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Human Metapneumovirus Infection in an Elderly Patient Receiving Maintenance Hemodialysis with Chronic Obstructive Pulmonary Disease (COPD): A Case Report

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ABSTRACT

Human metapneumovirus (hMPV) is an important cause of acute infections of the respiratory system affecting young children, older adults, and immunocompromised individuals. Patients suffering from chronic obstructive pulmonary disease (COPD) and end-stage renal disease (ESRD) receiving maintenance hemodialysis represent a particularly vulnerable population, yet published reports describing hMPV infection in dialysis patients remain limited.

A 70-year-old male with a background of COPD, hypertension, and diabetic nephropathy with a maintenance hemodialysis regimen presented with a four-day history of fever, cough with rhinorrhea, myalgias, and dyspnea. He was immunized against influenza, COVID-19, and RSV. Physical examination showed signs of mild hypoxemia with diffuse crackles and expiratory wheezing, without evidence of consolidation. The patient's chest radiograph showed chronic obstructive changes. Triplex RT-PCR for influenza virus, RSV, and SARS-CoV-2 was negative. However, a multiplex RT-PCR respiratory panel identified hMPV. He had a good response to supportive care with oxygen supplementation, bronchodilator therapy, and continuation of his scheduled hemodialysis regimen, with subsequent discharge after five days.

The above-mentioned case shows how crucial it is to consider the possible hMPV infection in differentiating the cause of respiratory complaints in dialysis patients. This infection, even being a relatively mild one, can have serious consequences from the point of view of infection control in dialysis units due to close contact between patients and their frequent use of common medical devices. This observation highlights the clinical significance of hMPV infections in hemodialysis patients.

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INTRODUCTION

Human metapneumovirus (hMPV), first reported in 2001, is a significant causative agent of acute respiratory tract infection (ARTI) worldwide [1]. Although infection is widespread, severe disease is most commonly reported in young children, the elderly, and those with pre-existing cardiopulmonary or renal disease [2,3].

Patients with end-stage renal disease (ESRD) who are on maintenance hemodialysis have abnormal immune responses with altered cellular and humoral immunity. This predisposes them to viral infections and worse clinical outcomes [3]. Respiratory infections remain a major cause of hospitalization and mortality in this population.

Seasonal respiratory viruses such as influenza virus, respiratory syncytial virus (RSV), and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) frequently present with overlapping clinical manifestations. As a result, etiologic diagnosis based solely on clinical features is unreliable. Molecular diagnostic testing plays an essential role in identifying the causative pathogen and guiding management [1].

Reports describing hMPV infection in patients receiving maintenance hemodialysis remain scarce. We describe a case of hMPV infection in an elderly hemodialysis patient with COPD and discuss diagnostic and clinical considerations relevant to this high-risk population.

KEY MESSAGES

What is already known on this topic?

