CASE REPORT

Tuberous Sclerosis Complex Presenting with Status Epilepticus: A Case Report on Diagnostic and Management Challenges in a Resource-Limited Setting

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ABSTRACT

Tuberous Sclerosis Complex (TSC) is an autosomal dominant disorder characterized by a diverse range of clinical manifestations and diagnostic challenges, particularly in resource-limited settings. We present a 13-year-old male patient with refractory seizures, developmental delays, angiofibromas, renal involvement, and malnutrition. The patient had been misdiagnosed with isolated epilepsy and malnutrition during prior hospital visits, delaying appropriate intervention. Despite limited access to advanced diagnostics, clinical evaluation and characteristic dermatological findings confirmed TSC. This case underscores the importance of early recognition, multidisciplinary care, and improved healthcare access to optimize patient outcomes.

INTRODUCTION

Tuberous Sclerosis Complex (TSC) is a rare multi-system genetic disorder with an incidence of approximately 1 in 6,000 live births and a prevalence of 1 in 10,000 individuals.[1, 2] It is caused by mutations in the TSC1 or TSC2 genes, leading to benign tumor growth in multiple organs, most notably the brain, kidneys, heart, skin, and lungs. While TSC can present with variable severity, epilepsy is one of its most common and debilitating manifestations, affecting 75%–90% of patients.[3, 4] The diagnosis is often delayed in resource-limited settings due to a

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lack of awareness and access to genetic testing and advanced imaging.

This case highlights the diagnostic and therapeutic challenges in managing a 13-year-old male with TSC in Zambia, emphasizing the need for improved recognition, multidisciplinary care, and targeted treatment strategies in low-resource environments.

CASE PRESENTATION

A 13-year-old male patient was brought to our facility in a state of status epilepticus. His medical history reveals a diagnosis of epilepsy at just one month of age, for which he has been on long-term anticonvulsant therapy. Despite this, he has continued to experience recurrent seizures throughout his life. Developmentally, the patient has faced significant challenges, including an inability to speak since infancy, persistent feeding difficulties, and the absence of formal schooling. There is no reported family history of genetic disorders, and his dental history is unremarkable. Additionally, he has received all the routine childhood vaccinations as per the immunization schedule.

Clinical Findings and Timeline

On Examination:

- **Vital Signs**: Respiratory rate: 36 breaths/min, Heart rate: 50 bpm, BP: 114/72 mmHg, Temp: 38.1°C.
- **Neurological**: Subtle tonic movements, intellectual disability.
- **Dermatological**: Multiple facial angiofibromas, ash-leaf spots on the back.
- **Renal**: Suprapubic distention, reduced urine output (<50ml/kg/day).
- **Anthropometry**: BMI and height below -3 SD, head circumference: 51 cm.

Timeline of Events:

Age	Clinical Event
1 month	Diagnosis of epilepsy, initiation of anticonvulsants
5 years	Developmental delays noted, non-verbal status identified
13 years	Status epilepticus, hospitalization, confirmed TSC diagnosis

Diagnostic Assessment

Investigations:

- **CBC**: WBC: 13.09×10?/L, Platelets: 262×10?/L, Hb: 10.2 g/dL
- **ESR**: 100 mm/hr, CRP: 80 mg/L
- **Urinalysis**: 1+ leukocytes, 2+ blood, 1+ protein
- **Kidney function**: Creatinine: 116.0 µmol/L, Urea: 10 mmol/L
- **TB GeneXpert**: Negative
- **HIV PCR**: Non-reactive
- **Imaging**: Normal chest X-ray and abdominal ultrasound

Due to financial and resource limitations, MRI and EEG were not performed, which is a common limitation in resource-constrained settings.[5, 6, 7, 8, 9]

Clinical Diagnosis:

TSC diagnosis was based on major features (angiofibromas, seizures, intellectual disability) and minor renal involvement.[5]

Please find below a picture gallery of the patient's dermatological manifestations of TSC

