INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH AND INNOVATIVE STUDIES
ISSN: 2820-7157
www.ijsrisjournal.com

December 2024 **Volume 3** **Number 6** **Pages 34-36**

Received Date: November 05, 2024 **Accepted Date:** November 26, 2024 **Published Date:** December 01, 2024

Available Online at https://www.ijsrisjournal.com/index.php/ojsfiles/article/view/255

https://doi.org/10.5281/zenodo.14251321

Glioblastoma Treatment and Quality of Life in Children: A Review

Ahmed Ali Al Saleem[1], Salem Hussain Al Zakri[2], Jawad Abdullah Alsalman[2], Zahra Yousef Al Sulaiman[2], Hassan Ali Al Abbad[2], Yasser Ali Al Hamad[2], Janat Abdullah Al Mohsin[2], Jawaher Ali Al Hares[2], Mohammed Salman Al Majhad[2], Hussain Mahdi Al Meshal[2], Hussien Ali Al Khalaf[2], Ahmed Mohammed Bu Julaya[2], Batool Abdullah Al Hijab[2], Ali Saleh Al Saleh[3], Mariam Essa Al Washer[4]

1. Al Jaber Eye and ENT Hospital
2. Al Jaber Eye and ENT Hospital
3. Al Rashadia PHC
4. Al Taraf PHC

ABSTRACT

Glioblastoma (GBM) is an aggressive and rare brain tumor in children, with significantly different biological and clinical features compared to adult GBM. Despite advances in treatment modalities, the prognosis for pediatric GBM remains poor, and the aggressive nature of therapies often impacts the quality of life (QoL) in affected children. This review discusses current treatment strategies, including surgery, radiotherapy, and chemotherapy, alongside emerging therapies such as immunotherapy and targeted approaches. Additionally, it evaluates the impact of these treatments on the quality of life, focusing on neurocognitive, emotional, and social aspects, and the importance of supportive care.

1. Introduction

Glioblastoma is classified as a grade IV astrocytoma by the World Health Organization (WHO), and while it accounts for less than 3% of pediatric brain tumors, it poses significant challenges due to its aggressive behavior, rapid progression, and treatment resistance. Unlike adult GBM, pediatric GBM often involves distinct molecular and genetic alterations, requiring tailored therapeutic approaches(1,2).

In addition to survival outcomes, quality of life in pediatric GBM patients has garnered increasing attention. The cognitive, physical, and emotional toll of intensive therapies necessitates comprehensive care strategies.

2. Current Treatment Strategies

2.1. Surgical Resection

Maximal safe surgical resection is the cornerstone of pediatric GBM management. Complete resection is associated with improved survival outcomes, but anatomical location often limits its feasibility. Advances in neuroimaging and intraoperative techniques, such as fluorescence-guided surgery and neuro-navigation, have enhanced surgical precision (3–5).

2.2. Radiotherapy

Postoperative radiotherapy remains a critical component of GBM treatment. The standard dose is 54–60 Gy, delivered over 6 weeks. However, in younger children, radiotherapy poses significant risks to developing brains, often resulting in cognitive impairments (6)Proton therapy is emerging as a promising alternative due to its ability to minimize damage to surrounding healthy tissues.

2.3. Chemotherapy

Temozolomide (TMZ), an oral alkylating agent, is the standard chemotherapeutic drug used in GBM. Studies suggest that pediatric GBM exhibits resistance to TMZ, potentially due to the lower prevalence of MGMT promoter methylation compared to adult GBM (Bender et al., 2019). Additional agents, such as bevacizumab (a VEGF inhibitor), are being investigated to improve therapeutic outcomes(7,8).

2.4. Emerging Therapies

- **Targeted Therapy**: Agents targeting molecular pathways such as BRAF mutations (dabrafenib) or histone mutations (HDAC inhibitors) are under evaluation.
- **Immunotherapy**: CAR-T cell therapy and immune checkpoint inhibitors are being explored to enhance anti-tumor immune responses.
- **Gene Therapy**: Delivery of tumor-suppressing genes using viral vectors holds promise but is still in early stages of research.

