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Treatment Outcomes for High-Grade Malignant Gliomas: An Analysis of Survival, Disease Progression, and Quality of Life

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Abstract The results of examination, treatment, and follow-up of 78 patients with glial brain tumors were analyzed. Despite the capabilities of modern highly informative neuroimaging techniques (MRI, f-MRI, DT-tractography, PET), intracranial tumors often present with significant sizes at the time of detection, which limits the radicality of subsequent surgical interventions. Despite the advancements in neuro-oncology, the treatment outcomes for brain tumors, especially low-grade neoplasms, cannot be considered satisfactory at present due to the high tendency for disease progression. The issues of timely diagnosis, the possibilities of surgical intervention, and the results of treatment for intracerebral tumors are discussed. The relationship between the long-term treatment outcomes of malignant brain tumors (survival and quality of life) and the timeliness of diagnosis, as well as the combined surgical and adjuvant treatment approach, is highlighted.

Keywords CNS tumors, Treatment of malignant brain tumors, Quality of life

1. Introduction

Central nervous system (CNS) tumors rank as the second most common type of malignancy, accounting for 14-28.6% of all neoplasms [1,4,6]. Recent advancements in neuro-oncology have facilitated more radical surgical interventions, enabling greater tumor resection across all age groups [3]. These improvements are attributed to advances in preoperative neuroimaging, surgical techniques [8], and anesthesiology. Surgical outcomes, however, are dependent on several factors, including tumor size, anatomical location, and its relationship to vital brain structures [1,3,5,7]. Adjuvant therapies, such as radiation and chemotherapy, have proven essential in improving outcomes for malignant brain tumors [1,2].

Objectives: This study aims to analyze the timeliness of diagnosis, as well as immediate and long-term treatment results including survival rates and quality of life of patients diagnosed with malignant gliomas.

2. Materials and Methods

A retrospective analysis was conducted on 78 patients with gliomas who underwent diagnostic examination, surgical treatment, and follow-up from 2020 to 2024. All patients were permanent residents of Uzbekistan at the time of diagnosis.

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The age range of patients was 19 to 68 years (median age: 43.5 years), comprising 41 men (52.6%) and 37 women (47.4%). Surgical resection was followed by histological confirmation in all cases. Adjuvant therapy was administered to 47 patients (60.3%).

Supratentorial tumors were diagnosed in 53 patients (67.9%), while subtentorial tumors were found in 25 patients (32.1%). Midline tumors were observed in 29 cases (37.2%). Gliomas accounted for 69.2% of all tumors, with astrocytomas (54.2%) and ependymomas (16.7%) being the most common histological types. The study included both low-grade (I-II) and high-grade (III-IV) gliomas, with the majority of high-grade tumors being diagnosed in 69.2% of cases. Imaging modalities, including MRI, functional MRI, and diffusion tensor imaging (DTI), were used for preoperative assessment.

3. Results and Discussion

The analysis of disease progression revealed significant delays in diagnosis. On average, patients experienced a diagnostic delay of 18.5 months from the onset of symptoms. Supratentorial gliomas were diagnosed after an average of 16.6 months, whereas pituitary tumors were diagnosed earlier, at 8.3 months ($p<0.05$). Anaplastic gliomas had a shorter diagnostic delay of 6.9 months, compared to well-differentiated tumors, which were diagnosed after an average of 15.2 months ($p<0.05$). These delays were observed across all tumor locations, with low-grade gliomas taking an average of 10.8 months for

diagnosis, while anaplastic tumors in the same group were diagnosed after 17 months.

Upon admission, only 28.5% of patients maintained a compensated clinical status, with the majority of patients presenting with moderate to severe symptoms. Subtentorial tumors typically presented with more advanced clinical stages ($p<0.05$). The functional status of patients was also dependent on the tumor's aggressiveness. For example, only 6.1% of patients with anaplastic gliomas presented with compensated status, compared to 39.7% of those with well-differentiated gliomas ($p<0.05$).

4. Conclusions

The study highlighted that the majority of patients presented with advanced-stage disease at the time of diagnosis. Less than one-third (28.5%) had a compensated clinical status, and the average duration from symptom onset to diagnosis was 11.2 months. Tumor size and location often limited the possibility of complete resection, with more than two-thirds (72.3%) of tumors being large or giant. Postoperative mortality was 5.1%, with supratentorial tumor resections resulting in a 3.7% mortality rate, and pituitary tumor resections leading to a 6.1% rate.

Despite surgery, only 52.1% of patients reported a good quality of life post-treatment. Patients with low-grade gliomas experienced a significantly lower quality of life, primarily due to the effects of adjuvant therapies like radiation and chemotherapy. Glioblastomas and anaplastic ependymomas exhibited the worst prognoses, with the lowest survival rates. Chemoradiotherapy was found to improve survival rates in pediatric patients with anaplastic gliomas, especially when small tumors were surgically removed. Increased surgical radicality in well-differentiated gliomas was associated with improved survival rates.

In conclusion, surgical radicality played a significant role in improving survival and quality of life for patients with low-grade gliomas. However, for high-grade gliomas, aggressive surgical intervention had a less significant impact on quality of life. The clinical status at the time of diagnosis was identified as a key factor influencing both survival and quality of life outcomes.

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