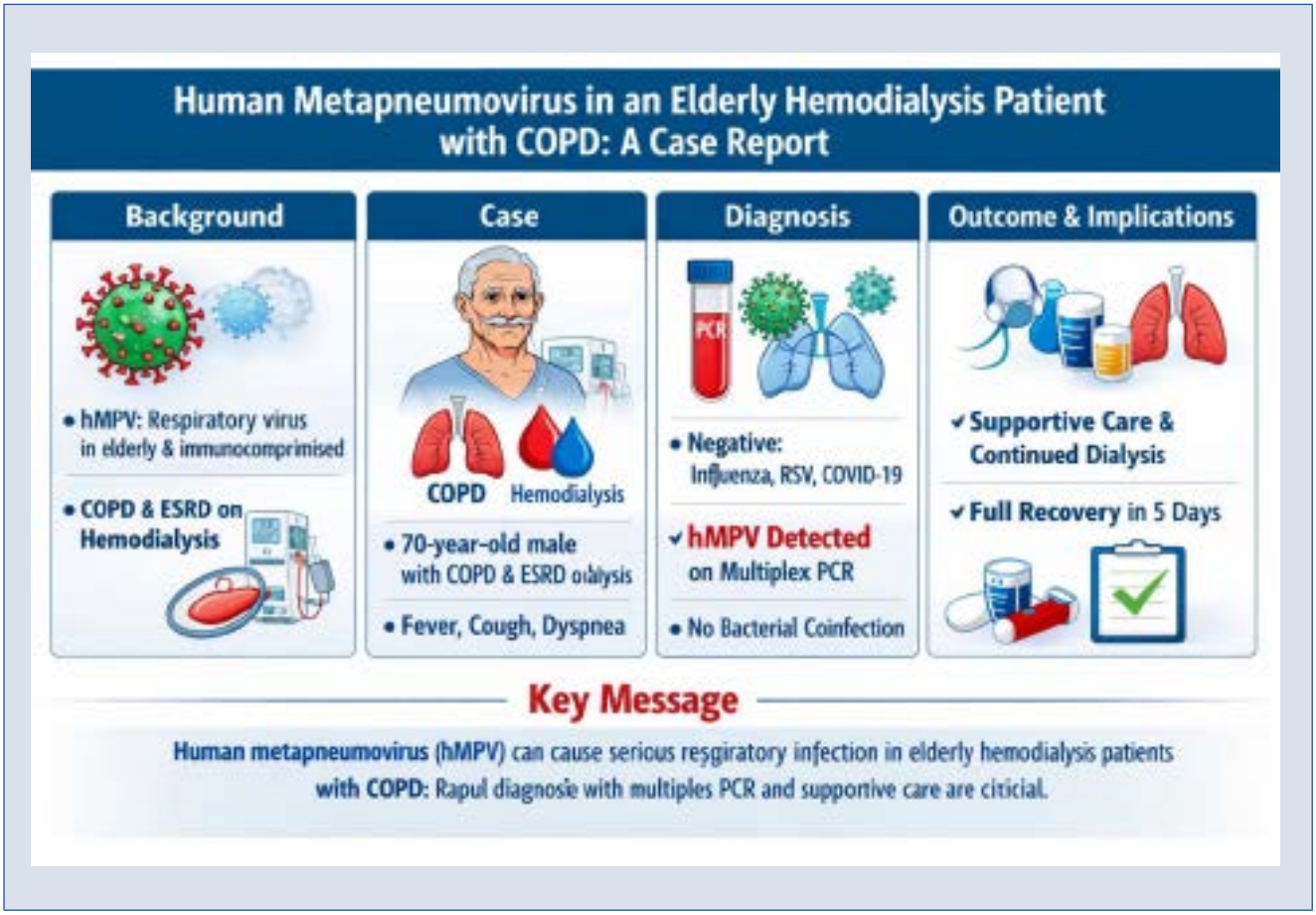
hMPV is an agent that causes a respiratory infection in elderly and immunocompromised individuals. Patients with ESRD on maintenance hemodialysis suffer from compromised immunity and are therefore prone to viral infections. Clinical overlap with influenza, RSV, and COVID 19 often complicates diagnosis.

What this study adds?

We report hMPV infection in an elderly hemodialysis patient with COPD. Multiplex RT PCR confirmed hMPV after negative targeted viral tests. The patient recovered with supportive care alone, showing that hMPV may follow a mild course in high risk individuals when bacterial coinfection is excluded.

How could this study contribute to advancing research agendas and refining practice?

Symptoms of respiratory infections among dialysis patients call for the evaluation of hMPV. The present case highlights the importance of employing multiplex molecular assays for correct pathogen diagnosis. Surveillance measures and vaccines must be created in order to protect patients who are at risk such as chronic hemodialysis patients.



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CASE PRESENTATION

A 70-year-old man was hospitalized in December 2025. He presented with a four-day history of fever (38.5 °C), dry cough, rhinorrhea, myalgia, fatigue, and dyspnea. He had previously received vaccination against influenza, COVID-19, and RSV.

The patient's medical history included COPD, hypertension for which he was on ramipril 5 mg once daily, and diabetic nephropathy, for which he had been undergoing maintenance hemodialysis three times a week for the preceding three years.

