints, but long-term outcomes will depend on the degree of LV regression and remodeling. Future multicenter studies with standardized imaging and extended follow-up are needed to confirm the prognostic role of early postoperative biomarker trends and to establish their relationship with ventricular remodeling and clinical outcomes.

CONCLUSION

Aortic stenosis is increasingly recognized as a systemic disorder involving valvular, ventricular, and vascular components. Our findings confirm that perioperative metabolic changes, biomarker fluctuations, and left ventricular hypertrophy significantly influence early postoperative outcomes after surgical valve replacement. While partial regression of hypertrophy is achievable, recovery remains incomplete in the early phase. These results support the growing shift toward earlier and individualized intervention, guided by an integrated approach combining imaging and biomarker assessment. Larger multicenter studies with standardized imaging and longer follow-up are warranted to validate these findings and to link early postoperative metabolic recovery with long-term ventricular remodeling and clinical outcomes.

Abbreviations

AF – atrial fibrillation
ASA – American Society of Anesthesiologists
AS – aortic stenosis
AVR – aortic valve replacement
BMI – body mass index
CK-MB – creatine kinase–MB isoenzyme
CPB – cardiopulmonary bypass
Hb – hemoglobin
Hct – hematocrit
IQR – interquartile range
LOS – length of stay
LVH – left ventricular hypertrophy
MAP – mean arterial pressure
$PaCO_2$ – arterial partial pressure of carbon dioxide
PaO_2 – arterial partial pressure of oxygen
SaO_2 – arterial oxygen saturation
SD – standard deviation
TAVR – transcatheter aortic valve replacement
Vmax – peak velocity

Ethics statement: The study was approved by the Institutional Ethics Committee of Acibadem-Sistina Hospital, Skopje, North Macedonia, and conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all patients prior to inclusion in the study.

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Conflict of Interest Statement: The authors declare that there is no conflict of interest related to this paper.

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Data Availability Statement: Requests to access the datasets should be directed to the corresponding author.

Note: Artificial intelligence was not utilized as a tool in this study.

Sažetak

PROCENA HEMODINAMSKIH I BIOMARKERSKIH PROMENA KOD PACIJENATA PODVRGNUTIH HIRURŠKOJ ZAMENI AORTNOG ZALISKA

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Uvod: Aortna stenoza (AS) predstavlja sistemsku bolest koju karakterišu valvularna opstrukcija, ventrikularno remodelovanje i perioperativna osetljivost na disbalans između snabdevanja i potrošnje kiseonika. Cilj ove studije bio je da proceni perioperativne metaboličke i biomarkerske promene, kao i rane postoperativne ishode kod pacijenata podvrgnutih hirurškoj zameni aortnog zaliska (AVR).

Pacijenti i Metode: Sprovedena je prospektivna opservaciona studija na 60 uzastopnih odraslih pacijenata sa teškom aortnom stenozom (AS) koji su podvrgnuti hirurškoj zameni aortnog zaliska (AVR) u jednoj ustanovi. Analizirani su demografski i antropometrijski podaci, intraoperativni parametri, postoperativne komplikacije, kao i hemodinamski i laboratorijski pokazatelji pre i posle operacije.

Postoperativno su, nakon 6 i 24 časa, praćeni sledeći parametri: srednji arterijski pritisak (MAP), arterijska saturacija kiseonikom (SaO_2), parcijalni pritisak kiseonika (PaO_2), pH, parcijalni pritisak ugljen-dioksida ($PaCO_2$), hemoglobin (Hb), laktat i kreatin kinaza–MB izoenzim (CK-MB). Kontinuirane vrednosti prikazane su kao srednja vrednost ± standardna devijacija (SD) ili kao medijana (interkvartilni opseg, IQR). Za poređenje vrednosti između 6. i 24. časa korišćen je parni t-test.

Rezultati: Prosečna starost pacijenata iznosila je 69,9 ± 7,3 godine; 58,3% bili su muškarci. Prosečno trajanje anestezije i operacije bilo je 151,5 ± 21,8, odnosno 126,8 ± 20,6 minuta, dok su prosečna vremena na kardiopulmonalnom bajpasu (CPB) i klemovanja iznosila 78,3 ± 17,6 i 58,5 ± 16,7 minuta.

Gotovo polovina pacijenata (46,7%) nije imala postoperativne komplikacije, dok su kod ostalih zabeležene sledeće: krvarenje (16,7%), aritmije koje su zahtevale terapiju (6,7%), ugradnja trajnog pejsmejkera (8,3%), reintervencija (6,7%), infekcija (8,3%), respiratorna insuficijencija (3,3%) i bubrežna insuficijencija (3,3%).

Od 6. do 24. časa postoperativno, vrednosti laktata su se smanjile (2,34 ± 0,96 → 1,87 ± 0,98 mmol/L; p = 0,006), CK-MB se smanjio (52,5 ± 34,2 → 39,0 ± 30,8 U/L; p = 0,001), dok je hemoglobin porastao (103,5 ± 10,1 → 120,1 ± 22,9 g/L; p < 0,001). pH se blago smanjio (7,396 ± 0,057 → 7,365 ± 0,065; p = 0,015). MAP, SaO_2, PaO_2 i $PaCO_2$ nisu pokazali statistički značajne promene. Medijana dužine hospitalizacije iznosila je 7 dana (IQR 6–8).

Zaključak: Kod pacijenata podvrgnutih hirurškoj zameni aortnog zaliska zbog aortne stenoze, rani postoperativni trendovi ukazuju na poboljšanje metaboličkog profila (niže vrednosti laktata) i normalizaciju biomarkera (CK-MB) uz stabilnu oksigenaciju, kao i nisku do umerenu stopu komplikacija i konstantnu medijanu hospitalizacije od sedam dana. Integrisanje perioperativnih markera balansa kiseonika i srčanih biomarkera sa imidžing metodama i procenom hipertrofije leve komore (LVH) može doprineti preciznijem određivanju vremena i stratifikaciji rizika za intervenciju. Potrebne su prospektivne studije sa standardizovanim imidžing metodama i dužim praćenjem kako bi se potvrdila povezanost rane metaboličke stabilizacije sa remodelovanjem leve komore i kliničkim ishodima.

Ključne reči: aortna stenoza, zamena aortnog zaliska, laktat, kreatin kinaza–MB izoenzim, biomarkeri.

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