ACQUAINT PUBLICATIONS
Journal of Medical Case Reports and Case Series ISSN: 2692-9880
Case Report Volume 5 Issue 15

A Complex Presentation of Chronic Kidney Disease with Coexisting Conditions. A Case Report

Prakash Shashi[1*], Vardani Bala[2]

[1]Nursing Faculty, Govt. College of Nursing, S. N. Medical College, Agra, Uttar Pradesh, India.

[2]B.Sc. Nursing Student, Govt. College of Nursing, S. N. Medical College, Agra, Uttar Pradesh, India.

[*]**Corresponding Author:** Prakash Shashi, Nursing Faculty, Govt. College of Nursing, S. N. Medical College, Agra, Uttar Pradesh, India.

Received date: 13 November 2024; **Accepted date:** 05 December 2024; **Published date:** 09 December 2024

Citation: Shashi P, Bala V (2024) A Complex Presentation of Chronic Kidney Disease with Coexisting Conditions. A Case Report. J Med Case Rep Case Series 5(15): https://doi.org/10.38207/JMCRCS/2024/DEC051501140

Abstract

This case report presents a 66-year-old male with a significant history of chronic kidney disease (CKD) on maintenance hemodialysis, who was admitted with multifactorial symptoms including fever, cough, nausea, and loss of appetite. The patient also had a history of thyroid cancer and reported recurrent symptoms that developed gradually over the past year. Upon admission, he exhibited signs of anemia and elevated serum urea levels, alongside radiological findings indicating pulmonary complications. The treatment regimen included broad-spectrum intravenous antibiotics, dietary modifications, and supportive care. This case illustrates the complexities in managing patients with multiple comorbidities, particularly in the context of recent COVID-19 vaccination, which may have contributed to his symptomatic decline. The need for a multidisciplinary approach in the management of such cases is emphasized, highlighting the challenges of treating infections in immunocompromised patients.

Clinical Background

Chronic kidney disease (CKD) is a progressive condition characterized by a gradual decline in kidney function over time, ultimately leading to end-stage renal disease (ESRD) if untreated. This condition is often accompanied by a variety of comorbidities, including hypertension, diabetes, and cardiovascular diseases, which collectively exacerbate the decline in renal function and overall health. **[22]** One of the most critical concerns for patients with CKD is the significant impairment of the immune system. Research indicates that CKD is associated with a dysregulation of immune pathways, which can result in a state of immunocompromise. **[19]** Patients with CKD exhibit alterations in both innate and adaptive immunity. The innate immune system, which provides the first line of defense against pathogens, is often impaired due to the reduced function of neutrophils and monocytes. Additionally, there is a decreased response of these cells to infection. **[12]** On the adaptive side, there is evidence of diminished T-cell function and an imbalance in cytokine production, contributing to an increased susceptibility to infections. **[1]** These immunological changes are particularly pronounced in individuals on dialysis, as the dialysis procedure itself can further stress the immune system.

The prevalence of respiratory infections, including pneumonia, is significantly higher among patients with CKD, particularly those undergoing hemodialysis. The risk is multifactorial, stemming from both the underlying disease and the frequent exposure to healthcare environments where pathogens are more likely to be encountered. **[12]** Studies have demonstrated that individuals on hemodialysis have a markedly increased incidence of pneumonia compared to the general population, leading to higher hospitalization rates and increased mortality. **[21]**

The clinical presentation of infections in CKD patients can be atypical and insidious. Symptoms such as fever, cough, and malaise may develop gradually over several weeks or months, complicating the diagnostic process. In the case of pneumonia, classic signs may be obscured, particularly in older adults or those with advanced kidney disease. **[13]** The presence of intermittent fever can often lead to misinterpretation, as it may be attributed to other underlying conditions, such as malignancy or autoimmune disorders, rather than an infectious process. This delay in recognition and treatment can result in worse outcomes for these patients**.**

Moreover, the management of infections in CKD patients is further complicated by the pharmacokinetics of antibiotics. Renal impairment affects the metabolism and excretion of many antimicrobial agents, necessitating careful adjustment of dosages to avoid toxicity while ensuring adequate therapeutic levels. **[11]** As such, clinicians must balance the need for aggressive treatment of infections with the potential risks posed by renal function deterioration.

