

Preoperative Assessment in Patients with Kidney Disease

Aftab Imtiaz¹, Raana Mahmood²

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Medically the care of chronic renal failure patients is very difficult, because of complications of comorbid conditions of hypertension, diabetes mellitus and coronary artery disease in these patients. Patients undergoing cardiovascular surgery and aortic aneurysm repair are at greater risk for perioperative acute renal failure. The limitations on solute and water intake due to compromised excretion imposed by renal dysfunction increases the susceptibility of this population to both salt deficit and surfeit, as well as hyponatremia and hypernatremia perioperatively¹. During the perioperative period, both anesthesia and surgery result in multiple hemodynamic and hormonal effects that may predispose patients to acute renal failure and fluid and electrolyte abnormalities. Moreover, anesthetic agents and antihistamines often cause bladder dysfunction leading to obstructive nephropathy².

Effective strategies for nephroprotection are crucial for the handling of patients with chronic kidney disease (CKD) in the perioperative setting to prevent complications and to avoid the progression of CKD. Due to the lack of perioperative studies with CKD patients there are only level 2 recommendations. First of all, this requires the identification of CKD patients through risk assessment and preoperative laboratory tests. In this regard,

biomarkers, such as cystatin C may facilitate the detection of chronically impaired renal function. Secondly, particular attention should be paid to the maintenance of hemodynamic stability, including an adequate blood pressure and cardiac index and the preservation of intravascular volume. There is clear evidence that an unimpaired renal perfusion, guaranteed through hemodynamic stability and an undisturbed fluid balance both reduce the incidence of acute kidney injury (AKI) and consequently the further deterioration of renal function. Thirdly, several studies demonstrate that tight glycemic control is associated with less renal impairment and better survival for patients with CKD³.

Preoperative diagnostic testing in patients with chronic kidney disease includes a renal panel, complete blood count, arterial blood gas measurements, bleeding time and physical examination with emphasis on volume status and chest radiograph to evaluate fluid status⁴. Prior to surgery, patients should have euvolemic status, normal osmolar status, appropriate creatinine clearance and not be receiving any potential nephrotoxins. Accurate assessment and successful treatment of these complications in renal failure patients require understanding of the concept of electrolyte-free water, proper utilization of diuretics, and calculated prescription of fluid therapy. Emergency surgery has a fivefold increase in the mortality and morbidity of the end-stage renal disease patient, the primary causes being sepsis and cardiac dysrhythmias². Prevention of acute renal failure in the elderly should include a timed creatinine clearance. Other measures include maintenance of euvolemia, nutritional repletion and avoidance of nephrotoxic medications. Monitoring patients undergoing aortic surgery with a Swan-

¹ Department of Anaesthesia, Karachi Medical & Dental College, Abbasi Shaheed Hospital,

² Department of Pharmacology, Karachi Medical & Dental College, Abbasi Shaheed Hospital,

Correspondence: Dr. Aftab Imtiaz

Department of Anaesthesia,

KMDC, Abbasi Shaheed Hospital

Email: aftab_imtiaz@yahoo.com

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Ganz catheter reduces the incidence of hypotensive episodes. Jaundiced patients are predisposed to hypotension, therefore meticulous volume management is critical. Based on the association of high bilirubin level with acute renal failure, according to one study there is significant benefit if preoperative percutaneous biliary tract drainage in regard to subsequent development of acute renal failure^{1,3}. The patient with chronic renal failure often also has a poorly compensated acidosis due to failure of ammonia production.

The incidence of preoperative hyperkalemia is estimated to be as high as 19 to 38 percent in patients with chronic or end-stage renal disease⁴. The presence of hyperkalemia in the adapted renal failure patient generally indicates a severe reduction in glomerular filtration as compare to nonrenal hypokalemic patients. Parenteral calcium and infusion of insulin with glucose represent the mainstays of immediate therapy, and sodium bicarbonate therapy should be given only when severe acidemia is present. Perioperative aggravation of pre-existing hypertension is common. Rebound hypertension attributable to injudicious adjustment of the medical regimen should be diligently searched if any new therapies are recommended before surgery. Relief of pain or anxiety is necessary⁵.

The cause of increased morbidity in these patients is mostly due to anemia, arrhythmias, pericarditis, left ventricular dysfunction, hypertension, bleeding and infections². Increased bleeding tendencies due to uremic platelet dysfunction can be managed by the administration of desmopressin, cryoprecipitate, or estrogens, and by avoiding the use of medications with antiplatelet effects before the surgery^{4,6}. The uremic complications can be minimized by performing dialysis day before surgery in patients with end-stage renal disease. As renal function declines, patients are likely to develop anemia because of decreased renal production of erythropoietin. Transfusions of red blood cells should be reserved for use in patients with clinically significant anemia, because antibody formation may decrease the likelihood of successful renal transplantation in the future. In addition, intraoperative infusion of blood may cause hyperkalemia as a result of cellular lysis. Many patients with chronic renal failure receive prophylactic antibiotics

for surgical procedures⁷. However, it is well established that patients with end-stage renal disease should undergo dialysis prior to surgery. Some medications, including angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, and diuretics, should be stopped prior to surgery to minimize hemodynamic changes during surgery. Glycemic control in diabetic ESRD and chronic kidney disease patients is very important, and clinicians should be aware of the risk of bleeding and the appropriate analgesics that can be used in dialysis patients in the perioperative setting. In conclusion, preoperative evaluation in patients with ESRD (end-stage renal disease) should be a multidisciplinary approach⁸.

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