Following a maintenance hemodialysis session, laboratory evaluation showed a white blood cell count of 6,800/µL with a differential of 65% neutrophils, 25% lymphocytes, and 8% monocytes without eosinophilia and elevated C-reactive protein (CRP) 23 mg/L (reference <5 mg/L). Hemoglobin was 11.1 g/dL, consistent with chronic anemia of renal disease and platelet count was 210,000/ µL. Rapid influenza antigen testing was negative. Additional investigations were performed to evaluate for possible bacterial coinfection. Serum procalcitonin was within normal limits at 0.12 ng/mL, suggesting a low probability of bacterial infection. Sputum culture showed no growth of pathogenic organisms, and blood cultures remained negative. The absence of radiographic consolidation and leukocytosis supported a primary viral etiology. The patient's favorable clinical course was most likely attributable, at least in part, to the absence of bacterial coinfection, a factor consistently associated with milder disease trajectories; host- and virus-related factors, discussed further below, may also have contributed.

With regard to hemodialysis-specific management and infection control, the patient continued his scheduled thrice-weekly hemodialysis sessions via arteriovenous fistula, with each session lasting 4 hours at a blood flow rate of 300 mL/min, dialysate flow of 500 mL/min, bicarbonate-based dialysate and an ultrafiltration volume of 2.5 L per session. Once his respiratory symptoms were recognized, he was dialyzed in an isolation dedicated room separated from other patients, and dialysis unit staff wore N95 masks, gowns, gloves, and eye protection for the duration of the session, in keeping with the unit's respiratory infection-control protocol.

On examination, oxygen saturation was 93% on room air. Diffuse crackles and expiratory wheezing were noted without focal signs of consolidation. There was no peripheral edema. Neurological and gastrointestinal examinations were unremarkable. Chest radiography revealed chronic changes consistent with obstructive disease, including pulmonary hyperinflation, flattened hemidiaphragms, and increased retrosternal airspace, with no focal consolidation, pleural effusion, or evidence of fluid overload **(Figure 1)**.



FIGURE 1 - Chest radiograph demonstrating chronic changes consistent with obstructive disease with no focal consolidation, pleural effusion, or acute cardiopulmonary abnormality.

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Initial triplex RT-PCR testing for influenza virus, RSV, and SARS-CoV-2 was negative. A subsequent multiplex RT-PCR respiratory panel (FilmArray Respiratory Panel, BioMérieux, Marcy-l'Étoile, France) identified hMPV

The patient was kept under observation and provided symptomatic care in the form of supplemental oxygen therapy, bronchodilators, and continuation of his scheduled hemodialysis sessions. No antiviral therapy was administered. The patient recovered gradually and was discharged after the fifth day without any complications.

DISCUSSION

hMPV is a recognized cause of upper and lower respiratory tract infections and is estimated to account for approximately 3–20% of respiratory illnesses worldwide [2,4]. The virus demonstrates seasonal circulation that overlaps with influenza viruses and respiratory syncytial virus activity [2,4]. Although infection is typically self-limited in otherwise healthy adults, more severe disease has been reported in elderly individuals and in patients with underlying cardiopulmonary disease [2,5].

Patients with end-stage renal disease (ESRD) receiving maintenance hemodialysis are particularly susceptible to infections because of uremia-associated immune dysfunction affecting both innate and adaptive immune responses [3]. This impaired immune function increases vulnerability to viral respiratory infections and their complications. However, published data describing the epidemiology and clinical characteristics of hMPV infection in maintenance hemodialysis populations remain limited.

Respiratory infections in elderly dialysis patients frequently present with non-specific symptoms such as fever, cough, and dyspnea, making clinical differentiation difficult. The differential diagnosis in this setting includes influenza, respiratory syncytial virus infection, COVID-19, bacterial pneumonia, exacerbation of chronic obstructive pulmonary disease, and dialysis-related fluid overload. Because clinical findings alone are insufficient to establish an etiologic diagnosis, reverse-transcription polymerase chain reaction (RT-PCR) testing is considered the diagnostic reference standard because of its high sensitivity and specificity [1,5]. Multiplex PCR assays allow simultaneous detection of multiple respiratory pathogens and are particularly useful during periods of seasonal viral co-circulation. In the present case, multiplex PCR testing confirmed hMPV infection after initial targeted testing was negative, illustrating the diagnostic value of comprehensive molecular testing in high-risk patients.