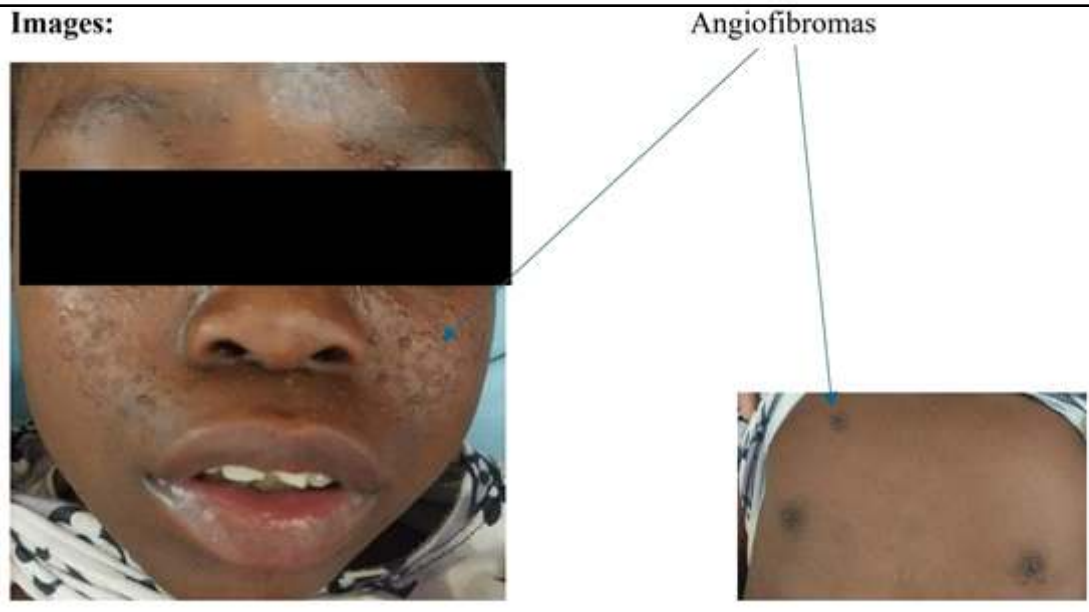

Figure 1: Shows Multiple Angiofibromas

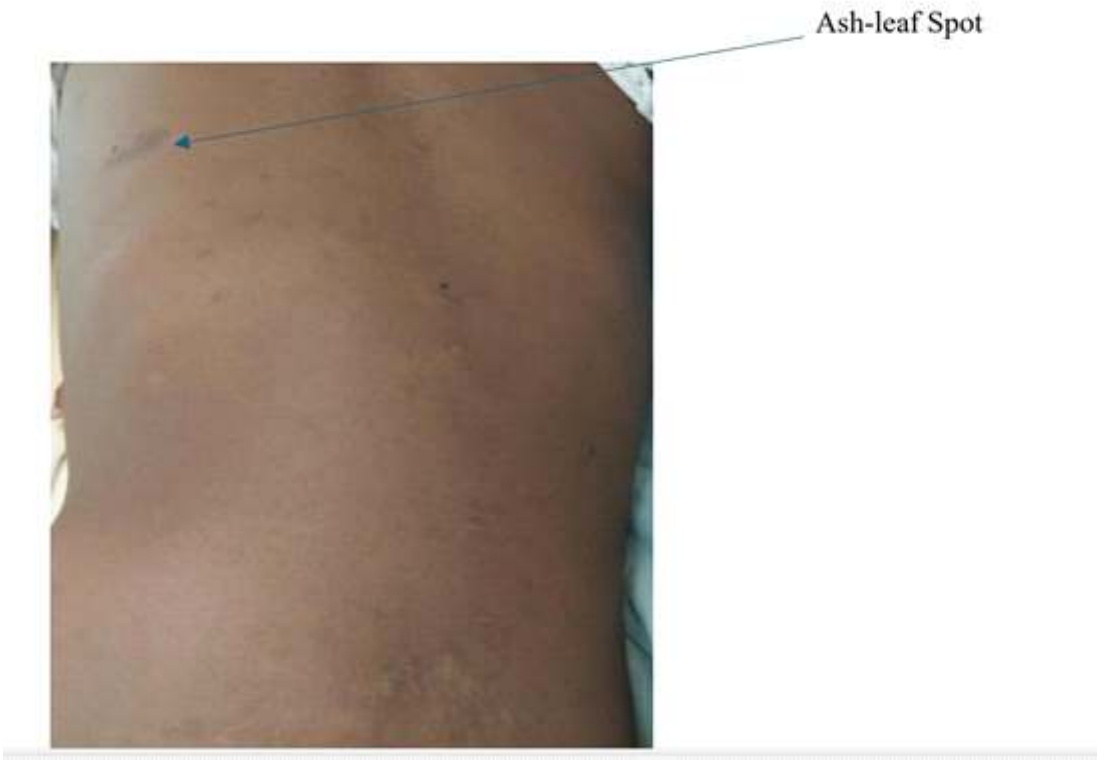

Figure 2: Shows Ash Leaf Spot on the back.