The interplay between CKD, immunocompromise, and susceptibility to infections underscores the importance of a comprehensive approach to patient care. Effective management requires not only treating acute infections but also implementing preventive strategies, such as vaccination against common pathogens (e.g., influenza and pneumococcus) and optimizing the management of CKD itself to enhance the patient's overall resilience to infections. **[2]**

In summary, the combination of CKD's immunological effects and the increased risk of respiratory infections presents a significant challenge in clinical practice. This multifaceted issue demands a nuanced understanding of the underlying pathophysiology, careful clinical assessment, and tailored therapeutic strategies to improve patient outcomes. The intricate relationship between chronic kidney disease and infectious diseases serves as a reminder of the need for ongoing research and the development of targeted interventions to protect this vulnerable patient population.

Case Presentation

Patient Information: We present a case of a 66-year-old male with a significant medical history, including chronic kidney disease (CKD), hypertension, and a provisional diagnosis of thyroid cancer. He was admitted to the hospital in August 2024, primarily due to a constellation of concerning symptoms that had emerged over the preceding year. Although he had been largely asymptomatic until approximately 12 months prior to admission, he began to experience intermittent fever, cough, and a marked decline in appetite.

Symptoms and Initial Assessment: The patient's symptoms had progressed significantly, and he reported several alarming issues. Notably, he described having a stomach infection for the past week, a persistent fever lasting three weeks, a cough that had been troubling him for one month, and nausea accompanied by a loss of appetite over the same duration. His medical history revealed that he had undergone his first hemodialysis treatment in 2012. Compounding his health issues, the thyroid cancer had recurred in 2018, a development that notably followed his COVID-19 vaccination. Additionally, he had been utilizing naturopathic treatments for the last four and a half years, during which he experienced intermittent fever, particularly in the evenings, starting from July 2019.

Upon physical examination, the patient was found to be febrile, with vital signs revealing a pulse rate of 86 beats per minute, a respiratory rate of 14 breaths per minute, and elevated blood pressure measured at 178/84 mmHg. This clinical picture raised significant concern for underlying infectious or inflammatory processes, particularly in light of his immunocompromised status due to CKD and his history of cancer.

Investigations: To elucidate the cause of his symptoms, a series of laboratory investigations were performed. The results showed anemia with a hemoglobin level of 8.9 g/dL, which warranted a transfusion that increased his levels to 10 g/dL the following day. Other critical findings included a total leukocyte count of 5,300 cells/mm³, a platelet count that was concerningly low at 54,000 cells/mm³, and a red blood cell count of 2.66 million cells/mm³. Additionally, his serum urea level was significantly elevated at 148 mg/dL, indicating compromised renal function. A chest X-ray was conducted, which revealed bilateral lung infiltrates, prompting further imaging. A non- contrast CT (NCCT) scan of the chest demonstrated bronchial thickening, ground-glass opacities, and discrete nodules in the lower lobe, findings that suggested potential pneumonia or other pulmonary pathology.

Treatment

Given the severity of his clinical presentation, the patient was promptly started on a regimen of intravenous antibiotics to address the possible infectious etiology. The antibiotics included meropenem 0.5 g administered three times daily, along with levofloxacin 100 cc once daily, and forcan 100 cc once daily. These medications were chosen based on their broad-spectrum activity and the patient's clinical needs. Supportive care measures were also instituted, including pantoprazole 40 mg twice daily to manage gastric acidity and prevent stress ulcers, as well as emset 4 mg three times daily to alleviate nausea. Paracetamol was provided as needed for fever management.

Recognizing the patient's chronic kidney disease, dietary modifications were implemented to ensure a low-sodium diet while restricting potassium intake, further tailored to manage his renal function and overall health. This comprehensive approach to treatment aimed not only to address the acute issues but also to stabilize his chronic conditions and improve his quality of life during this challenging episode.

In summary, this case underscores the complexity of managing patients with multiple coexisting medical conditions, particularly in the context of acute infections and ongoing cancer treatment. The interplay between chronic kidney disease and the potential complications from his cancer recurrence requires careful consideration and a multidisciplinary approach to care.

Discussion

The management of CKD patients, particularly those with multiple comorbidities, presents significant challenges in clinical practice. This case of a 66-year-old male illustrates the intricate interplay between CKD, malignancy, and infection, highlighting the necessity for a comprehensive and multidisciplinary approach to treatment.

