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CASE REPORT

Tracheobronchial Aspergillosis with Hepatocellular Carcinoma and Multi-Organ Dysfunction: A Complex Case Managed in Emergency and Critical Care

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ABSTRACT

We present the case of a sixty-one-year-old male with chronic kidney disease (CKD) who developed multi-organ dysfunction characterised by tracheobronchial aspergillosis, hepatocellular carcinoma (HCC), urosepsis, and acute kidney injury (AKI).[1,2] The patient initially presented with respiratory distress, haematuria, and sepsis, requiring intensive multidisciplinary intervention. Radiological investigations revealed a fluorodeoxyglucose (FDG)-avid hepatic lesion with features suggestive of HCC[3] and widespread bronchial pseudomembranes consistent with invasive aspergillosis.[4] Management involved haemodialysis, antifungal therapy, bladder clot evacuation, and supportive care.[5] This case underscores the complexity of managing critically ill patients with overlapping infectious and oncological pathologies presenting to emergency services.[1,6] Early identification and coordinated multidisciplinary care are critical for optimising outcomes.[7] Furthermore, the coexistence of severe fungal airway disease with advanced hepatic malignancy and septic complications highlights the need for heightened clinical vigilance in high-risk CKD populations.[8] The integration of serial bronchoscopic assessments, targeted antifungal therapy, and vigilant organ support played a pivotal role in stabilising this patient, demonstrating the importance of comprehensive emergency and critical care pathways in managing such rare and life-threatening presentations.[9,10]

Key Messages: This case highlights the diagnostic and therapeutic challenges posed by the coexistence of tracheobronchial aspergillosis and hepatocellular carcinoma in a patient with chronic kidney disease and sepsis. Prompt multidisciplinary management is essential to improve survival outcomes in such critically ill patients.

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• Tracheobronchial aspergillosis • Hepatocellular carcinoma • Chronic kidney disease • Acute kidney injury • Urosepsis • Emergency medicine • Critical care • Invasive aspergillosis • Hepatitis-B-related liver cancer • Multidisciplinary management

INTRODUCTION

Invasive tracheobronchial aspergillosis is an uncommon but severe fungal infection that occurs particularly in immunocompromised or critically ill patients. Hepatocellular carcinoma in individuals with chronic hepatitis B virus (HBV) infection further complicates clinical management. This case report describes a patient with coexisting aspergillosis, hepatocellular carcinoma, urosepsis, and acute kidney injury, emphasising the importance of emergency care and multidisciplinary management in such high-risk cases.

Background on Invasive/Tracheobronchial Aspergillosis

Tracheobronchial aspergillosis involves fungal invasion of the tracheal and bronchial mucosa and is most commonly observed in organ transplant recipients, individuals with haematological malignancies, prolonged neutropenia, or those receiving high-dose corticosteroids.[4]

It is classified into ulcerative, pseudomembranous, and obstructive subtypes based on bronchoscopic appearance.

Common clinical presentations include:

- Persistent cough
- Dyspnoea
- Fever
- Haemoptysis
- Hoarseness of voice
- Wheezing or stridor
- Chest pain
- Fatigue
- Respiratory failure[4,8]

Risk Factors and Epidemiology

Risk factors for tracheobronchial aspergillosis include chronic kidney disease, immunosuppressive therapy, prolonged intensive care unit (ICU) stay, hepatocellular carcinoma, hepatitis B virus infection, and malnutrition. Although rare, tracheobronchial aspergillosis is increasingly recognised due to improved diagnostic techniques and a growing population of immunocompromised patients.

Case Presentation Summary

A sixty-one-year-old male with a history of hypertension, type two diabetes mellitus, chronic kidney disease (baseline serum creatinine two to three mg/dL), and hepatitis B virus positivity presented with high-grade fever, cough, bilateral pedal oedema, and lower urinary tract symptoms.

Laboratory evaluation demonstrated acute kidney injury (serum creatinine seven mg/dL), urosepsis with Enterococcus faecium, total leucocyte count of sixteen thousand four hundred/mm^3, and a markedly elevated procalcitonin level of two hundred and fourteen point eight ng/mL.

Despite antibiotic therapy, respiratory symptoms persisted.

A fluorodeoxyglucose–positron emission tomography (FDG–PET) scan and contrast-enhanced computed tomography (CT) revealed an FDG-avid liver lesion, subsequently diagnosed as hepatocellular carcinoma on biopsy.

Bronchoscopy identified pseudomembranes and thick secretions, with bronchoalveolar lavage (BAL) studies confirming invasive tracheobronchial aspergillosis.

