Biopsy versus resection in the management of malignant gliomas: a systematic review and meta-analysis

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CRD summary
The authors of this review concluded that resection in adults with malignant gliomas appeared to be associated with prolonged survival when compared to biopsy. Well-designed studies that compared the two treatments in for overall survival, progression-free survival and quality of life were required. The conclusions and recommendations for further research appear appropriate.

Authors' objectives
To assess whether resection was superior to biopsy for management of malignant gliomas

Searching
MEDLINE, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched in May 2008. Search terms were detailed in the report. No language restrictions were applied. Reference lists of all studies considered for inclusion in the review, review articles and letters to journal editors were searched. Authors of included studies were contacted for relevant unpublished data.

Study selection
Eligible studies needed to compare one or more of quality of life (QoL), progression-free survival and overall survival in adult patients with supratentorial malignant gliomas (irrespective of specific histological type) who underwent biopsy or resection as an intervention. Studies needed to attempt to prevent selection bias based on patient characteristics, particularly in terms of Karnofsky Performance Scale (KPS) and age. The main outcome of interest was overall survival (time interval from the outset of measurement to death in months). Progression-free survival and QoL were secondary outcome measures. No other study design, conduct or reporting limitations were imposed. Outcomes needed to be reported separately for the two treatment groups.

Sample size ranged from 30 to 645 patients (median sample size 128 patients). Three studies covered a wide age range and two were oriented towards older patients. There was variation in KPS scores and mean values ranged from 55 to 84.2. Further characteristics of patients, tumours, operations and adjuvant therapy in the included studies were outlined in the report.

Studies were screened by two independent reviewers. In cases of doubt, study authors were contacted.

Assessment of study quality
The authors did not state how study quality was assessed.

Data extraction
Definition and values for survival and QoL outcomes were extracted from included studies. Calculation of hazard ratios for survival was performed according to published methodology with details provided in the report. Mean differences in postoperative QoL or change before and after the operation were calculated.

Data extraction was conducted independently by two reviewers who communicated with study authors where necessary.

Methods of synthesis
Studies were synthesised using meta-analysis techniques. Hazard ratios (HR) for overall survival were pooled along with associated confidence intervals (CI). Statistical heterogeneity was assessed using the Q and I² statistics. I² values of 50% or more were considered to indicate significant heterogeneity. A fixed-effect model was used and where significant heterogeneity was noted, the DerSimonian-Laird inverse variance random-effects model was to be employed.
Sensitivity analysis excluded lower quality studies and studies where outcome data were extracted based on Kaplan-Meier curves. Subgroup analyses were conducted on grade of glioma and age. QoL data were intended to be pooled, but insufficient data were available and results were summarised narratively. Publication bias was assessed using established techniques.

Results of the review
Five studies were included in the review (n=1,111 patients). One study was a randomised controlled trial (RCT) with 30 participants and four were retrospective cohort studies.

Four out of five studies found a positive association between resection of the tumour and survival. The pooled hazard ratio for overall survival was significantly reduced in favour of the resection group (HR 0.61, 95% CI 0.52 to 0.71) with no statistically significant heterogeneity. No publication bias was identified. Sensitivity analyses did not substantially alter the results. In subgroup analyses, grade of glioma and age did not show differential effects.

One small study assessed progression-free survival and did not find significant differences between treatment groups.

Three studies explored KPS scores. One study found a significant difference in favour of resection, one found a difference after surgery that disappeared after completion of radiotherapy and one did not detect a statistically significant difference. Meta-analysis was not possible.

Authors’ conclusions
It appeared that resection in adults with malignant gliomas was associated with prolonged survival. Well-designed prospective studies to assess the comparative efficacy of resection versus biopsy in terms of overall and progression-free survival and QOL were required.

CRD commentary
This review had a clear research question with defined criteria for participants, interventions, outcomes and study designs. Searching was based on a range of databases. Attempts were made to reduce language and publication biases. Two reviewers were involved in study selection and data extraction. Methods of assessing study validity were less well explained, but it was clear that a range of potential biases in the included studies were investigated. The robustness of the pooled hazard ratio for survival was assessed through sensitivity analysis. Clinical and statistical heterogeneity were investigated.

The authors’ conclusions and recommendations for further research appear appropriate.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that a well-designed prospective randomised trial that compared biopsy and resection might be able to answer the research questions with more confidence. Such a trial would need to be adequately powered and as sufficient numbers of participants were unlikely to be found in a single centre, would require multiple centres. The role of chemotherapeutic agents might be clarified in such a trial.

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Not stated.

Bibliographic details
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.