Chronic Kidney Disease and Immune Dysfunction: Patients with CKD exhibit notable immunological abnormalities, including decreased function of immune cells and altered cytokine profiles, increasing susceptibility to infections. **[19]** Kwan et al. (2020) reported that patients on maintenance hemodialysis have a significantly higher incidence of infections, particularly respiratory infections, due to impaired cellular immunity and frequent healthcare exposure. **[17]** This aligns with our patient's presentation of respiratory symptoms, suggesting a possible infection exacerbated by his CKD status.

Comorbidities and Infection Risk: The patient's history of thyroid cancer further complicates the management of CKD. Cancer patients, particularly those receiving treatment, are at increased risk for

infections. **[15]** The interaction between CKD and malignancies can further diminish immune responses, leading to greater susceptibility to opportunistic and community-acquired infections. **[18]** The recurrence of thyroid cancer and the recent COVID-19 vaccination may have contributed to the patient's symptomatic decline, underscoring the need for vigilant monitoring in this population.

Infectious Complications: Imaging results indicated bilateral lung infiltrates, suggestive of pneumonia. Studies show that patients with CKD, especially those on dialysis, have a higher incidence of pneumonia and other infections due to impaired lung function and altered immune responses. **[14]** CKD patients are also at risk for opportunistic pathogens, making them particularly vulnerable in an immunocompromised state. **[16]** Furthermore, while COVID-19 vaccinations are crucial for preventing severe disease, immunocompromised patients may still face heightened infection risks despite vaccination. **[20]** Understanding the relationship between vaccination and immune function in CKD is vital for clinical decision-making.

Anemia Management in CKD: Anemia is a prevalent issue in CKD, affecting approximately 40% to 80% of patients on dialysis. **[9]** The patient's initial hemoglobin level of 8.9 g/dL reflects this common complication, with its pathophysiology involving erythropoietin deficiency, iron deficiency, and inflammation. **[3]** Although blood transfusions provided immediate relief, studies advocate for a long-term management strategy incorporating erythropoiesis-stimulating agents (ESAs) and iron supplementation to address the underlying causes of anemia.**[4,5]** The KDOQI guidelines emphasize the importance of regular monitoring and treatment of anemia to enhance quality of life and reduce cardiovascular risks. **[6]**

Nutritional Considerations: Dietary management is critical in CKD patients, particularly those on dialysis. The KDOQI (2015) emphasizes the need for individualized dietary plans that consider electrolyte imbalances and overall nutritional status. In this case, dietary modifications, including sodium and potassium restrictions, were essential for managing CKD and preventing complications. 9 Research indicates that adherence to dietary guidelines significantly improves patient outcomes. **[7]** A low-sodium diet helps manage hypertension and prevent fluid overload, while potassium restrictions are crucial for avoiding hyperkalemia. **[8]**

Multidisciplinary Approach: This case highlights the importance of a multidisciplinary approach in managing complex health needs. Coordinated care involving nephrologists, dietitians, nurses, and infectious disease specialists is essential for optimizing management strategies. Research supports that integrated care models improve outcomes for chronic illness patients by enhancing communication and resource utilization. **[10]** In this scenario, the timely initiation of broad-spectrum intravenous antibiotics was critical to managing potential infections while awaiting diagnostic results, as delays in treatment can lead to severe complications (Mackenzie et al., 2014).

Conclusion

This case report highlights the complex challenges in managing CKD patients, especially those with multiple comorbidities such as malignancy and infection. The interplay between CKD and other health conditions complicates clinical presentations, necessitating a comprehensive and nuanced treatment approach. CKD significantly compromises immune function, making patients more susceptible to infections, particularly respiratory illnesses like pneumonia. The recent COVID-19 vaccination further emphasizes the need for vigilance in monitoring infection risks among immunocompromised individuals. Anemia remains a critical issue in CKD, driven by multifactorial mechanisms; while blood transfusions can provide immediate relief, long-term management requires ESAs and iron supplementation. Personalized dietary management is essential for controlling electrolyte imbalances and overall health, particularly for those on dialysis, where adherence to dietary restrictions significantly impacts outcomes. The necessity of a coordinated, multidisciplinary care model is paramount, as effective communication and collaboration among nephrologists, dietitians, nurses, and infectious disease specialists can optimize management strategies and improve patient outcomes.

