

Original Research Article

Postoperative Acute Renal Failure: Etiologies and Prognostic Factors

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Abstract: Postoperative acute renal failure is a rare complication in the surgical context. It is the consequence of a significant and prolonged decrease in the glomerular filtration rate, leading to a failure to eliminate nitrogen catabolism products and a hydroelectrolytic disorder. Early recognition of risk factors and prevention of spinal cord ischemia are the two fundamental elements in the management of postoperative renal failure.

Keywords: Acute renal failure, post operative, glomerular filtration, etiology.

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INTRODUCTION

Postoperative acute renal failure is the consequence of a significant and prolonged decrease in the glomerular filtration rate, which reduces the capacity to eliminate endogenous nitrogen products and compromises the maintenance of the subject's hydroelectrolytic homeostasis.

Postoperative acute renal failure results in progressively increasing nitrogen retention and various hydroelectrolytic disorders, the intensity of which depends on the diagnostic delay and the effectiveness of the resuscitation maneuvers undertaken

The etiologies are dominated by sepsis, hypovolemia and the administration of nephrotoxic drugs.

Consequently, early recognition of risk factors and prevention of spinal cord ischemia are the two fundamental elements in the management of postoperative acute renal failure.

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Acute postoperative renal failure is a serious event given the morbidity and mortality for which it is responsible.

MATERIALS AND METHODS

We report a retrospective study spread over 1 year from January 1, 2022 to December 31, 2022, collecting 35 cases of postoperative acute renal failure, where the patients included are patients operated on with normal renal function preoperatively.

Inclusion Criteria

- Patient with normal renal function preoperatively, i.e. creat $< 16\text{mg/l}$ and urea $< 0.45\text{g/l}$.
- Postoperative creat $\geq 16\text{mg/l}$
- And/or postoperative urea $\geq 0.45\text{g/l}$.

Exclusion Criteria

- Patients already known to suffer from chronic renal failure.
- Patients with incomplete records, as well as patients with no surgical indication.

RESULTS

Its incidence is 6.03% patients hospitalized in surgical intensive care: 60% visceral surgery, 24%

polytrauma, 10% neurosurgery, 2% trauma and 4% pulmonary surgery.

Postoperative IRA and type of surgery

Type of Surgery	Number of ARF Cases	%
Visceral Surgery	21	60
Polytrauma	8	24
Neurosurgery	4	10
Trauma	1	2
Pulmonary Surgery	1	4

- The average age of our patients was 55.5 years with a sex ratio of 3.28 or 76.6% men versus 23.4% women.
- The risk history found in our patients was as follows: Arterial hypertension first, heart disease, diabetes and arteriopathy.

- Septic states and hemorrhages represent the main etiologies of postoperative acute renal failure, cardiogenic shock comes third.
- Ten patients presented with oligoanuric IRA, twenty-five patients had preserved diuresis.
- Treatment included vascular filling, transfusion, appropriate antibiotic therapy, noradrenaline, dobutamine. 7 patients required haemodialysis.
- The mean creatinine was 28.94 mg/l and varied between 16.7 mg/l and 93 mg/l.
- The mean uremia was 1.14g/l with a minimum value of 0.5g/l and a maximum value of 2.23 g/l.
- The mean kalemia of our patients was 4.50 mg/l with extremes ranging from 3.5 mg/l to 8.6 mg/l.