Complications during hospitalisation included acute laryngitis, haematuria with bladder clot retention, and an intracranial haemorrhage. The patient required antifungal therapy, repeated bronchoscopies, endotracheal intubation, ICU care, and haemodialysis.

Following a prolonged hospital course, he gradually stabilised and was discharged with planned follow-up.

Diagnostic Workup

BAL galactomannan index was thirteen point two eight, with septate hyphae exhibiting

acute-angle branching, consistent with Aspergillus species.[4]

Bronchoscopic findings included diffuse pseudomembranes, mucopurulent secretions, and subglottic inflammation.

FDG–PET demonstrated FDG-avid tracheal thickening, cavitating pulmonary nodules, and mediastinal lymphadenopathy.[3]

Liver biopsy confirmed hepatocellular carcinoma with high hepatitis B virus DNA levels.[11]

Magnetic resonance imaging (MRI) of the brain demonstrated a right temporal lobe haemorrhage.

Invasive Aspergillosis and Chronic Kidney Disease – The Link

Patients with chronic kidney disease are predisposed to invasive fungal infections because of:

- Impaired neutrophil and monocyte function
- Compromised epithelial barriers
- Frequent use of broad-spectrum antibiotics
- Immune dysregulation associated with haemodialysis
- A uraemic milieu that suppresses innate immunity.[9]

These factors increase the likelihood of airway colonisation progressing to invasive aspergillosis.

Differential Diagnoses Considered

- Bacterial lower respiratory tract infection
- Tuberculosis (excluded by acid-fast bacilli staining and negative GeneXpert)
- Pulmonary malignancy
- Mucormycosis
- Allergic bronchopulmonary aspergillosis

Management Approach

Initial Management

- Empirical broad-spectrum intravenous antibiotics, later adjusted for Enterococcus faecium
- Haemodialysis via permanent catheter insertion.[9]
- Bronchodilators, diuretics, antihypertensives, lactulose, and symptomatic management
- Nutritional optimisation and liver support

Specific Antifungal Therapy

- Initial combination therapy with intravenous amphotericin B and voriconazole
- Transition to isavuconazole (Cresemba) for long-term oral antifungal therapy.[5,10]

Bronchoscopic Debridement

- Serial cryoextraction procedures
- Mechanical removal of pseudomembranes to restore airway patency

Intensive Care Support

- Mechanical ventilation during periods of airway compromise and respiratory failure
- Ear, nose, and throat (ENT) review for subglottic inflammation and acute laryngitis
- Levetiracetam for seizure control after intracranial haemorrhage

Monitoring

- Serial BAL galactomannan levels
- Repeated chest radiography and high-resolution computed tomography (HRCT)
- Renal and liver function tests
- Serial urine and blood cultures
- Alpha-fetoprotein (AFP) levels for HCC surveillance
- Neurological monitoring with MRI where appropriate

Complications and Outcomes

Complications included airway bleeding during bronchoscopy, respiratory failure requiring intubation, sepsis progression, and an intracranial haemorrhage.

Despite these, early antifungal therapy and aggressive ICU management resulted in gradual clinical improvement and eventual stabilisation.

Prevention Strategies

Hospital-Based Measures

- Strict aseptic precautions
- Early referral for bronchoscopy in high-risk patients
- Antibiotic stewardship
- Environmental fungal surveillance
- Consideration of prophylactic antifungals for selected high-risk individuals
- Multidisciplinary team involvement

Patient-Centred Measures

- Education on hygiene practices
- Avoidance of unnecessary corticosteroids
- Vaccination adherence
- Nutritional optimisation
- Strict adherence to antifungal therapy[9]

Clinical Pearls and Learning Points

- BAL galactomannan is a highly sensitive early diagnostic test.
- Repeated bronchoscopy may be necessary in pseudomembranous tracheobronchial aspergillosis.
- A high index of suspicion is crucial in patients with chronic kidney disease and hepatocellular carcinoma, even in the absence of fever.

Future Perspectives

Future directions include the development of more accurate non-invasive diagnostic tools, exploration of antifungal prophylaxis strategies, and personalised antifungal therapy guided by host immunological factors.

CONCLUSION

This case demonstrates the diagnostic and therapeutic challenges in managing tracheobronchial aspergillosis in a patient with chronic kidney disease and hepatocellular carcinoma. Early bronchoscopy, timely antifungal initiation, and coordinated multidisciplinary care were pivotal to recovery. Patients with chronic kidney disease must be closely monitored for opportunistic fungal infections.

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Conflict of Interest: None

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