CASE REPORT

Nursing Consideration in Rhinocerebral Mucormycosis: A Case Report

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Abstract

Introduction: Rhinocerebral mucormycosis is a rare but aggressive opportunistic fungal infection commonly caused by Rhizopus oryzae and Rhizopus delemar that predominantly affects immunocompromised individuals, particularly those with uncontrolled diabetes mellitus or undergoing immunosuppressive therapy. It demands urgent diagnosis and multidisciplinary management due to its rapid progression and high mortality rate. Nurses play a critical role in early recognition, timely intervention, and coordination of multidisciplinary care.

Case presentation: This case report describes the clinical course of Rhinocerebral mucormycosis in a patient with diabetic ketoacidosis (DKA), further complicated by post-herpetic neuralgia and lower motor neuron (LMN) facial palsy. Nursing care included implementation of the insulin protocol for DKA management, administration and monitoring of liposomal Amphotericin B, frequent neurological assessments, early detection and reporting of secondary lesions, pain management, continuous monitoring of vital parameters, infection prevention measures, and accurate documentation and communication with the healthcare team.

Despite comprehensive nursing and medical management, the patient developed secondary lesions suggesting disseminated infection, central nervous system involvement, and vascular compromise hindered the possibility of surgical debridement, ultimately resulting in respiratory failure and death.

Conclusions: The case highlights the crucial role of nurses in managing complex intensive care unit presentations, from early recognition of signs and symptoms, vigilant nursing assessment, prompt intervention, and interprofessional communication. Nurses are central to detecting early signs of deterioration and ensuring coordinated, evidence-based care.

Keywords: *case report; diabetic ketoacidosis; facial palsy; nursing considerations; mucormycosis.*

Introduction

Mucormycosis is a serious fungal infection caused by molds known as mucormycetes, commonly found in soil and decaying organic matter, such as leaves and compost.[1-3] Transmission typically occurs through the inhalation of fungal spores from the environmental risk factors include uncontrolled diabetes mellitus, particularly diabetic ketoacidosis, malignancies, organ transplantation, and traumatic injuries.[4,5] The

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surge in mucormycosis cases during the COVID-19 pandemic has disproportionately affected low- and middle-income countries (LMICs), particularly India, which reported over 47,500 cases of COVID-associated mucormycosis (CAM) between May and August 2021.[6] Moreover, meta-analyses of nearly 1,000 reported cases confirm that the majority (88.80%) were reported from LMICs, highlighting global disparities in both risk and healthcare outcomes.[3] There are five major forms of Mucormycosis: Rhinocerebral (common in diabetes/DKA), pulmonary (common in cancer, transplant, neutropenia), Cutaneous (follows trauma or burns, gastrointestinal (seen in neonates, malnutrition), and disseminated (in severe immunosuppression).[1-3] Rhinocerebral mucormycosis (ROCM) is the most common form, accounting for 42.10% of CAM, and can present with fever, one-sided facial swelling, headache, vision changes, nasal or sinus congestion, black lesions on the nasal bridge or the upper inside of the mouth.[7]

Case Report

Patient Profile

A 35-year-old male from Baglung, Nepal, undergoing treatment for Herpes, diabetes ketoacidosis, and suspected Mucromycosis, presented to Inova Hospital, Emergency Department. The patient had Post-herpetic neuralgia with Lower Motor Neuron (LMN) facial palsy, papulo-vesicular rash on the left side of the face, with an eschar extending over the left forehead (4 x 5 cm) and cheek, and left lower lip, extending to the neck (10 x 8 cm). The patient's Glasgow Coma Scale (GCS) upon arrival was Eye opening-3, Verbal-1, Motor-5. Vital signs were as follows: Blood pressure (BP) 110/60 mmHg, heart rate (HR) 86 bpm, SpO_2 91% in room air, respiratory rate (RR) 16/min. The diagnosis of ROCM was confirmed through biopsy report brought by the patient and Magnetic Resonance Imaging (MRI), which showed an extensive infective lesion on the left face and neck involving muscles, glands, and carotid space with vascular compromise. Intracranial spread via left trigeminal and facial nerves with multifocal brain lesions.