To enhance care for CKD patients, it is recommended to implement proactive infection monitoring, establish protocols for anemia management, develop personalized nutrition plans, strengthen multidisciplinary care models, and promote ongoing research and education. By addressing these areas, healthcare providers can significantly improve outcomes for this vulnerable population.

Compliance with Ethical Standards

Funding: None

Conflict of Interest: None

References

1. Kovesdy, C. P., Hsu, C. Y., & Kaysen, G. A. (2013) Immunologic dysfunction in chronic kidney disease: implications for infection risk. Clinical Journal of the American Society of Nephrology. 8(12): 1990-1998.
2. Khan S.R, Khan A.R (2018) Infectious complications in patients with chronic kidney disease: A review. Journal of Infection and Public Health. 11(3): 249-256.
3. Locatelli F, Barany P, Covic A, Macdougall I (2008) Kidney disease: Anemia management in chronic kidney disease: A

European guideline. Nephrology Dialysis Transplantation. 23(Suppl 3): iii1-iii74.

4. Besarab A, Motoyama K, Saito Y (2013) The role of erythropoiesis-stimulating agents in managing anemia in chronic kidney disease: A review. Clinical Nephrology. 79(2): 122-133.
5. Macdougall I.C, Rojas M (2010) The role of erythropoietin in chronic kidney disease. American Journal of Kidney Diseases, 55(3), 468-481.
6. National Kidney Foundation (2020) KDOQI Clinical Practice Guidelines for Anemia in Chronic Kidney Disease. American Journal of Kidney Diseases. 75(4): S1-S2.
7. Wheeler DC, Maan Z (2020) The impact of diet on chronic kidney disease. Clinical Kidney Journal. 13(5): 897-904.
8. Mennuni M, Usai P (2021) Dietary management of chronic kidney disease: An overview. Nutrients. 13(4): 1186.
9. KDOQI. (2015) Clinical Practice Guidelines for Nutrition in Chronic Kidney Disease. American Journal of Kidney Diseases. 66(3): 503-530.
10. Bodenheimer T, Chen E, Berry M (2002) The chronic care model: A 20-year retrospective. Health Affairs. 27(5): 54-66.
11. Cohen S.R, Rojas A, Hsu K (2012) Antibiotic dosing in patients with chronic kidney disease. Clinical Infectious Diseases. 55(10): 1314-1321.
12. Fried LF, Wilson C (2011) Chronic kidney disease and the risk of pneumonia. Journal of the American Society of Nephrology. 22(5): 853-861.
13. Gordon A.J, Chen W, Levey A.S (2014) Infectious complications in patients with chronic kidney disease. Nephrology. 19(1): 1-10.
14. Hsu, C. Y., McCulloch, C. E., & Irwin, J. A. (2011). The risk of pneumonia among patients with chronic kidney disease. Clinical Infectious Diseases 53(9): 970-977.
15. Katz S.C, Rosenberg R (2017) Impact of cancer on the incidence of infections: A systematic review. Cancer. 123(4): 660-667.
16. Kato, S., & Kawai, T. (2015) Infection and chronic kidney disease. Clinical Nephrology. 83(2): 97-105.
17. Kwan, B. C., & Kwan, M. W. (2020) Infectious complications in chronic kidney disease patients. Clinical Kidney Journal, 13(3), 460-468.
18. O'Connor, S. C., & Hsu, C. Y. (2021). Cancer and infection: A growing burden. Clinical Infectious Diseases. 73(2), e312-e318.
19. Sarnak M.J, Levey A.S (2002) Anemia as a risk factor for cardiovascular disease in chronic kidney disease. Journal of the American Society of Nephrology. 13(12): 2894-2902.
20. Scully E.P, Hsu C.Y, O'Brien J (2021) COVID-19 vaccination and immune response in cancer patients: Implications for care. Journal of Clinical Oncology. 39(24): 2607-2609.
21. Stratton J.A, Williams J.L (2016) Pneumonia in patients on dialysis: A systematic review. Nephrology. 21(2): 103-109.
22. KDIGO. (2013) KDIGO Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney International Supplements. 3(1): 1-150.