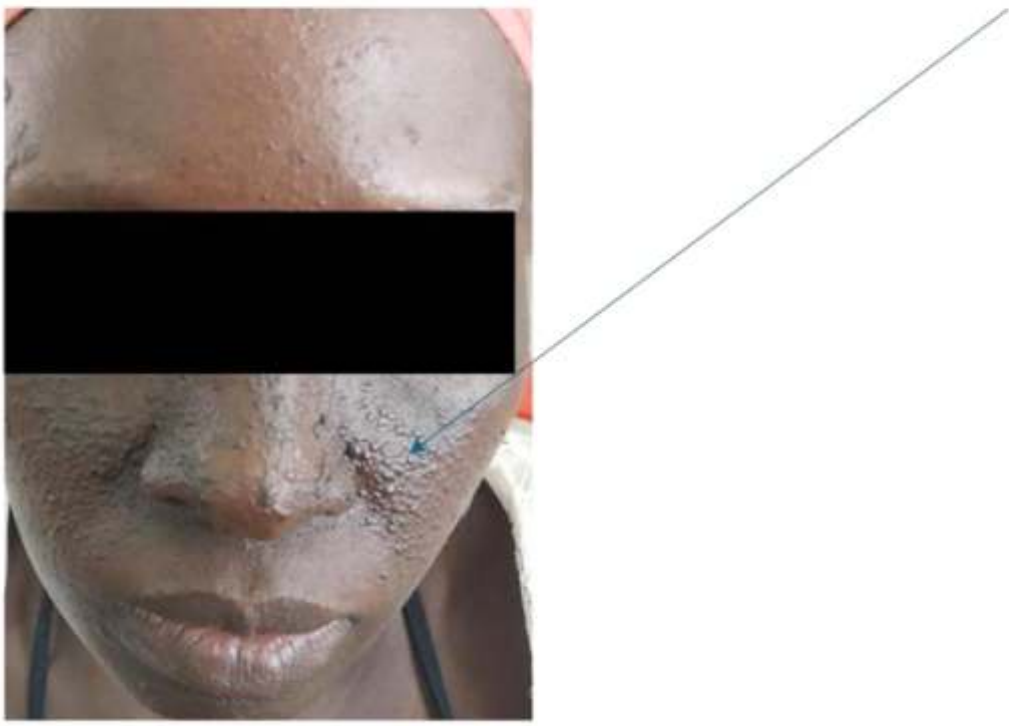

Figure 3: Shows multiple angiofibromas on the boy's mother

Therapeutic Interventions

Seizure Management:

The patient was given Diazepam 6.5mg IV stat and Phenobarbitone 400mg IV stat as part of the acute seizure management. For maintenance therapy, Carbamazepine 100mg was given in the morning and 200mg in the evening, alongside Levetiracetam 200mg twice a day. Additionally, alternative therapies, such as the ketogenic diet and newer anticonvulsants, were considered as potential options for managing the refractory seizures.[10,11,12,13]

Nutritional Support:

Due to malnutrition, the patient initially required nasogastric feeding. Over time, the transition to oral feeding was made as the patient's nutritional status improved, with a focus on optimizing nutrition to support overall recovery.[7]

Infection Control:

Empirical intravenous Ceftriaxone (1.6g OD) was initiated due to elevated ESR/CRP levels, which suggested an ongoing infection or inflammation. This approach aimed at addressing potential infectious causes that could exacerbate the patient's condition.[8]

Renal Monitoring:

Given the renal involvement in TSC, the patient underwent daily urinalysis, and catheterization was performed to monitor urine output. This was crucial to track renal function and prevent potential complications, such as renal failure or other related issues.[5]

Multidisciplinary Support:

Several specialists were involved in the patient's care. Pediatric Neurology focused on seizure control and developmental assessment, while Speech Therapy addressed communication strategies, helping to improve the patient's non-verbal status. Psychosocial support was also provided, including counseling for the caregiver burden experienced by the patient's mother. This comprehensive care plan aimed to address the physical, developmental, and emotional challenges the patient faced.[14]

