Journal of Clinical Medicine: Current Research
Volume 1 (2021) 2 Pages

Commentary | *Open Access*

Commentary: A Systematic Review and Meta-Analysis of Fluorescent-Guided Resection and Therapy Based Photodynamics on the Survival of Patients with Glioma

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Received: December 09, 2021;
Accepted: December 14, 2021;
Published: December 17, 2021

Citation: Zhongyu Ren, Jun Wen, Yunyan Mo, Peng Zhang, Hanren Chen, Shiyin Jiang, Jian Wen. Commentary: A Systematic Review and Meta-Analysis of Fluorescent-Guided Resection and Therapy Based Photodynamics on the Survival of Patients with Glioma. J Clin Med Current Res. (2021);1(1): 1-2

Glioblastoma is the most common and aggressive form of primary brain tumor, accounting for approximately 60 ~ 70% of human brain tumors [1]. GBM, an extremely invasive and high-grade (grade IV) glioma, is one of the worst of all human cancers and it is becoming one of the most severe clinical challenges in neural oncology for its low total resection rate, poor prognosis and high mortality [2]. The standard treatment for GBM is neurosurgical resection followed by biopsy, chemotherapy and/or radiation therapy [3,4]. Despite these, patients diagnosed with glioma have a poor prognosis with the median survival time of only 12 to 15 months [5],and the natural life span of patients with multiple glioblastomas diagnosed as WHO grade IV is about 3 months and the 5-year survival rate is less than 1% [6].

Nowadays, PDT, including FGR, as a promising intraoperative adjuvant therapy for malignant brain tumors, is undergoing in-depth clinical research [7]. Especially in the United States, the FDA has approved 5-ALA for surgical treatment of glioma. Based on these, we have collected and sorted out articles related to FGR and PDT in human glioma surgery, and conducted a more comprehensive report on the research in this area.

It is an indisputable fact that gross total resection (GTR) leads to a better prognosis, 4.5. current research reports have shown that the GTR rate caused by different photosensitizers was different. According to our research involving 985 patients, GTR rate under FGR was 73% (95% CI, 68.00 ~ 79.00%, $P < 0.01$) and the GTR rate was 78.00% (95% CI, 72.00 ~ 85.00%, $P < 0.01$) for primary tumor patients (767 people), while that was 57% (95% CI, 46.00 ~ 72.00%, $P < 0.01$) for recurrent tumor patients (218 people), suggesting that the GTR rate under FGR for primary patients was superior to that for recurrent tumor ($P = 0.01$). Although, comparing 5-ALA and talaporfin, there is no statistical difference in GTR, the trend of 5-ALA over talaporfin is worth noting. We are also in favor of further clinical research on talaporfin to obtain a more accurate GTR rate. At the same time, we hope different photosensitizers entering the research queue to make people's understanding of this aspect more comprehensive.

Involving the impact of PDT on the prognosis of patients, our research shows that the OS of GBM patients underwent PDT was 17.78 months (95% CI, 8.89~26.67, P < 0.01) in 75 patients. Simultaneously, the PFS was 10.82 months (95% CI, 7.04~14.61, P < 0.01) in 90 patients. Furthermore, the one-year survival rate of all patients with primary or recurrent GBM was 59.00% (95% CI, 38.00~77.00%, P < 0.01). At the same time, two-year survival rate was 25.00% (95% CI, 15.00~36.00%, P < 0.01). There was no statistical difference between primary and recurrent GBM patients in the one-year and two-year survival rates. We also compared the survival of patients after PDT and conventional surgical resection, the results show that the mean difference of OS between PDT and conventional surgical resection was 6.18 (95% CI, 3.3 ~ 9.06, P < 0.01), indicating a statistical significant difference (P < 0.01).

PDT treatment leads to a better prognosis from the results of our research. Unfortunately, we have only collected fewer cases, and we call for more relevant studies to further confirm our conclusions. But so far, there have not been too many large-scale randomized controlled experiments, which may be affected by ethics. This suggests that we should think about how to balance these two issues in future work.

To summarized, FGR and PDT are feasible for treatment of glioma patients, for FGR can effectively increase the maximum resection rate, especially for primary glioma patients with 5-ALA based FGR, and prolong the survival time with PDT. However, due to the small sample size and randomized control in the existing studies, larger samples and randomized controlled clinical trials are needed to analyze the efficacy of PDT in patients with glioma.

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