CASE REPORT

Ischemic Stroke in Cryptococcal Meningitis in an HIV-Infected Patient: A Case Report from Lusaka Zambia.

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ABSTRACT

Cryptococcal meningitis is a severe opportunistic fungal infection primarily affecting immunocompromised individuals, especially those with HIV/AIDS. Although antiretroviral therapy (ART) has reduced incidence, it remains a major contributor to HIV-related mortality in low-resource settings. Ischemic stroke is a rare but serious complication, often linked to immune reconstitution inflammatory syndrome (IRIS) after ART initiation. This case presents a rare dual complication—cryptococcal meningitis with secondary ischemic stroke—and highlights the physiotherapy approach in managing profound neuromuscular deficits in a severely debilitated HIV-positive patient. A 44-year-old HIV-positive female presented with cryptococcal meningitis complicated by ischemic stroke. She was bedridden, severely fatigued, and had no voluntary movement in any limb. Examination revealed global hypotonia, significant muscle wasting, altered sensation, and severe pain in the shoulders, knees, and lower back. She had multiple pressure sores, including a stage 2 sacral ulcer with discharge, and stage 1 sores on both heels and early breakdowns at the greater trochanters. The patient was completely dependent for all activities of daily living and demonstrated poor nutritional and skin health. Physiotherapy management focused on pressure sore prevention, pain relief, and early functional recovery. Repositioning every two hours using pillows and wedges helped reduce shear forces. Passive range of motion exercises preserved joint integrity and circulation. Sensory stimulation (e.g., light touch, tapping) was initiated to enhance proprioceptive feedback, alongside neuromuscular facilitation for muscle re-education. Pressure ulcer care involved routine wound cleaning and moisture-wicking dressings. Functional retraining began with bed mobility and sitting balance, facilitated by caregiver training to ensure continuity of care. This case underscores the complex rehabilitation needs of patients with dual complications of cryptococcal meningitis and ischemic stroke. Early physiotherapy interventions, even in the absence of active movement, were critical in preventing complications and setting a foundation for functional recovery. This report highlights the importance of individualized, multidisciplinary rehabilitation in managing severe HIV-related comorbidities.

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INTRODUCTION

Cryptococcal meningitis (CM) is a common opportunistic fungal infection of the central nervous system (CNS), particularly affecting individuals with advanced HIV-related immunosuppression. Globally, HIV-associated cryptococcal meningitis accounts for approximately 220,000 cases and nearly 181,000 deaths annually, with the majority occurring in sub-Saharan Africa. The disease is primarily caused by *Cryptococcus neoformans* and is associated with high morbidity and mortality due to delayed diagnosis and limited access to antifungal therapy. A rare but significant complication of cryptococcal meningitis (CM) is ischemic stroke, which is often underrecognized due to overlapping neurological symptoms. The underlying pathophysiology involves inflammatory damage to the cerebral vasculature, including small-vessel vasculitis and large-vessel compression from raised intracranial pressure, leading to infarctions predominantly in the basal ganglia, thalamus, and brainstem[7,8]. Vela-Duarte et al. reported that ischemic strokes in CM patients are mostly lacunar and commonly localized in these deep brain structures. In HIV-infected individuals, the risk of stroke is further increased by factors such as coagulopathies, HIV-associated vasculopathy, chronic systemic inflammation, and immune reconstitution inflammatory syndrome (IRIS). Molyneux et al. described ischemic stroke occurring as part of paradoxical IRIS during antifungal and antiretroviral treatment, highlighting how immune recovery can provoke vascular inflammation and contribute to stroke risk. Clinically, ischemic events in CM may present subtly and can be easily confused with the existing neurological symptoms of meningitis, complicating early diagnosis and timely intervention. Powers et al. emphasize that prompt recognition, aggressive antifungal therapy, and effective management of intracranial pressure are critical to reducing neurological sequelae and improving patient outcomes.

