Scientific Research Publishing

Open Journal of Modern Neurosurgery, 2026, 16(2), 172-181
https://www.scirp.org/journal/ojmn
ISSN Online: 2163-0585
ISSN Print: 2163-0569

Glioblastoma Management in Togo: Challenges and Neurosurgical Perspectives

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How to cite this paper: Doléagbénou, A.K., Adani-Ifè, A., Djoubairou, B.O. and Kpelao, E. (2026) Glioblastoma Management in Togo: Challenges and Neurosurgical Perspectives. *Open Journal of Modern Neurosurgery*, **16**, 172-181.
https://doi.org/10.4236/ojmn.2026.162016

Received: January 12, 2026
Accepted: February 11, 2026
Published: February 14, 2026

Abstract

Background: Glioblastoma is the most common and aggressive primary malignant brain tumor in adults. In Togo, its management is challenged by late diagnosis, limited neurosurgical resources, and scarce access to adjuvant therapies. **Methods**: We retrospectively reviewed patients with histologically confirmed glioblastoma managed at Sylvanus Olympio University Teaching Hospital, Lomé, between 2018 and 2022. Clinical, radiological, surgical, and therapeutic data were analyzed. **Results**: Forty-three patients were included (mean age 48 years; male-to-female ratio 1.3). Most presented late, after more than three months of symptoms. Seizures (65%) and intracranial hypertension (46%) were common. Surgery consisted of biopsy (35%), subtotal resection (46%), or gross total resection (19%). Postoperative complications included seizures (25%) and intracranial hypertension (13%). Only one patient received the full Stupp protocol. **Conclusion**: Glioblastoma management in Togo remains limited, with poor access to adjuvant therapy. Expanding neurosurgical capacity and radiotherapy availability is crucial for improving outcomes.

Keywords

Glioblastoma, Neurosurgery, Togo, Resource-Limited Settings

1. Introduction

Glioblastoma is the most common and aggressive primary malignant tumor of the central nervous system in adults. Despite therapeutic advances, prognosis remains poor, with median survival rarely exceeding 15 months under optimal conditions

[1] [2]. Standard management relies on maximal safe surgical resection, followed by radiotherapy with concomitant and adjuvant chemotherapy, known as the Stupp protocol [3]. The Stupp protocol involves a specific regimen of temozolomide, a type of chemotherapy, given in combination with radiotherapy. Neurosurgery thus plays a pivotal role in both diagnosis (biopsy, histological confirmation) and treatment (tumor resection).

There is a significant variation in the epidemiology of glioblastoma in different regions of the world, with a clear predominance amongst Caucasians compared with African-Americans [4]. Reliable data on the occurrence of glioblastoma in sub-Saharan Africa, and indeed in Togo, is scarce. This may be attributed to a paucity of tumor registries [5]. In high-income countries, progress in neuroimaging, neuronavigation, microsurgical instruments, and perioperative neurocritical care has improved surgical outcomes and overall survival [6] [7]. However, in low- and middle-income countries (LMICs), particularly in sub-Saharan Africa, neurosurgical practice faces significant obstacles: insufficient diagnostic tools, a scarcity of trained neurosurgeons, and limited access to adjuvant therapies [8]-[10]. In Togo, these difficulties are exacerbated by financial barriers and infrastructural gaps, which significantly affect the quality of care. By 2024, eight neurosurgeons served a Togolese population of 8.8 million. Meningioma is the most common intracranial tumor among Togolese [11]. No studies have been conducted on glioblastomas and their management in Togo. This study aimed to describe the epidemiological characteristics and neurosurgical management of glioblastomas in Togo, highlight the challenges encountered in a resource-limited context, and propose strategies to strengthen neuro-oncological care.

Togo is a low-income, French-speaking country in West Africa, with an estimated population of 8.8 million as of 2023. The country's gross domestic product (GDP) was approximately USD 8.6 billion, and the gross national income per capita reached around USD 880. The CFA franc (XOF) serves as Togo's currency, with an exchange rate of approximately 600 XOF to the US dollar. In 2021, the life expectancy at birth was 62.3 years, and the working-age population (ages 15-64) comprised nearly 55% of the total population. Urban residents constituted 43.5% of the population, while the national poverty rate remained high at 45.5%. The minimum monthly wage is roughly USD 33 [12].

