1998). Treatment patterns reflected disease progression, with a substantial proportion requiring combination therapy.

Sleep duration also appeared relevant, as poor sleep has been linked to impaired glucose regulation. These findings emphasize the importance of comprehensive diabetes management, including medication adherence, lifestyle modification, and regular monitoring.

Conclusions

Patients with type 2 diabetes at Gomel City Clinical Hospital № 3 demonstrated suboptimal glycemic control despite a majority showing good medication adherence. Diabetic complications were highly prevalent, particularly neuropathy, nephropathy, and retinopathy. Older age and longer disease duration increased complication risk.

These results highlight the need for improved patient education, lifestyle modification, and careful monitoring to prevent complications and improve outcomes. Further studies with larger samples are recommended.

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INCIDENCE AND RISK FACTORS OF POSTOPERATIVE ARRHYTHMIAS AFTER MAJOR CARDIAC SURGERY: THE ROLE OF HEMODYNAMICS AND ELECTROLYTES

Introduction

Cardiac surgery, encompassing coronary artery bypass grafting (CABG) and valve procedures, remains a cornerstone in treating advanced coronary and structural heart diseases. Despite advancements in perioperative management, postoperative arrhythmias are the most frequent complication.

Data from the American Heart Association (AHA) and European Society of Cardiology (ESC) indicate that atrial arrhythmias occur in 20–40% of isolated CABG cases and 40–60% of valve or combined procedures. Notably, postoperative atrial fibrillation (POAF) affects 80–90% of patients, typically peaking between the 2nd and 4th postoperative days. Other rhythm disturbances include paroxysmal supraventricular tachycardia (up to 13%), ventricular arrhythmias (1–5% within the first 24 hours), and bradyarrhythmias (1–4%).

These disturbances are classified by timing: early arrhythmias occur within the first three days and represent 70–80% of all cases, while late arrhythmias occur thereafter. The pathogenesis is multifactorial, involving surgical trauma, myocardial ischemia-reperfusion injury, autonomic activation, and systemic inflammation. Specifically, fluctuations in electrolyte concentrations – particularly potassium and sodium – alter myocardial action potential duration and conduction velocity. Furthermore, comorbidities such as arterial hypertension, diabetes mellitus, and chronic heart failure increase susceptibility through structural remodeling and atrial enlargement.

Current AHA and ESC guidelines recommend preventive strategies including perioperative beta-blocker therapy, electrolyte correction, and pharmacologic rhythm control with sotalol or amiodarone for high-risk cohorts. This study evaluates the clinical, laboratory, and hemodynamic parameters associated with these rhythm disturbances, demonstrating significant correlations between arrhythmia occurrence and electrolyte imbalance, inflammatory activation, and altered cardiac hemodynamics.

Goal

The goal of this study was to analyze the incidence of postoperative arrhythmias after cardiac surgery and to evaluate potential contributing factors including electrolyte imbalance, postoperative inflammatory response, and changes in cardiac hemodynamics.

Material and methods of research

This retrospective study analyzed 30 patients who underwent cardiac surgery (CABG, valve replacement, or combined procedures) at the Gomel Regional Cardiology Center (ГОКЦ) between 2017 and 2020. Notably, 100% of the cohort developed postoperative arrhythmias.

Clinical records were reviewed for demographics, comorbidities, and echocardiographic parameters. Arterial hypertension was present in 70% of cases (predominantly grades II–IV), with ischemic heart disease and diabetes mellitus as additional common comorbidities.

Data collection focused on electrolyte levels (potassium, sodium), complete blood count (WBC, RBC, platelets), and cardiac function indicators, including EDV, ESV, SV, EF, and RWT. Due to dataset limitations, a self-controlled comparison was utilized, contrasting measurements from arrhythmia-free postoperative days against those recorded during arrhythmic events; several parameters were also compared with preoperative baselines.

Statistical analysis was conducted using Excel and JASP. Drafting and formatting were assisted by ChatGPT, with all results subsequently reverified for accuracy.

The results of the research and their discussion

Postoperative arrhythmias were observed predominantly during the early postoperative period. Approximately 75% of arrhythmia episodes occurred within the first three postoperative days. Late arrhythmias occurring after postoperative day three accounted for approximately 25% of cases. 90% of patients developed postop atrial fibrillation ,6% developed atrial flutter, and 4% SVT, Electrolyte levels demonstrated statistically significant differences between the arrhythmia day and control days.

Table 1 – Electrolyte parameters during arrhythmia and control days

Parameter	Arrhythmia day (Mean±SD)	Control day 1	Control day 2	p-value
Potassium (mmol/L)	4.28±0.46	4.63±0.45	4.91±0.45	0.00032**
Sodium (mmol/L)	145.0±5.14	142.86±3.21	140.91±1.81	0.017*

Potassium levels during arrhythmia episodes were approximately 7–13% lower compared with control measurements. Potassium imbalance is known to affect myocardial membrane excitability and may contribute to arrhythmia development. Sodium concentrations were approximately 2–3% higher on the arrhythmia day compared with control measurements.

Table 2 – Complete blood count parameters

Parameter	Arrhythmia day (Mean±SD)	Control day 1	Control day 2	p-value
WBC (10^9/L)	14.98±5.71	11.54±3.26	9.90±2.29	0.00002*
RBC (10^{12}/L)	3.08±0.38	3.19±0.37	3.48±0.44	0.00047*
Platelets (10^9/L)	154.7±53.3	163.2±60.3	207.4±6.5	0.0046*

White blood cell count on the arrhythmia day was approximately 30–50% higher compared with control measurements. This finding suggests activation of the postoperative inflammatory response. Inflammation is recognized as a contributor to atrial electrical remodeling and postoperative arrhythmogenesis.

Red blood cell counts were approximately 8–11% lower on the arrhythmia day compared with control values. Platelet counts demonstrated a reduction of approximately 25% compared with later control measurements.

Table 3 – Hemodynamic and cardiac function parameters

Parameter	Preoperative (Mean±SD)	Postoperative arrhythmia day (Mean±SD)	p-value
EDV (ml)	158.7±46.5	130.7±34.8	0.015*
ESV (ml)	62.5±29.7	50.6±28.5	0.143
Stroke volume (ml)	101.5±37.2	81.5±20.2	0.023*
Ejection fraction (%)	61.0±13.9	64.4±12.3	0.359

During postoperative arrhythmia episodes, end-diastolic volume (EDV) and stroke volume (SV) decreased by approximately 18% and 20%, respectively, reflecting impaired ventricular filling and reduced cardiac output. Notably, the lack of statistically significant changes in ejection fraction (EF) suggests that these rhythm disturbances were primarily driven by altered preload conditions, electrolyte imbalances, and inflammatory processes rather than acute systolic failure. Ultimately, these findings underscore that postoperative arrhythmias arise from a synergistic interaction of electrolyte instability, systemic inflammation, and shifted cardiac hemodynamics.

Conclusions

1. Based on this study, most postoperative arrhythmias (75%) occur in the early period, driven by a synergistic interaction of electrolyte instability (low K^+).

2. Systemic inflammation (high WBC), and altered cardiac preload (reduced SV and ventricular filling).

3. Effective prevention requires stringent electrolyte monitoring, hemodynamic optimization, and early detection of inflammatory markers.

4. Further large-scale studies are essential to refine risk stratification and improve postoperative protocols.

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