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Management of Chronic Kidney Disease in an Anesthesia-Intensive Care Setting

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Abstract: **Original Research**

Chronic kidney disease (CKD) poses a major challenge in anesthesia due to its effects on the pharmacology of the agents used. This prospective study, conducted on 1,467 patients in pre-anesthetic consultations, found a prevalence of 1.3%, primarily due to hypertension and diabetes. Adjusting doses according to glomerular filtration rate (GFR) allowed for safe management without postoperative complications. These results highlight the importance of early screening and an individualized anesthetic strategy.

Keywords: Chronic Kidney Disease, Anesthesia, Risk Factors.

INTRODUCTION

Chronic kidney disease (CKD) is a major public health issue. It is recognized as the seventh leading risk factor for mortality worldwide. The rapid increase in CKD prevalence results from the convergence of multiple traditional risk factors, including diabetes and hypertension, as well as significant improvements in screening tools and diagnostic techniques [1].

In the perioperative setting, the management of patients with CKD presents a major clinical challenge for the anesthesiologist, as impaired renal function disrupts the pharmacokinetics and pharmacodynamics of anesthetic agents, thus prolonging their effects. These changes increase patients' vulnerability to hemodynamic and respiratory depression. Early assessment of renal function allows the anesthesiologist to adjust the doses and choice of anesthetic agents.

The objective of this study is to analyze the prevalence of chronic kidney disease (CKD) during pre-anesthetic consultations and to identify risk factors specific to this population. Our study also explores the impact of CKD on anesthetic strategy.

MATERIALS AND METHODS

This is a prospective, descriptive study of an adult population assessed during pre-anesthetic consultations for scheduled surgery. The study aims to describe the prevalence of chronic kidney disease (CKD) in this context, to identify the main associated risk factors in the patients

concerned, and to analyze the potential impact of CKD on anesthetic management. Data were collected over a six-month period, from January 2025 to June 2025. The study was conducted in the pre-anesthetic consultation department of the Avicenne Military Hospital in Marrakech.

All adult patients seen for pre-anesthetic consultation during the defined period who presented with impaired renal function suggestive of possible chronic kidney disease (CKD) were included in the study.

RESULTS

The study included a total of 1467 patients assessed by pre-anesthetic consultation. Among these patients, 19 had elevated creatinine levels and met the criteria for CKD. The prevalence in this population was therefore estimated at 1.30%.

Analysis of the reasons for consultation revealed a notable predominance of urological procedures (48%), including transurethral resection of the prostate and transurethral resection of bladder tumors; and visceral surgery (21%), such as cholecystectomy and inguinal hernia repair. Trauma (21%) such as acromioplasty and joint replacement (knee and hip) as well as thoracoscopy (5%).

The distribution of risk factors among the 19 patients studied shows a clear predominance of hypertension in 12 cases (63.2%); diabetes in 7 patients (36.8%), divided into type 1 in 2 cases and type 2 in 5 cases. Cardiovascular disease, systemic diseases, and a history of kidney stones were each observed in 1 patient. Smoking was reported by 3 patients (15.8%) and prolonged use of NSAIDs by 2 patients (10.5%). Finally, the "other" category comprised 4 patients (21.1%), including gout (2 cases, 10.5%), benign prostatic hyperplasia (1 case, 5.3%), and a history of bladder cancer (1 case, 5.3%). Multiple comorbidities were noted in some patients.

Special precautions were taken in certain cases, depending on chronic treatments and scheduled surgical procedures. In five patients receiving an angiotensin-converting enzyme (ACE) inhibitor or an angiotensin II receptor blocker (ARB), a temporary discontinuation (48 hours) of these medications was initiated preoperatively, with a switch to amlodipine. Furthermore, in one patient taking an antiplatelet drug (Kardegic), a five-day temporary discontinuation was implemented prior to the procedure, followed by prophylactic heparin therapy with low molecular weight heparin (LMWH) adjusted according to renal function. Finally, specialist consultations were sought in several cases: a nephrologist's opinion was requested for five patients, a cardiologist's for two patients, and an endocrinologist's opinion for one patient with poorly controlled diabetes.