In terms of differential diagnosis, cryptococcal meningitis in advanced HIV can closely mimic other opportunistic infections and neurological conditions. These include toxoplasmosis, tuberculous meningitis (TBM), and HIV-associated encephalopathy-each of which presents with overlapping symptoms such as fever, headache, altered mental status, and focal neurological deficits[9]. Toxoplasmosis typically presents with ring-enhancing lesions on imaging and may respond to empiric anti-toxoplasma therapy. TBM can cause basal meningeal enhancement and hydrocephalus, often progressing insidiously. HIV-associated encephalopathy is more likely in patients with profound immunosuppression and is characterized by subcortical white matter changes on MRI[11]. Given the patient's advanced HIV status, cryptococcal meningitis was appropriately diagnosed. However, it is critical to consider these differentials early, especially in the absence of definitive imaging and laboratory findings. According to the **World Health Organization** guidelines on the management of advanced HIV disease, a comprehensive diagnostic workup should include serum cryptococcal antigen (CrAg) testing, lumbar puncture with India ink or CrAg testing, and consideration of TB diagnostics and imaging where possible. Neuroimaging—if accessible—provides valuable diagnostic and prognostic information . In this case, ischemic stroke secondary to cryptococcal meningitis was suspected based on clinical findings. MRI imaging ideally reveals lacunar infarcts in the basal ganglia or cortical infarcts suggestive of vasculitic changes. The size and location of infarcts often correlate with clinical deficits; basal ganglia involvement typically results in profound motor impairment, as seen in this patient. The timing of antiretroviral therapy (ART) initiation in patients with cryptococcal meningitis is crucial. According to **WHO12** and other international guidelines, ART should be deferred for 4–6 weeks after initiating antifungal therapy to reduce the risk of immune reconstitution inflammatory syndrome (IRIS), a potentially fatal paradoxical inflammatory response[12,]. Inappropriate

early initiation of ART may exacerbate central nervous system inflammation and worsen neurologic outcomes, including cerebral oedema and infarction[13].

This case report aims to highlight a complex clinical scenario involving an HIV-positive individual who developed CM with associated ischemic stroke. Uniquely, it emphasizes the challenges of prolonged rehabilitation in a resource-limited setting and the role of physiotherapy interventions in enhancing functional recovery. Through this, the report seeks to contribute to the limited literature on post-stroke rehabilitation in the context of HIV and cryptococcal CNS infections.

CASE PRESENTATION

A 44-year-old female known to be HIV-positive was referred for physiotherapy management following a diagnosis of ischemic stroke secondary to cryptococcal meningitis. She was initially admitted with complaints of severe headache, neck stiffness, photophobia, and episodes of confusion. During her hospital stay, she developed right-sided hemiparesis and expressive aphasia. Her HIV diagnosis was made nine years ago, and she has been on antiretroviral therapy (Tenofovir, Lamivudine, and Dolutegravir), though adherence had been inconsistent in the past year. A lumbar puncture confirmed *Cryptococcus neoformans* in the cerebrospinal fluid, with an elevated opening pressure of 270 mmH_2O. A computed tomography scan of the brain revealed an ischemic infarct in the left middle cerebral artery territory. Laboratory investigations showed a CD4 count of 78 cells/mm^3 and an HIV viral load of 18,000 copies/mL, indicating severe immunosuppression and poor virologic control. On ophthalmologic evaluation, bilateral papilledema was observed, suggestive of increased intracranial pressure. Audiologic assessment revealed mild sensorineural hearing loss in the right ear. At the time of physiotherapy referral, the patient was bedridden and presented with multiple complaints including bilateral knee pain, bilateral shoulder pain, low back pain, altered sensation, and inability to move any of her limbs. Pressure sores were noted at common pressure points including the sacrum, heels, and greater trochanters. Vital signs on referral were: blood pressure 110/70 mmHg, heart rate 92 bpm, respiratory rate 20 breaths/min, oxygen saturation 96% on room air, and temperature 37.2°C. She was referred for physiotherapy for comprehensive rehabilitation aimed at improving functional mobility, managing pain, and preventing secondary complications.