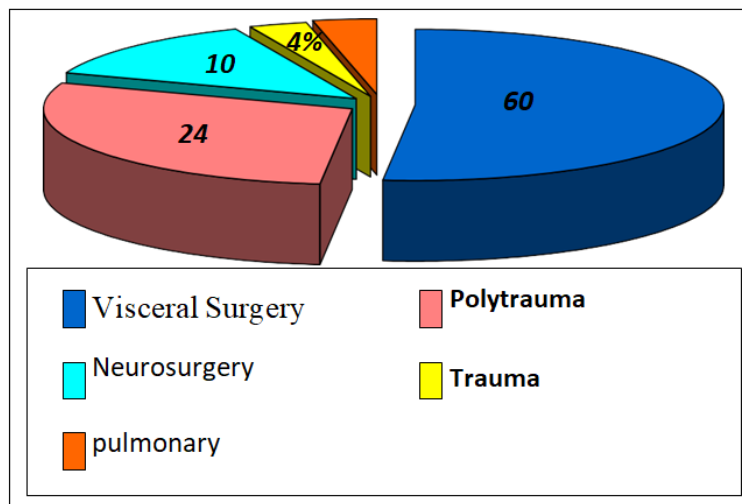


Fig: Incidence of postoperative renal failure by specialties

- In our series, sepsis is the most common etiology of postoperative acute renal failure, since we have identified 16 cases with a percentage of 45.71%.
- We have also identified 12 cases of hemorrhagic shock with 34.28%.
- We have identified 4 cases of cardiogenic shock with 11.42% of all patients
- Medications: 3 of our patients were on nephrotoxic drugs, in our study, the use of nephrotoxic drugs is considered only as a factor associated with the occurrence of postoperative acute renal failure.
- All patients received peripheral venous line.
- All 16 patients with septic condition received non-nephrotoxic antibiotic therapy
- Blood transfusion was necessary in 8 cases
- Loop diuretics were used in 13 cases
- 12 patients received dopamine treatment
- 7 patients required hemodialysis.

DISCUSSION

The findings of this study highlight the complexity of acute renal failure (ARF) in the postoperative setting. The predominance of renal hypoperfusion as the leading cause of ARF emphasizes the critical importance of maintaining adequate hemodynamics during surgery. Hypoperfusion can arise from various factors, including inadequate fluid resuscitation, surgical blood loss, and intraoperative hypotension. Our results are consistent with previous studies that stress the need for vigilant monitoring of blood pressure and fluid balance in high-risk patients. Implementing strategies such as goal-directed fluid therapy and continuous hemodynamic monitoring could potentially reduce the risk of ARF.

Nephrotoxicity, which accounted for 29% of cases in our cohort, is also a significant concern, particularly regarding the use of certain medications. Agents like non-steroidal anti-inflammatory drugs (NSAIDs), certain antibiotics, and contrast media are known to exert toxic effects on the kidneys. Our findings

suggest that a thorough pre-operative assessment of renal function, combined with careful consideration of medication use, is essential for minimizing the risk of nephrotoxic injury. Developing protocols for the judicious use of these agents in susceptible populations may further aid in reducing renal complications.

Although less frequent, urinary obstruction remains an important cause of post-operative ARF, particularly in surgeries involving the abdominal and pelvic regions. Obstructions can result from various factors, such as clots, swelling, or anatomical changes due to surgery. Post-operative monitoring should include assessments for urinary retention and other signs of obstruction, allowing for timely interventions. The use of bladder scans and monitoring urine output can be invaluable in detecting and managing these complications early.

Our analysis also revealed that older age and the presence of comorbidities were significant predictors of severe ARF and poorer outcomes. These findings align with existing literature that identifies age as a critical risk factor for post-operative complications. Older patients often have decreased renal reserve and a higher burden of comorbid conditions, which can exacerbate the effects of surgery on renal function. Tailoring perioperative care to the individual needs of these patients, including optimized pre-operative evaluations and enhanced post-operative monitoring, can improve outcomes.

In summary, the multifactorial nature of ARF post-operatively necessitates a comprehensive approach to prevention and management. Key strategies should include optimizing fluid management, minimizing exposure to nephrotoxic agents, and ensuring vigilant post-operative monitoring for potential complications. Future research should focus on developing and validating risk stratification tools to identify high-risk patients and evaluate the effectiveness of targeted interventions in reducing the incidence and severity of ARF in surgical settings.

CONCLUSION

The perioperative context constitutes a situation with renal risk. All the hormonal-hemodynamic changes related to anesthesia, associated with surgical stress, lead to a deregulation of the renal system that can lead to a real renal attack when sepsis, hypovolemia or nephrotoxic drugs are added. - The occurrence of postoperative acute renal failure is rare but burdened with significant morbidity and mortality. The main circumstances of occurrence of postoperative acute renal failure are either related to the patient (age, diabetes, high blood pressure, history of taking nephrotoxic drugs, etc.) or related to surgery (intraoperative surgery, emergency surgery, septic surgery, etc.). In our context, the main etiologies are septic shock, hemorrhage and then cardiogenic shock.

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