2. Methods

2.1. Togo Healthcare Context [12]

Togo's national health system is organized into three levels: primary health centers, secondary regional hospitals, and tertiary university hospitals. Sylvanus Olympio University Teaching Hospital in Lomé is the country's main referral center for neurosurgical care. Neurosurgical practice is constrained by limited intensive care capacity, lack of advanced intraoperative technologies, and restricted access to adjuvant oncological therapies. Although a Universal Health Insurance program (Assurance Maladie Universelle) has been introduced, most patients still rely on out-

of-pocket payments for diagnostic imaging, surgery, and postoperative care.

2.2. Study Design and Setting

We conducted a retrospective, descriptive study of patients with histologically confirmed glioblastoma (WHO grade 4) managed in the neurosurgery department of Sylvanus Olympio University Teaching Hospital (CHU Sylvanus Olympio) in Lomé, Togo, between 2018 and 2022. The neurosurgery unit delivers care in resource-limited settings, which in Togo include a lack of advanced neuroimaging equipment, limited access to adjuvant therapies, and a shortage of trained neurosurgeons. These factors significantly impact the quality of care provided.

2.3. Participants

Inclusion criteria: All consecutive patients with a tissue diagnosis of glioblastoma who underwent a neurosurgical procedure (biopsy or resection) during the study period.

Exclusion criteria: Patients without histological confirmation; patients whose primary surgery occurred outside the study hospital; cases with missing minimum dataset (age, sex, operative report).

2.4. Data Sources and Variables

Data were abstracted from operative logs, anesthesia charts, radiology reports, and inpatient records using a standardized extraction form.

Baseline variables: age, sex, residence (urban/rural), symptom type and duration, seizure history, and comorbidities (if available).

Imaging variables: modality (CT-scan/MRI), tumor location (lobe, laterality, supra-/infratentorial), and largest diameter (cm).

Operative variables: surgical approach, instruments available on the day of surgery, extent of resection (EOR) categorized as: biopsy only; subtotal resection/debulking; gross total resection (no residual enhancing tumor on immediate postoperative imaging when available, or surgeon's impression when imaging unavailable).

Postoperative variables included admission location (intensive care unit), complications (hemorrhage, infection, intracranial hypertension, seizures), and in-hospital mortality.

Adjuvant therapy variables: initiation of radiotherapy, temozolomide, or the full Stupp protocol; time from surgery to initiation of adjuvant therapy.

Outcomes: primary outcomes included the distribution of surgical procedures and EOR, as well as access to adjuvant therapy. Secondary outcomes included postoperative complications.

Statistical analysis

Data were analyzed using Epi Info version 7.5.2.0. Results are presented using descriptive statistics only, including means, standard deviations, and proportions.

Ethical considerations

The Bioethics Committee approved this study for Health Research from the Togo Ministry of Health ("Comité de Bioéthique pour la Recherche en Santé (CBRS)," Ref No: 0101/2016/MS/CAB/DGS/DPLET/CBRS). Data were anonymized to ensure confidentiality.

3. Results

3.1. Epidemiological Characteristics and Clinical Presentation

Table 1 shows that 43 patients with histologically confirmed glioblastoma were included during the study period. The mean age was 48 ± 6.2 years, with a male predominance (sex ratio = 1.3). The most frequent complaints were signs of intracranial hypertension (46%; headaches, vomiting, papilledema). The average consultation delay after symptom onset was over 3 months for all patients. Epileptic seizures were reported in 65% of cases.

Table 1. Epidemiological and clinical characteristics.

	Value
Sample size	N = 43
Age, mean ± SD (years)	48 ± 6.2
Sex ratio	1.3
Symptom duration	> 3 months, (n = 43)
Seizures at presentation	65%
Intracranial hypertension syndrome	46%
Altered consciousness	32%

3.2. Radiological Findings

Imaging was available for all patients. Twenty-three patients (53.48%) had an MRI. Tumor location was supratentorial in 78% of cases, with the frontal and temporal lobes most frequently affected (Figure 1). Tumor size exceeded 5.5 cm in 60% of patients at diagnosis. Imaging was available for all patients. Twenty-three patients (53.48%) underwent brain MRI. However, MRI access was inconsistent and largely depended on patients' financial capacity, with diagnoses primarily based on CT imaging in routine practice. Diagnosis relied mainly on CT imaging.

3.3. Surgical Management

On the day of surgery, we used a manual trephine, Gigli, bipolar forceps, surgical loupes, and, if available, basic surgical microscopes. All patients underwent a neurosurgical procedure in these conditions, including:

- **Open biopsy** in 35% of cases.
- **Tumor reduction (subtotal resection or debulking)** in 46% of cases.
- **Gross total resection** was achieved in 8 patients (19%) (Figure 2). Among these, postoperative imaging confirmation was available in 5 cases, whereas the surgeon's intraoperative assessment determined the extent of resection in the remaining cases.