Of the 19 patients included, 73.3% underwent general anesthesia and 26.7% under spinal anesthesia.

For general anesthesia, induction was performed using propofol, combined with fentanyl and rocuronium, while maintenance of anesthesia was achieved with sevoflurane or isoflurane. In patients with an eGFR greater than 60 mL/min/1.73 m², no dosage adjustment is necessary, no specific procedure was performed. In cases of renal insufficiency (eGFR < 60 mL/min/1.73 m²), without the need for hemodialysis, a dose reduction was systematically applied for opioids and neuromuscular blocking agents (fentanyl 0.5–1 µg/kg and rocuronium 0.6 mg/kg), while propofol continued to be administered at the usual dosages. Anesthetic maintenance relied on the administration of halogenated agents, the

concentrations of which remained unchanged regardless of renal status (2–3% for sevoflurane and 1.2–1.4% for isoflurane). In hemodialysis patients, a dialysis session was scheduled within 24 hours prior to the procedure, and the dosages used were reduced for fentanyl and rocuronium, while maintaining the standard doses of propofol, sevoflurane, and isoflurane. Regarding spinal anesthesia, it was performed using a combination of fentanyl and ropivacaine, without any dosage adjustment being deemed necessary, regardless of the patients' renal status.

Postoperative recovery was uneventful in all patients with CKD. No significant clinical incidents were noted during the immediate postoperative period or during hospitalization. Nephrological follow-up after surgery shows stabilization of renal function.

DISCUSSION

In our study, the prevalence of CKD was 1.3%, which represents a relatively low proportion. This figure appears significantly lower than that reported by several studies, including Minakata *et al.*, The prevalence of CKD was 92% in Japan [2]. For elderly patients, Shavit *et al.*, [3] observed that 44% of octogenarians had preoperative renal dysfunction. The preoperative prevalence of CKD varies depending on the populations studied, which are often older or at high risk, as shown in published series. Our study, however, focused on a more heterogeneous population representative of all types of surgery.

In our series, 63.2% of CKD patients were hypertensive, an intermediate rate compared to international data. The study by Liao *et al*., [4] reported 78% hypertension in 2023 and 18.2% in 2024 [5]. Our results are in line with the average of published studies and confirm the importance of hypertension as a major comorbidity in patients with CKD. The prevalence of diabetes observed in this series (36.8%) is comparable to that reported by Liao *et al*., 32% [6].

Regarding the anesthetic agents used, propofol has gradually become the agent of choice in anesthesia over the past several years. Its pharmacokinetic profile allows for rapid awakening and complete recovery of psychomotor function in less than 90 minutes. It can be used safely in patients with chronic renal insufficiency, with few pharmacokinetic changes and no significant accumulation. Transient hemodynamic variations can be limited by careful, titrated administration.

Rocuronium is widely used to achieve adequate muscle relaxation during intubation and surgical procedures. In patients with renal insufficiency, rocuronium clearance is reduced, resulting in a prolonged duration of action and increased variability between patients. These alterations underscore the importance of careful monitoring [7]. In patients with chronic renal disease, fentanyl clearance may be partially impaired. Therefore, it is recommended to reduce the dose by up to 50% to limit adverse effects. In the protocol of Seoul National University Hospital in Bundang, the administered dose is adjusted by 25 to 50% according to the eGFR [8].

Isoflurane is a halogenated volatile anesthetic widely used for maintaining general anesthesia. It causes a temporary and reversible depression of renal function [9].

Spinal anesthesia offers significant advantages in patients with chronic kidney disease. Recent data show that it is associated with a significant reduction in the risk of postoperative acute kidney injury compared to general anesthesia. Its use therefore remains safe even during prolonged infusions [10].