Management of hMPV infection remains primarily supportive and includes oxygen therapy, bronchodilators when clinically indicated, and careful monitoring [6]. In patients receiving maintenance hemodialysis, optimization of dialysis scheduling and fluid balance is particularly important to prevent volume overload and worsening respiratory symptoms. No antiviral therapy has been approved for hMPV infection to date, although investigational treatments such as ribavirin and monoclonal antibodies have been described [6].

hMPV infection has been associated with severe lower respiratory tract disease and adverse outcomes in elderly and immunocompromised individuals, including patients with ESRD. In contrast, our patient experienced a mild, self-limiting illness despite multiple recognized risk factors, including advanced age, chronic obstructive pulmonary disease, and long-term hemodialysis. Clinical improvement occurred with supportive care alone, without complications, underscoring the importance of diagnostic vigilance and infection-control awareness in dialysis settings even when presentations are not severe.

This case illustrates that hMPV infection in a dialysis patient may follow a mild, self-limiting course, complementing prior reports of severe presentations in similar populations. Rather than establishing variability from a single observation, our findings should be contextualized within the broader literature that documents a spectrum of disease severity. Several factors may explain this variability, including differences in the infecting hMPV genotype and inoculum size, the patient's baseline cellular and humoral immune competence at the time of infection, and the inherent heterogeneity of host–virus interactions that characterizes respiratory viral illness more broadly. Advanced age and COPD are recognized risk factors for severe outcomes, but they do not invariably predict a fulminant cytokine response or respiratory failure, as illustrated by the comparatively mild course observed in our patient. These findings suggest that while dialysis patients are considered a vulnerable population, the clinical course of hMPV infection may vary and should be assessed individually.

The clinical features of the hMPV infection in patients with adult comorbidity have been elucidated in recent case studies. In particular, Virzi et al. reported a patient with COPD and morbid obesity suffering from viral septic shock with a need for intubation and dialysis [4]. In contrast, Khachatryan et al. reported a fatal case of hemorrhagic hMPV pneumonia in a patient with liver cirrhosis and diabetes who deteriorated rapidly within days of symptom onset [7]. Our patient's uncomplicated recovery, situated between these two more severe presentations, reinforces the concept that clinical outcomes in hMPV infection are heterogeneous even among patients sharing recognized risk factors. As a single case report, our observations cannot establish causal relationships or generalizable predictors of outcome, and the inherent selection and reporting

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biases of case reports should be considered when interpreting them; larger cohort studies of hMPV infection specifically in maintenance hemodialysis populations are needed to define its true burden and range of clinical presentations.

Despite prior immunization against influenza, COVID-19, and respiratory syncytial virus, the patient developed hMPV infection, reflecting the absence of an available vaccine for this pathogen. Several vaccine candidates, including live-attenuated and subunit formulations, are currently under investigation [8]. Until effective vaccination becomes available, preventive strategies in dialysis units should include early identification of respiratory symptoms, prompt molecular testing, adherence to infection-control practices, and appropriate patient segregation when indicated. Practical measures particularly relevant to the dialysis-unit setting include dialyzing symptomatic patients in an isolation room or at the end of the treatment shift, use of appropriate personal protective equipment (masks, gowns, gloves, and eye protection) by staff, dedicated or thoroughly disinfected dialysis stations and shared equipment, reinforced hand hygiene, and patient and staff education on respiratory hygiene, given the close physical proximity and shared equipment inherent to hemodialysis units.

CONCLUSION

This case shows that hMPV infection can occur, and may follow an unexpectedly mild course, in hemodialysis patients with recognized risk factors for severe disease, and that multiplex molecular testing is essential for its timely and accurate diagnosis when standard viral panels are negative. Clinicians caring for maintenance hemodialysis patients should maintain a high index of suspicion for hMPV during respiratory illness and adhere to appropriate infection-control measures to limit transmission within dialysis units.

Keywords

Human metapneumovirus, COPD, Hemodialysis, Elderly, Respiratory infection, Lebanon

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Author contributions

AJZ conceived the case study, drafted and revised the manuscript, and approved the final version.

Declarations

Conflicts Of Interests

The Authors declare that there is no conflict of interest.

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Registration

No registration applicable.

Data availability statement

All data underlying this article are derived from the present case. No new datasets were generated or analyzed by the author.

Ethical approval

Institutional review board approval was not required for a single case report.

Informed Consent

Informed consent was obtained from the patient.

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