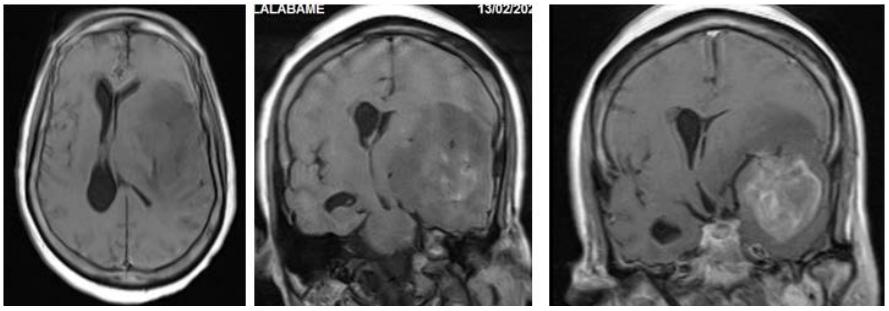

Figure 1. Axial MRI of a left temporal mass consistent with glioblastoma: T1 post-contrast image demonstrating an irregular ring-enhancing lesion with central necrosis and surrounding vasogenic edema causing mild midline shift.

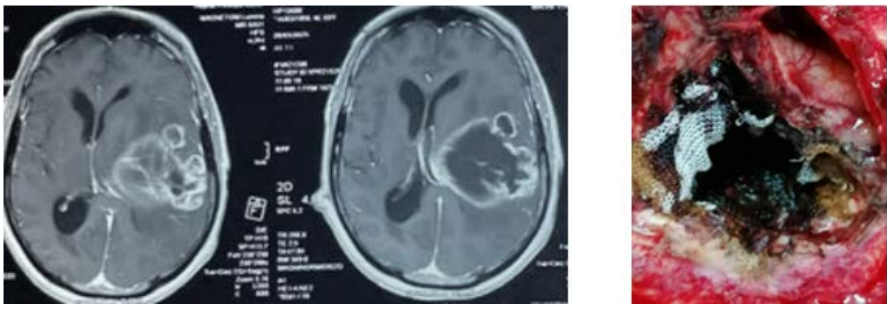

Figure 2. Intraoperative photograph of left temporal craniotomy and tumor excision. Surgicel is placed at the base of the resection cavity for hemostasis.

4. Postoperative Care

Postoperative intensive neurocritical care was not available. Patients were admitted after surgery to the general intensive care unit. The main postoperative complications included infections such as pneumonia in 1% of cases, intracranial hypertension in 13% of cases, and seizures in 25% of cases (Table 2).

5. Adjuvant Therapy

Access to adjuvant treatments was minimal. Radiotherapy and chemotherapy with temozolomide were not systematically available. Only one patient was able to initiate the Stupp protocol (Table 3).

6. Early Outcomes and Mortality

In-hospital mortality was observed in 10 patients (23.25%). Due to limited follow-up data and loss to follow-up after discharge, the median overall survival could not be calculated. Thirty-day mortality data were available for six patients, but follow-up was lost early after hospital discharge.

7. Discussion

There is a significant variation in the epidemiology of glioblastoma across different regions of the world, with a clear predominance among Caucasians compared with African-Americans [4]. Reliable data on the incidence of

Table 2. Surgical modalities and postoperative complications.

Variable	n (%)
Biopsy only	15 (35%)
Subtotal resection/debulking	20 (46%)
Gross total resection	8 (19%)
Complications—pneumonia	1 (1%)
Complications—intracranial hypertension, n (%)	5 (13%)
Complications—seizures, n (%)	11 (25%)

Table 3. Adjuvant treatment received.

Modality	n
Concomitant radiotherapy + temozolomide (Stupp)	1
Sequential radiotherapy → temozolomide	0
Temozolomide only	0
Radiotherapy only	0

glioblastoma in sub-Saharan Africa, and particularly in Togo, remain scarce, primarily due to the absence of comprehensive tumor registries [5]. Our findings highlight both the central role of neurosurgery in the management of glioblastoma in Togo and the considerable limitations imposed by a resource-constrained setting. Survival analysis was limited by the retrospective design and the lack of reliable long-term follow-up, a common challenge in resource-limited settings. These limitations underscore the need for improved data collection systems and neuro-oncology registries in Togo.

