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A systematic review and meta-analysis informing the role of adjuvant radiotherapy (RT) in Grade 2 and 3 oligodendroglioma

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Highlights

- Adjuvant RT improved OS and PFS in patients with oligodendroglioma.
- Earlier introduction of RT improved OS and PFS (i.e. adjuvant vs salvage).
- Adjuvant RT improved OS in Grade 3 but not Grade 2 oligodendroglioma.
- No significant differences in OS and PFS between adjuvant RT vs adjuvant chemotherapy alone.
- In patients with low-risk features (e.g. Grade 2), alternative approaches such as adjuvant chemotherapy alone may be considered.

Abstract

Background and purpose

Evidence and clinical guidelines support the use of adjuvant RT in high-risk low-grade gliomas. However, patients with oligodendroglioma have a more indolent disease course and delaying or avoiding RT is often considered to reduce treatment-related toxicities. As the optimal adjuvant management for oligodendroglioma is unclear, we aimed to assess the effect of adjuvant RT on overall survival (OS) and progression-free survival (PFS).

Methods

MEDLINE, EMBASE, CENTRAL and CINAHL were searched from January 1990 to February 2023 for studies comparing adjuvant RT versus no adjuvant RT for patients with oligodendroglioma.

Results

This review found 17 eligible studies including 14 comparative retrospective studies and 3 randomized controlled trials. Using random-effects model, the results suggested that adjuvant RT improved OS by 28% (HR 0.72, 95% CI (0.56–0.93), I^2=86%), and PFS by 48% (HR 0.52, (95% CI 0.40–0.66), I^2=48%) compared to patients without adjuvant RT. Subgroup analysis showed that upfront adjuvant RT improved OS and PFS compared to salvage RT. There were no significant differences in OS and PFS between adjuvant RT versus adjuvant chemotherapy. There was improvement in PFS but not OS for adjuvant chemoradiotherapy versus adjuvant chemotherapy alone. Adjuvant RT improved OS in WHO Grade 3 but not WHO Grade 2 oligodendroglioma.

Conclusion

Overall, adjuvant RT improved OS and PFS in patients with oligodendroglioma. In patients with low-risk features (e.g. Grade 2, gross total resection), alternative approaches and individualization of management such as adjuvant chemotherapy alone may be reasonable considering the lack of survival benefit. Future efforts should prospectively investigate these treatment regimens on molecularly-classified oligodendroglioma patients (defined by presence

of IDH mutation and 1p/19q co-deletion), balancing between maximizing survival outcomes and reducing RT-related toxicities.

Section snippets

Background

Oligodendroglioma is a type of diffusely infiltrating glioma, most common in adults between 25 and 45 years old [1]. According to the updated 2016 and 2021 World Health Organization (WHO) Classification of Tumours of the Central Nervous System (CNS) [2], [3], key molecular alterations provide superior prognostication, such that primary brain tumours are now classified based on both histopathological and genotypic features. Oligodendrogliomas are characterised by the presence of both IDH…

Methods

This systematic review was conducted and reported according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [17]….

Results of the search

130 unique records were retrieved and 109 studies excluded on the basis of title and abstract screening. 21 studies underwent full text screening. 17 studies were included with 11,949 participants in the final analysis [22], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42]. Fig. 1 outlines the selection process (Adapted from PRISMA Flowchart). Three were RCTs, while 14 were comparative retrospective studies. Ten trials were conducted in United…

Discussion

Our findings suggested that adjuvant RT improved OS (by 28%) and PFS (by 50%) in patients with oligodendroglioma, compared to patients who did not receive immediate adjuvant RT. However, there was heterogeneity in our results, particularly for OS. We attempted to study the factors driving heterogeneity using pre-planned subgroup analysis. In particular, we found that OS was significantly improved with earlier introduction of RT (adjuvant approach compared to salvage RT), Grade 3…

Conclusion

In conclusion, adjuvant RT may improve OS and PFS in patients with oligodendroglioma particularly with Grade 3 tumours compared to no adjuvant RT, and should be discussed with all relevant patients. Combined-modality therapy (RT and chemotherapy concurrently or

sequentially) is preferred over monotherapy when RT is being administered. Patients with low-risk features (e.g. Grade 2, gross-total resection) were not well represented in this review. In this group of patients, alternative approaches…

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The rest of the authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

Availability of data and material

The data that support the findings of this study are available from the author, ZXN, upon request.…

Authors' contributions

Two …

CRediT authorship contribution statement

Zhi Xuan Ng: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Visualization, Writing – original draft, Writing – review & editing. **Eng Siew Koh:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. **Shing Fung Lee:** Data curation, Formal analysis, Funding acquisition, Investigation, Methodology,…

Declaration of competing interest

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