FOLLOW-UP AND OUTCOME

Short-term Outcome:

The patient showed improvement in seizure control, which was a significant positive outcome in the short term. Additionally, nutritional recovery was observed, as the patient began to tolerate oral feeding more effectively.[10]

Long-term Plan:

The long-term care plan included the possibility of performing an MRI, should resources become available. The patient would also continue to undergo neurological and renal monitoring to assess and manage any complications. Developmental therapy would be essential for addressing the patient's cognitive and motor delays, and psychiatric support would be integrated into the long-term follow-up plan.[9]

DISCUSSION

Tuberous Sclerosis Complex (TSC) is a challenging condition to diagnose and manage, particularly in resource-limited settings. The diagnostic process often relies on clinical evaluation and recognition of hallmark features due to the unavailability of genetic testing and advanced imaging modalities such as MRI. In this case, the presence of angiofibromas, intellectual disability, and refractory seizures led to the diagnosis of TSC. However, delayed recognition due to previous misdiagnoses demonstrates a critical gap in awareness among healthcare providers. Increased clinical training and better access to diagnostic tools would significantly improve early detection and patient outcomes.[1,5]

Seizure management in TSC is particularly challenging, as epilepsy in these patients is often refractory to standard anticonvulsant therapy. In this case, the patient's seizures persisted despite multiple antiepileptic drugs. Emerging treatment options, such as mTOR inhibitors like everolimus and dietary interventions like the ketogenic diet, have shown promise in managing refractory seizures.[13] However, these therapies remain largely inaccessible in low-resource settings. The lack of specialized pediatric neurologists further complicates management, emphasizing the need for training general practitioners in epilepsy care for TSC patients.[11]

Genetic counseling is an important yet often overlooked aspect of TSC management. As an autosomal dominant disorder, there is a 50% chance of transmission if one parent carries the mutation. In this case, no family history was noted, but without genetic testing, sporadic mutations cannot be confirmed. Educating families on the inheritance pattern of TSC allows for better reproductive decision-making and early monitoring of future offspring who may be at risk.[6]

Beyond medical challenges, the psychosocial impact of TSC is significant. The patient in this case faced developmental delays, communication barriers, and the inability to attend school, which severely affected his quality of life. His mother also experienced emotional and financial burdens, highlighting the need for psychosocial support services. In many low-resource settings, stigma surrounding neurological and genetic conditions can lead to social isolation. Establishing community support networks and integrating mental health care into treatment plans can greatly enhance coping strategies for both patients and caregivers.[7]

Long-term management of TSC requires multidisciplinary care, including neurology, nephrology, dermatology, and psychiatry. Regular renal screening is crucial, as renal involvement is a leading cause of morbidity in TSC patients. In this

case, renal function was monitored, but further imaging was limited due to resource constraints. Developing standardized follow-up protocols in low-resource settings can ensure continuous monitoring and timely intervention for complications such as angiomyolipomas and renal cysts.[5]

The limitations of this case highlight the need for better healthcare infrastructure and research initiatives in resource-limited settings. The absence of MRI and genetic testing restricted diagnostic accuracy and treatment planning. Addressing these gaps through international collaborations, increased funding, and policy changes can improve outcomes for TSC patients in low-income regions.[9]

Challenges in Diagnosing TSC in Resource-Limited Settings

Limited access to MRI and genetic testing often delays diagnosis in resource-limited settings. In such environments, healthcare providers rely on clinical criteria, emphasizing the importance of recognizing hallmark features of TSC, such as angiofibromas, ash-leaf spots, and renal involvement. Early diagnosis and intervention can significantly improve outcomes, and increasing awareness of TSC among healthcare providers is essential for timely recognition and treatment.[9]

CONCLUSION

In conclusion, this case underscores the complexities of diagnosing and managing TSC in resource-limited settings. Improved clinical training, access to advanced diagnostics, alternative therapeutic strategies, and psychosocial support are all critical components of optimizing care. Future efforts should focus on raising awareness among healthcare providers, implementing cost-effective diagnostic approaches, and enhancing community-based support systems to improve the overall quality of life for TSC patients and their families.[10, 13, 15, 16, 17]

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Conflict of interest:

There are no conflicts of interest.

Ethical consideration

Not applicable

Consent

The patient's mother provided written informed consent for the publication of the case.

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