3. Quality of Life Considerations

3.1. Neurocognitive Outcomes

Cognitive deficits are common in pediatric GBM survivors due to tumor effects, treatment-related brain injury, and neuroinflammation. Radiotherapy, especially conventional photon therapy, is a significant contributor to long-term cognitive decline(9). Neuroprotective strategies, such as hippocampal-sparing techniques, are being investigated to mitigate these effects.

3.2. Physical and Motor Function

Tumor location and treatments can impair motor function and physical independence. Rehabilitation programs focusing on physical therapy and occupational therapy play a vital role in improving mobility and daily functioning.

3.3. Emotional and Social Well-being

Children with GBM and their families often experience anxiety, depression, and social isolation. Supportive care services, including counseling, peer support groups, and school reintegration programs, are essential for addressing emotional and social challenges.

3.4. End-of-Life Care

Palliative care is crucial for children with progressive or refractory GBM. Emphasis on symptom management, comfort, and family support can improve QoL during the terminal phase.

4. Challenges and Future Directions

4.1. Need for Tailored Therapies

The genetic and molecular diversity of pediatric GBM highlights the need for precision medicine approaches. Comprehensive genomic profiling should guide treatment decisions to optimize outcomes.

4.2. Balancing Treatment Efficacy and QoL

While aggressive therapies aim to extend survival, they often compromise QoL. Future research should focus on reducing treatment toxicity and incorporating QoL as a primary endpoint in clinical trials.

4.3. Multidisciplinary Care

Comprehensive care involving oncologists, neurologists, psychologists, and rehabilitation specialists is essential for addressing the diverse needs of pediatric GBM patients and their families.

5. Conclusion

Glioblastoma in children is a complex and challenging condition requiring multimodal treatment approaches. While current therapies aim to improve survival, their impact on the quality of life cannot be overlooked. Advancements in molecularly targeted therapies, neuroprotective strategies, and supportive care hold promise for enhancing both survival and QoL in pediatric GBM patients. Collaborative efforts between clinicians, researchers, and families are vital for driving progress in this field.

References

1.Amarouch A, Mazeron JJ. Radiotherapy plus concomitant and adjuvant Temozolomide for glioblastoma. Cancer/Radiotherapie. 2005;9(3).

2.Stupp R, Mason WP, van den Bent MJ, Weller M, Fisher B, Taphoorn MJB, et al. Radiotherapy plus Concomitant and Adjuvant Temozolomide for Glioblastoma. New England Journal of Medicine. 2005;352(10).

3.Gilard V, Tebani A, Dabaj I, Laquerrière A, Fontanilles M, Derrey S, et al. Diagnosis and management of glioblastoma: A comprehensive perspective. Vol. 11, Journal of Personalized Medicine. 2021.

4,Rodríguez-Camacho A, Flores-Vázquez JG, Moscardini-Martelli J, Torres-Ríos JA, Olmos-Guzmán A, Ortiz-Arce CS, et al. Glioblastoma Treatment: State-of-the-Art and Future Perspectives. Vol. 23, International Journal of Molecular Sciences. 2022.

5. erritsen 5.JKW, Broekman MLD, De Vleeschouwer S, Schucht P, Nahed BV, Berger MS, et al. Safe surgery for glioblastRecent advances and modern challenges. Vol. 9, Neuro-Oncology Practice. 2022.

6.Merchant TE, Hoehn ME, Khan RB, Sabin ND, Klimo P, Boop FA, et al. Proton therapy and limited surgery for paediatric and adolescent patients with craniopharyngioma (RT2CR): a single-arm, phase 2 study. Lancet Oncol. 2023;24(5).

7.Harder BG, Peng S, Sereduk CP, Sodoma AM, Kitange GJ, Loftus JC, et al. Inhibition of phosphatidylinositol 3-kinase by PX-866 suppresses temozolomide-induced autophagy and promotes apoptosis in glioblastoma cells. Molecular Medicine. 2019;25(1).

8.Kitange GJ, Carlson BL, Schroeder MA, Grogan PT, Lamont JD, Decker PA, et al. Induction of MGMT expression is associated with temozolomide resistance in glioblastoma xenografts. Neuro Oncol. 2009;11(3).

9.Child AE, Warren EA, Grosshans DR, Paulino AC, Okcu MF, Ris MD, et al. Long-term cognitive and academic outcomes among pediatric brain tumor survivors treated with proton versus photon radiotherapy. Pediatr Blood Cancer. 2021;68(9).