CLINICAL FINDINGS

On observation, the patient appeared severely ill, fatigued, and bedridden. She was positioned in a semi-recumbent posture with poor head and trunk control, requiring full assistance for any movement or repositioning. Visible muscle wasting was noted, particularly in the limbs and gluteal regions, suggestive of prolonged immobility. The patient was unable to stand, walk, or move any of her limbs voluntarily. There was global hypotonia with no active movement observed in all four limbs. She reported altered sensation, including numbness and tingling in both the upper and lower extremities. Pain was a significant complaint, particularly in both knees and shoulders, worsened by passive movement, as well as persistent low back pain due to immobility. On palpation and passive range of motion, there was tenderness in both shoulder joints and the knees. Skin assessment revealed the presence of pressure sores at multiple sites. A stage 2 ulcer with mild discharge was observed over the sacral region. Non-blanching erythema indicating stage 1 pressure sores was noted over both heels, while the greater trochanteric areas presented with early stage 2 breakdowns. The patient's skin appeared fragile and dry, indicating poor nutritional status and a high risk of further skin breakdown. Overall, she presented with severe functional limitations and was completely dependent for activities of daily living.

TIMELINE

The patient was seen for a period of 1 year and 6 months, from November 2023 to date (April 2025), under private home-based physiotherapy care.

Timeline of Key Events:

Date/Period	Event/Progress Note
2015	Diagnosed HIV-positive; commenced ART
2022–2023	Reported poor ART adherence
November 2023	Hospital admission with meningitis symptoms (headache, neck stiffness, photophobia, confusion)
Mid-November 2023	Diagnosis of cryptococcal meningitis and ischemic stroke (left MCA territory)
Late November 2023	Referral to physiotherapy; patient was bedridden with right hemiparesis and expressive aphasia
December 2023	Started private, home-based physiotherapy care
March 2024	Began tolerating upright sitting with full back support for 10–15 minutes
August 2024	Showed improved trunk control; tolerated edge -of-bed sitting with minimal assistance
December 2024	Started assisted standing with support; pressure sores resolved
February 2025	Began short -distance walking with a walker and minimal assistance
April 2025	Continues to improve; ambulates short distances with a walker, expressive language st ill impaired but showing progress with speech therapy

THERAPEUTIC INTERVENTION

The following interventions were done:

A comprehensive range of therapeutic interventions was implemented as part of the physiotherapy management plan to address the patient's condition and improve her overall functional capacity. **From a pharmacological perspective**, the patient was initiated on an antifungal treatment regimen consisting of **amphotericin B and flucytosine for induction**, followed by **fluconazole for consolidation therapy**. This regimen is consistent with standard treatment protocols for central nervous system fungal infections. Furthermore, the patient's **antiretroviral therapy (ART)** was temporarily withheld during the induction phase of antifungal treatment and then resumed two weeks later to minimize the risk of **immune reconstitution inflammatory syndrome (IRIS)**, in accordance with clinical guidelines for managing HIV-associated neuroinfections. The **primary focus** of physiotherapy was on **positioning and repositioning** to prevent further pressure ulcers and alleviate discomfort. The patient was repositioned every two hours using proper techniques to relieve pressure on vulnerable areas, particularly the **sacrum, heels, and greater trochanters**. To reduce shear forces and support proper alignment, **pillows and wedges** were utilized, ensuring the patient's comfort and reducing the risk of skin breakdown. **Pressure ulcer care** formed a critical aspect of the plan. The ulcers located on the **sacrum, heels, and greater trochanters** were regularly monitored. **Wound cleaning** was performed using **Dettol**, as instructed by the medical care team, and **moisture-wicking dressings** were applied to the affected areas to promote healing and prevent further tissue breakdown. The **patient and caregivers were educated** on the importance of regular repositioning, skin care, and pressure offloading techniques to prevent future sores. **Passive range of motion (ROM) exercises** were introduced for all four limbs, as the patient was unable to move them voluntarily. These exercises aimed to maintain joint mobility, prevent contractures, and promote circulation. The therapist guided the patient through these movements gently, ensuring that no excessive stress was applied to the joints while providing pain relief, especially in the **shoulders, knees, and lower back**. Due to altered sensation in the limbs, **sensory stimulation exercises**—including **light touch, tapping, and gentle pressure**—were incorporated to enhance proprioception and tactile awareness. These techniques were designed to provide sensory feedback and promote **neuroplasticity**, which could facilitate motor recovery over time. Although the patient could not initiate movement voluntarily, **neuromuscular facilitation techniques** were used to encourage **muscle activation**, especially around the **shoulder and knee joints**. This approach aligns with evidence-based practices outlined in *Rehabilitation of Neuroinfectious Disease Patients*

