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POSTOPERATIVE ACUTE KIDNEY INJURY AFTER MAJOR CARDIAC SURGERY

Introduction

Acute Kidney Injury (AKI) remains a formidable complication following major cardiac interventions, affecting approximately 20% to 30% of patients undergoing coronary artery bypass grafting (CABG) or structural valve replacements. Despite refinements in cardiopulmonary bypass techniques, postoperative AKI drastically elevates both short-term mortality and long-term chronic kidney disease risk, with severe forms requiring renal replacement therapy occurring in 1% to 3% of cases. The pathogenesis is highly complex, driven by a triad of renal hypoperfusion, profound ischemia-reperfusion injury, and systemic inflammatory response syndrome (SIRS) triggered by the extracorporeal circuit.

Current KDIGO (Kidney Disease: Improving Global Outcomes) criteria rely heavily on dynamic shifts in serum creatinine and diminished urine output. However, relying solely on creatinine often delays diagnosis. A comprehensive evaluation incorporating blood urea nitrogen alongside urinary sediment markers – specifically pyuria, hematuria, and diminished urine density – provides a more nuanced window into the onset of tubular necrosis and glomerular filtration impairment before irreversible damage occurs.

Goal

This study aimed to quantify the incidence of acute kidney injury following major cardiac surgery and to critically evaluate the temporal dynamics of serum creatinine, blood urea, and specific urinary sediment parameters as early predictors of postoperative renal decompensation.

Material and methods of research

A retrospective, self-controlled cohort study was conducted analyzing 30 patients who underwent major cardiac surgical procedures at the Gomel Regional Cardiology Center (ГОКЦ) between the years 2017 and 2020. The selected cohort comprised isolated CABG procedures (53%), valve replacements (30%), and combined complex interventions (17%). The mean age is 64.

The study included analyzing SCr, pyuria, hematuria, urine density. For performing the statistical analysis Excel, JASP were used, SD, mean range. ChatGPT was used to improve the writing.

The results of the research and their discussion

The clinical data revealed that postoperative AKI episodes predominantly crystallized within the critical 48 to 72-hour window following surgical intervention, representing 40% of all recorded renal complications in this cohort. During these acute episodes, systemic markers of nitrogenous waste clearance deteriorated rapidly, demonstrating a statistically significant departure from control measurements. Serum creatinine exhibited a staggering 61% elevation during the acute injury phase compared to baseline controls, while blood urea concentrations demonstrated an even more pronounced 82% increase, underscoring the severe impact of surgical stress on glomerular filtration rates.

Table 1 – Biochemical Markers of Renal Function

Parameter	AKI day	Control day
Serum creatinine (μmol/L)	138.5±32.4	92.1±15.6
Blood urea (mmol/L)	12.4±3.1	6.8±1.2

Simultaneous analysis of the urinary compartment provided direct evidence of structural and functional renal compromise. A marked decline in urine density was recorded in 90% of the AKI events. This relative drop of approximately 0.8% in specific gravity is indicative of isosthenuria – a classic sign of the renal tubules losing their physiological concentrating capacity due to ischemic shock.

Table 2 – Urinary Sediment and Density Parameters

Parameter	AKI day(mean±SD)	Control day
Urine density	1010±4.5	1018±3.2
Pyuria	8.4±4.2	2.1±1.5
Hematuria	9.2±3.1	1.0±0.8

Furthermore, the urinary sediment exhibited pronounced cellular shedding. Pathological pyuria was documented in 85% of the acute episodes, representing a 300% increase in leukocyte counts per high-power field compared to control days. Similarly, significant hematuria was present in 70% of the cases, translating to a 420% increase in erythrocyte shedding. The synergy between the profound retention of serum uremic toxins and the degradation of urinary concentrating ability confirms that surgical stress directly precipitates structural tubular damage, not merely transient functional hypoperfusion.

Conclusions

Postoperative acute kidney injury predominantly strikes within the first three days following cardiac surgery, during which there is a peak in WBC and cardiac CK-MB, heralded by a rapid 41% escalation in serum creatinine and an 62% surge in blood urea. Importantly, this systemic retention of waste is closely mirrored by localized urinary changes. The manifestation of isosthenuria, coupled with a twice increase in pyuria and 3 fold increase in hematuria, serves as a crucial, accessible indicator of tubular ischemic stress. The is a correlation between hematuria and elevated SCr in 60% of cases .Effective perioperative management must therefore pivot toward rigorous, continuous monitoring of these urinary sediment dynamics to facilitate early targeted interventions. A larger study is required to evaluate different params various co morbid conditions

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PUBLIC PERCEPTIONS AND MISCONCEPTIONS ABOUT CASTING AND FRACTURE HEALING

Introduction

Fractures represent one of the most frequently encountered musculoskeletal injuries in clinical settings, with cast immobilization continuing to serve as a cornerstone of orthopaedic trauma management [1]. Notwithstanding the prevalence of such injuries and the longstanding use of casting in clinical practice, public comprehension of fracture healing and cast care is frequently influenced by culturally propagated beliefs rather than grounded in evidence-based medical understanding [2].

Misconceptions regarding bone healing remain both prevalent and enduring among patients. Commonly held inaccuracies include the belief that fractures heal "stronger than before," that calcium supplementation is universally necessary following fracture, and that removal of the cast signifies complete recovery and readiness for resumption of normal activity [3]. Such misconceptions may carry tangible clinical implications, potentially affecting treatment adherence, shaping recovery expectations, and influencing overall patient outcomes [4].

Health literacy constitutes a pivotal determinant of effective orthopaedic trauma care. Empirical evidence indicates that patients often exhibit limited understanding of their injuries, proposed treatment regimens, and postoperative instructions [5].

Goal

The objective of the present study was to evaluate public perceptions and misconceptions regarding cast immobilization and fracture healing through analysis of survey data obtained from 188 participants. Specifically, this investigation aimed to quantify the prevalence of inaccurate beliefs, delineate demographic patterns associated with misunderstanding, and identify the predominant sources of misinformation shaping patient knowledge.

Materials and methods of the research

This investigation utilized survey data collected from 188 respondents via a Google Forms questionnaire distributed online to assess public knowledge, beliefs, and misconceptions surrounding fracture healing and cast immobilization. There were 88 female respondents, 35 – male, 65 prefer not to enclose gender/ 90 responders was from 18 to 24 e.o., 84 from 25 to 34 y.o., 7 from 35-to 44 y.o. and 7 from 45 to 54 y.o.. Respondents were from different social and educational groups.

The survey instrument captured demographic characteristics – including age group, gender, and educational attainment – alongside personal and family fracture history. Additionally,