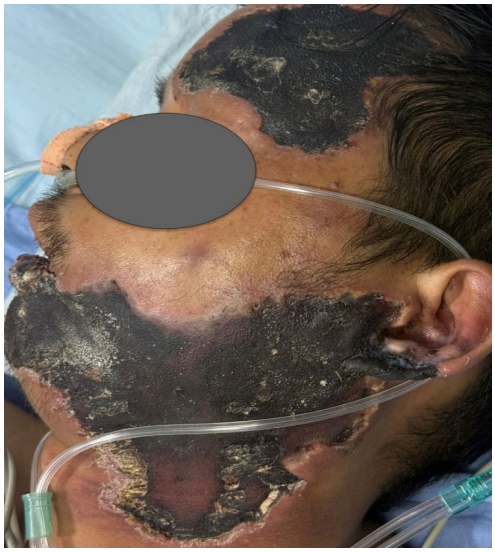

Figure 1: Patient with Rhinocerebral Mucormycosis

Clinical course

The patient presented with altered sensorium (GCS E3V1M5) and severe metabolic acidosis secondary to DKA (glucose 448 mg/dL, serum acetone +++). Initial management included fluid resuscitation, insulin infusion per ICU protocol, potassium correction, and initiation of liposomal amphotericin B, with planned surgical debridement. On Day 2, DKA persisted (glucose 325.8 mg/dL, acetone ++), and multidisciplinary consultations were undertaken. On Day 3, metabolic acidosis resolved, but a new clavicular lesion was detected; surgical debridement was deferred due to instability. The patient was referred to a higher center, intubated the following day at the referral center, and subsequently died.

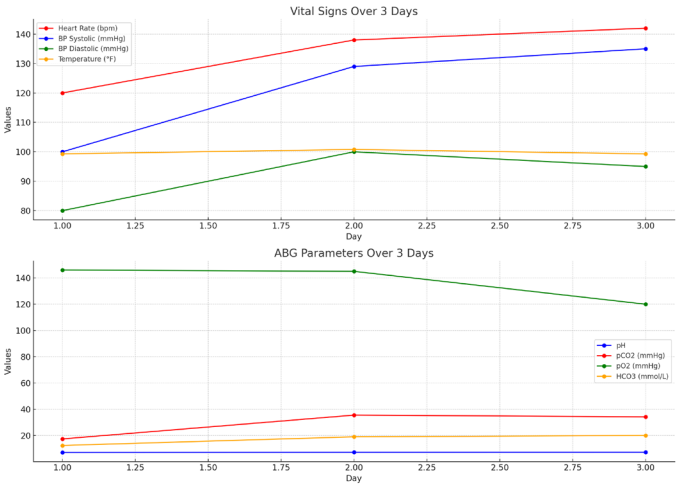

Figure 2: Vital Parameters

Nursing Consideration

Assessment and Monitoring

The patient was kept on a cardiac monitor for continuous assessment of vital signs, three-lead ECG, and oxygen saturation. For the first 2 days patient was in a nasal prong with up to 3 liters of oxygen throughout the stay. Humidified oxygen with distilled water was used and was changed every day. Neurological assessment was done by using the Glasgow Coma Scale (GCS) hourly to assess the early signs of deterioration. The VII cranial nerve was examined every 6 hours by instructing the patient to raise eyebrows, close eyes tightly, show teeth, puff out cheeks (noting air escape), or whistle, which was impaired, indicating lower motor neuron (LMN) facial palsy. The patient was unable to close the eyes, lubricant eye drops were applied, and the affected eye was covered with an eye patch to prevent corneal damage.

Airway Management

The patient was in potential risk of bronchospasm and respiratory compromise as verbal response was absent (V1). The patient was kept in Fowler's position to maintain airway patency, and oral suctioning was performed every 2 hours or as required. The emergency airway equipment was readily available at the bedside.

Fluid and Electrolyte Balance

Fluid and electrolyte balance was maintained through the 24-hour Input and output record. Renal function and electrolytes were assessed every 2–4 hours as per protocol. Sodium Chloride (Nacl) 3% with 20 mEq 100ml over 6 hours, 20meq KCL in each pint of fluid was given. Sodium levels were corrected gradually to prevent cerebral edema or osmotic demyelination syndrome (ODS).

Metabolic Management / DKA Management

DKA was managed with glucose, potassium, and insulin therapy as per protocol. The regular insulin infusion rate was adjusted according to hourly blood glucose levels. Serum ketone levels were positive and prompting continued fluid resuscitation and insulin adjustment. The patient was observed for signs of hypoglycemia and hypokalemia; hypoglycemia was corrected with 10% dextrose infusion until blood glucose was 200–250 mg/dL. Insulin was temporarily held, and potassium (K^+) was replaced aggressively until K^+ was 3.4 mmol/L. Continuous cardiac monitoring was maintained to detect arrhythmias related to intracellular potassium shifts and hypokalemia.

Antifungal Therapy and Pain Management

The nurses prepared and administered 350mg antifungal drugs with precautions. Amphotericin B was infused in a dark room with the IV line covered, ensuring no precipitate remained in the solution. Dextrose was used for flushing and dilution, and the patient was monitored for local infusion reactions. Normal Saline (NS) 500ml bolus before and after infusion was given to maintain adequate hydration. Six-hourly creatinine and potassium were monitored.