This comparison of our practices with data from the literature highlights the conformity of our dosage choices with international recommendations, illustrating

safe anesthetic management adapted to the patients' renal function.

CONCLUSION

Chronic kidney disease is a major determinant of perioperative morbidity and mortality. Its optimal management represents a fundamental pillar of patient safety in anesthesia and intensive care. Our work confirmed the presence of traditional risk factors (diabetes, hypertension) in our patients, but above all revealed that a significant number of them arrived at the pre-anesthesia consultationTherapeutic approach with advanced renal insufficiency. This finding underscores the crucial role of the anesthesiologist-intensivist, who becomes the final link in an imperfect screening chain. The rigorous application of the adaptation protocol, particularly the strict adjustment of anesthetic agents according to the eGFR, has demonstrated exceptional safety.

BIBLIOGRAPHIES

1. Stevens, P. E., Ahmed, S. B., Carrero, J. J., Foster, B., Francis, A., Hall, R. K., ... & Levin, A. (2024). KDIGO 2024 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney international*, *105*(4), S117-S314.
2. Minakata, K., Bando, K., Tanaka, S., Takanashi, S., Konishi, H., Miyamoto, Y., ... & Sakata, R. (2014). Preoperative chronic kidney disease as a strong predictor of postoperative infection and mortality after coronary artery bypass grafting. *Circulation Journal*, *78*(9), 2225-2231.
3. Shavit, L., Lifschitz, M., Slotki, I., Oren, A., Tauber, R., Bitran, D., & Fink, D. (2013). Preoperative renal dysfunction and clinical outcomes of cardiac surgery in octogenarians. *Experimental gerontology*, *48*(3), 364-370.
4. Liao, Y. C., Chang, C. C., Chen, C. Y., Liu, C. C., Liao, C. C., Shih, Y. R. V., & Lin, C. S. (2023). Preoperative renal insufficiency predicts postoperative adverse outcomes in a mixed surgical population: a retrospective matched cohort study using the NSQIP database. *International Journal of Surgery*, *109*(4), 752-759.
5. Liao, C. C., Liu, C. C., Lee, Y. W., Chang, C. C., Yeh, C. C., Chang, T. H., ... & Lin, C. S. (2024). Complications and mortality after surgery in patients with chronic kidney disease: a retrospective cohort study based on a multicenter clinical database. *Journal of Multidisciplinary Healthcare*, 3535-3544.
6. Liao, Y. C., Chang, C. C., Chen, C. Y., Liu, C. C., Liao, C. C., Shih, Y. R. V., & Lin, C. S. (2023). Preoperative renal insufficiency predicts postoperative adverse outcomes in a mixed surgical population: a retrospective matched cohort study using the NSQIP database. *International Journal of Surgery*, *109*(4), 752-759.
7. Robertson, E. N., Driessen, J. J., & Booij, L. H. D. J. (2005). Pharmacokinetics and pharmacodynamics of rocuronium in patients with and without renal failure. *European journal of anaesthesiology*, *22*(1), 4-10.
8. Choi, H. R., Oh, T. K., Kim, J., & Jeon, Y. T. (2019). Analgesia after major laparoscopic surgery in patients with chronic kidney disease: a retrospective cohort study. *Scientific reports*, *9*(1), 3939.
9. Chou, Y. P., Huang, W. C., Chang, C. L., & Lin, C. Y. (1990). Renal effect of isoflurane. *Ma zui xue za zhi= Anaesthesiologica Sinica*, *28*(4), 410-418.
10. Pere, P. J., Ekstrand, A., Salonen, M., Honkanen, E., Sjövall, J., Henriksson, J., & Rosenberg, P. H. (2011). Pharmacokinetics of ropivacaine in patients with chronic renal failure. *British journal of anaesthesia*, *106*(4), 512-521.