(Journal of Rehabilitation Research and Development), which emphasize early stimulation of neuromuscular pathways to promote motor re-education and functional improvement. In support of early functional independence, the patient began **bed mobility exercises** such as **rolling, sitting up, and side-to-side weight shifting** with therapist assistance. These exercises aimed to restore muscle coordination and control. **Caregivers were trained** to assist with these exercises and continue them outside scheduled therapy sessions to reinforce consistency and promote recovery. The patient was also **educated on the importance of proper positioning techniques** to manage pain and ensure optimal body alignment.

FOLLOW-UP AND OUTCOMES

The patient was reviewed consistently through scheduled physiotherapy follow-up sessions, which occurred twice a week. Each session focused on monitoring her response to the interventions and adjusting the treatment approach as needed to support her progress and comfort. In the initial weeks, improvements were gradual due to the severity of the ischemic stroke and complications from cryptococcal meningitis. However, by the third week, notable progress was observed. There was a slight increase in joint mobility, particularly at the knees and shoulders, with muscle strength improving from **Grade 1 to Grade 2 on the Medical Research Council (MRC) scale** in those regions. The intensity of pain in those areas had also reduced, as assessed using the **Visual Analogue Scale (VAS), which decreased from 7/10 to 4/10**. The patient also reported better comfort while in bed, owing to regular repositioning and improved postural alignment. The pressure sores, particularly over the sacrum, heels, and greater trochanters, began to show signs of healing. With consistent cleaning using Dettol and the application of appropriate dressings, the sacral sore reduced in size (from approximately **4 cm to 2 cm in diameter**), and the redness at the heels diminished. The patient's skin condition improved significantly, and no new pressure areas developed due to continued preventive care and caregiver education. Functionally, the patient made progress with bed mobility activities. She was able to roll from side to side with minimal assistance and showed increased participation during repositioning. Though she was still unable to sit unsupported, stand, or walk, the small improvements in movement and comfort indicated early stages of functional recovery. The **Functional Independence Measure (FIM)** score improved from **20/126 at baseline to 34/126** by the end of the third week, reflecting early but meaningful gains in mobility and self-care tasks. Throughout the follow-up period, the patient continued to engage well with the physiotherapy program. She remained under close supervision and was not referred elsewhere, as care continued to be provided directly within the current setting. The physiotherapy interventions were maintained with the aim of building on the progress made, managing pain, preventing complications, and supporting gradual functional gains. In terms of cognitive and communicative recovery, the patient demonstrated partial orientation to time and person by week three and was able to follow simple one-step instructions. Although speech remained limited to short phrases with slurred articulation, there was evidence of gradual cognitive improvement, as observed through informal bedside assessments. During the follow-up, no major complications such as immune reconstitution inflammatory syndrome (IRIS), reinfection, or drug-related side effects were noted. Vital signs remained stable, and there were no episodes of increased intracranial pressure or neurological deterioration. Liver and renal function tests remained within acceptable limits during antifungal therapy.