Clinical presentation and diagnosis

The patients in Togo usually present late, with a significant tumor burden that directly impacts surgical management and prognosis. This late presentation has been reported in Nigeria [9] [10]. Symptomatology in our series is not different from that seen in other populations, with most of the patients presenting with headaches, seizures, and focal neurological deficits [5] [9] [10] [13]. Over the years, the imaging diagnosis of glioblastomas has improved in the country, thanks to the availability of MRI machines. But MRI is not accessible in the context of an out-of-pocket healthcare payment system by a largely impoverished population with a low minimum wage. Studies are still mainly anatomic, with limited physiologic and functional studies. This contrasts with high-income countries, where advanced neuroimaging enables earlier detection and safer resections [6] [14].

Management and outcome

The imaging diagnosis of a possible glioblastoma warranting a surgical consult should ordinarily lead to the discussion of the case at a multidisciplinary tumor board, to forge a treatment pathway for the patient [5].

The standard of care for patients with glioblastoma worldwide includes surgical

resection, followed by the Stupp protocol [1], which has led to improved overall survival [15]. The extent of resection of glioblastoma has been shown to influence both overall and progression-free survival [16] [17]. In our study, neurosurgery often serves a palliative rather than curative function, aiming to reduce the mass effect and obtain tissue for diagnosis rather than achieving complete resection. The predominance of partial resections and biopsies in our study demonstrates the challenge of attaining gross total resection, which is known to improve survival [18]. This limitation is due to both tumor factors (size and eloquent locations) and the lack of technical resources, such as neuronavigation, intraoperative monitoring, and specialized microsurgical instruments [9] [19]-[24].

The absence of systematic postoperative intensive care in our conditions also impacts outcomes. Optimal neurosurgical management requires not only surgical expertise but also specialized anesthesia, postoperative monitoring, and rehabilitation, all of which remain scarce in our setting.

The Stupp protocol has remained the standard of care for the postoperative management of newly diagnosed glioblastoma [23] [24]. However, various suggestions for modification have been made, such as the "super-early" initiation of temozolomide [25]. While in high-income countries, maximal safe resection is often followed by multimodal therapy [3] [4], in our condition, surgery is usually the only available intervention. The challenge of postoperative management for glioblastoma patients in Togo is not only the high cost of temozolomide, especially given a predominantly out-of-pocket healthcare payment system for a largely impoverished population with a low minimum wage [10] [12] [26], but also its limited availability. The limited availability of radiotherapy machines further complicates postoperative care. There is only one radiotherapy machine in Togo, and its treatment costs are prohibitively high for the country's impoverished population. The challenge created by delayed access to postoperative chemotherapy and radiotherapy is early recurrence or progression of the disease, thus impacting mortality and morbidity [8]. From a therapeutic perspective, the near-total unavailability of radiotherapy and the prohibitive cost of temozolomide limit the benefit of surgery.

Perspectives include reinforcing neurosurgical training, expanding technical infrastructure, and developing multidisciplinary teams in neuro-oncology. International partnerships and global neurosurgery initiatives have shown success in bridging gaps between high- and low-income countries [13] [26]. For Togo, such collaborations could provide training opportunities, equipment donations, and capacity building, with the long-term goal of establishing access to radiotherapy and affordable chemotherapy.

8. Conclusions

Glioblastoma management in Togo illustrates both the central role and the limits of neurosurgery in a resource-limited setting. Most patients present late, undergo only partial resection or biopsy, and rarely receive adjuvant therapies, resulting in

outcomes far below international standards. Addressing these disparities requires a twofold approach:

- **Strengthening neurosurgical capacity**—increasing the number of trained neurosurgeons, improving surgical infrastructure, and developing intensive care units.
- **Building multidisciplinary perspectives**—ensuring access to radiotherapy and chemotherapy, and fostering partnerships with international centers.

From a neurosurgical perspective, investing in technical platforms and training is the first essential step toward improving glioblastoma care and reducing inequalities in Togo and sub-Saharan Africa.

Authors' Contributions

A.K. Doléagbénou conceived the study, performed data collection, analysis, and interpretation, and drafted and revised the manuscript. A. Adani-Ifè., B.O. Djoubairou, and E.Kpélao reviewed the manuscript. All authors have read and approved the final manuscript.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Consent to Publish

Consent was obtained from all the authors to publish the study results.

Conflicts of Interest

We have no competing interests to declare

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