Pain management was done with continuous fentanyl infusion at 20mcg/hour, titrated according to patient response and neurological status. Adjuvant therapy with gabapentin was provided for neuropathic pain relief.

Infection Control and Care

The patient was kept in an isolation room. Two-hourly care was provided, which includes body wipes, position change, chest physiotherapy, and passive exercise. The room and linen were cleaned as necessary. Personal protective equipment and hand hygiene were strictly maintained. The wound sites were marked and inspected daily for healing and early signs of infection. Strict aseptic techniques during dressing were maintained. The patient was monitored for local infection signs, including redness, swelling, and discharge, as well as systemic indicators such as fever, hypotension, and signs of sepsis or shock.

Patient Education and Support

The patient and family were educated about the disease process, treatment plan, potential signs of complications, and proper medication use. Emphasis was placed on adherence to insulin therapy, fluid management, and antifungal treatment. Psychological support was provided, addressing concerns related to physical changes, dietary adjustments, mobility limitations, and prognosis.

Documentation and Communication

All assessments, interventions, patient responses, medication administration, and wound or infusion site observations were recorded. Any changes in patient condition were promptly communicated to the healthcare team. Structured formats SOAP (Situation, Observation, Assessment, and Planning/ Recommendation) was used during handovers to ensure continuity of care.

Table 1: Clinical course and management timeline

Day	GCS	Key Clinical Findings	Management	Outcome / Notes
Day 1	E3V1M5	Severe metabolic acidosis (ABG), Glucose 448 mg/dL, Serum acetone +++ (DKA)	Fluid resuscitation IVF DNS with 20meq KCL at 70ml/hr, Insulin infusion (ICU protocol), liposomal amphotericin B infusion	Initial stabilization; Surgical debridement planned
Day 2	E3V1M5	Persistent metabolic acidosis, ABG, Glucose 325.8 mg/dL, Serum acetone ++	Continued fluid and insulin management, Potassium correction, liposomal amphotericin B infusion Multidisciplinary consults	DKA ongoing; Multidisciplinary involvement (Neurosurgery, Dermatology, Plastic Surgery, Faciomaxillary, ENT)
Day 3	E3V1M5	Recovery from metabolic acidosis; New 3×3 cm lesion on left clavicle	Referred to higher center	Patient expired

Discussion

The uncommon, fatal fungal infection affects people with uncontrolled diabetes and DKA (37.2%) as much as immune-compromised individuals.[4,8] The infection starts with the fungal spores entering the nasal cavity to the central nervous system (CNS) via vascular involvement or extension into brain tissues. Usually very aggressive and forms scars in the nasal and ocular region, including the cheek and face.[5] Current ECMM/MSG-ERC global guidelines emphasize early initiation of high-dose liposomal Amphotericin B (5–10 mg/kg), correction of underlying metabolic abnormalities, and surgical debridement where feasible.[2] Newer agents, such as isavuconazole or posaconazole, are recommended as step-down therapy.[1,2] Debridement, along with medical therapy, can reduce mortality by up to 50% compared to medical therapy alone. Delay in antifungal initiation beyond 6 days doubles mortality risk.[6,8] Prognosis depends on timely diagnosis, the extent of disease, and metabolic control.

Nurses play a crucial role in implementing Glucose–Potassium–Insulin therapy or insulin infusion protocols, with hourly glucose checks and electrolyte/ABG monitoring. This is essential in preventing complications such as hypokalemia, which may be exacerbated by Amphotericin B therapy.[5] Nurses are responsible for ensuring correct infusion rates, prehydration protocols, and vigilant monitoring for nephrotoxicity, electrolyte loss, and infusion reactions during use of Amphotericin B therapy.[1] The early detection and rapid escalation with a multidisciplinary team shows improved clinical outcomes.[7] Furthermore, nurses are also involved in preoperative and postoperative care, assisting with surgical procedures, patient and family counseling, pain management, and reporting, which is equally important for patients' positive outcomes.[1]

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Conflict of Interest

The authors declare no competing interest. Hasina Rai is currently serving as Assistant Editor of Medical Journal of Armed Police Force Nepal. She was not involved in the editorial review or decision-making for this manuscript.

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Bios

Ms. Pariksha Sharma, ICU Nurse Incharge at Inova Hospital and Assistant Professor at Purbanchal University, holds a Master's in Women's Health and Development. With 10+ years' nursing and teaching experience, she specializes in critical care, women's health and clinical education, and conducted researche in critical care, women's/ children's health, geriatric nursing, and nursing education

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