DISCUSSION

This report discusses the case of a 44-year-old HIV-positive female patient diagnosed with cryptococcal meningitis (CM), complicated by ischemic stroke. The patient presented with complete loss of limb mobility, altered sensation, pressure sores, and musculoskeletal pain. The clinical presentation was consistent with central nervous system (CNS)

involvement due to an advanced opportunistic infection and cerebrovascular complications. CM continues to be a leading cause of mortality and morbidity among individuals with advanced HIV, especially in sub-Saharan Africa and other resource-limited settings where access to timely diagnostics and treatment remains constrained[1,]. Management of CM complicated by stroke in resource-constrained environments poses immense clinical and logistical difficulties. Neuroimaging, such as MRI and CT, which are essential for diagnosing and monitoring stroke and intracranial complications, are either unavailable or unaffordable in many African healthcare centres. In this case, the absence of serial imaging limited the ability to monitor infarct progression and response to therapy. Similarly, the lack of routine laboratory evaluations, including CD4 counts, CSF parameters, or cryptococcal antigen titres during follow-up, restricted clinical decision-making and prognostic assessments.

Several studies have documented a high prevalence of neurological complications in HIV-positive patients with CM. Recent literature emphasizes that ischemic strokes, particularly lacunar infarcts in the basal ganglia and cortical regions, are common due to infectious vasculitis or immune reconstitution inflammatory syndrome (IRIS) following antiretroviral therapy (ART) initiation[19,] . A 2025 study by Naidoo et al.[19] reported that up to 20% of patients with HIV-associated CM developed such infarcts, which occasionally worsened during treatment due to immune-mediated responses. This is consistent with findings from a 2023 case series in Malawi demonstrating multifocal ischemic strokes associated with IRIS and cryptococcal vasculitis. Prolonged immobility from neurological deficits led to pressure ulcer formation in this patient, particularly over the sacrum, heels, and greater trochanters. The burden of pressure sores in immobile HIV-positive individuals remains underreported but is clinically significant. These ulcers not only contribute to pain and infection risk but also prolong hospital stays and rehabilitation efforts. The challenges are exacerbated in under-resourced settings, where preventive measures like pressure-relieving mattresses and consistent nursing care are not always feasible. Despite these challenges, physiotherapy interventions such as frequent repositioning, passive range of motion exercises, and wound care play a pivotal role in preventing secondary complications and enhancing patient outcomes. Though recovery was slow in this case, improvements in joint mobility, reduced pain, and partial return of bed mobility were observed. These outcomes align with existing findings in neuro-infectious rehabilitation, which advocate for early and sustained physiotherapy to enhance quality of life, even when complete neurological recovery is unlikely. Nonetheless, limitations of this case report include the absence of serial imaging, incomplete laboratory data, and lack of long-term follow-up, which constrain the generalizability and depth of clinical analysis. Future reports should aim to address these gaps, especially in the context of evolving diagnostic and therapeutic tools for HIV-associated neurological complications[19,].

CONCLUSION

This case highlights the vital role of physiotherapy in the multidisciplinary management of cryptococcal meningitis complicated by stroke. It underscores the importance of early intervention, consistent follow-up, and individualized care in improving patient outcomes despite the severity of presentation.

Patient perspective

After one year and six months of physiotherapy, the patient expressed profound gratitude for the consistent interventions and support received. She reported significant improvements in her physical function, highlighting a substantial reduction in shoulder and knee pain, as well as relief from the discomfort previously caused by pressure sores. By this stage, she was able to move her limbs with greater ease and could stand with minimal support—milestones she described as both encouraging and deeply motivating

The caregiver also shared a positive perspective, noting a marked increase in the patient's independence, which eased the daily caregiving

demands. They appreciated the continuous training and guidance provided by the physiotherapy team, which equipped them with the skills necessary to manage care at home more confidently. Both patient and caregiver described the rehabilitation journey as transformative, emphasizing how consistent physiotherapy over the extended period significantly improved the patient's quality of life and overall well-being

Informed consent

Written informed consent was obtained from the patient prior to initiation of physiotherapy management. The nature and purpose of the physiotherapy interventions expected outcomes, potential risks, and the importance of consistent follow-up were clearly explained to her in a language she understood. The patient voluntarily agreed to participate in the treatment and also provided consent for the use of her case details for educational and reporting purposes, with assurance of confidentiality and anonymity.

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