Clinical Study

Low-grade pure and mixed cerebral astrocytomas treated in the CT scan era

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Summary

From 1974 to 1992, 63 patients diagnosed with low-grade pure or mixed oligo-astrocytoma were seen and treated at our institution. All patients underwent CT scan pre-operatively. There were 20 female and 43 males ranging in age from 12 to 73 years (median age of 33 years). 15 patients had a stereotactic biopsy as the only surgical procedure. 34 had a partial tumor resection and 14 a gross total tumor resection.

43 patients were treated with post-operative radiotherapy whereas 20 patients underwent surgery only as part of the initial management. 50 to 60 Gy (median 59.4 Gy) were given with daily fractions of 1.8 to 2 Gy. Tumor volume ranged from 3.4 to 441 cm³. Median tumor volume was larger for radiotherapy treated patients.

Median follow-up was 54 months (range of 4 to 240 months). The overall 10 and 15 actuarial survival rates were 37% and 25% respectively. The 5 year survival rate for patients treated at initial diagnosis with surgery alone was 66% and it was 67.3% for patients treated with radiation therapy (P = NS). Prognostic factors having independant significant impact on survival were: extent of surgery, age, gender and tumor volume.

As well, survival for patients with low-grade astrocytoma in the CT scan era appears to be improved compared to historical controls in the literature.

Introduction

Low-grade gliomas do not behave in a benign fashion. Low-grade non-pilocytic astrocytomas of the cerebral hemispheres carry a poor prognosis with 5 years and 10 year survival rates in the range of 50% and of 20% respectively [1–7]. Currently, there remains a controversy regarding whether or not those patients should be managed with surgery alone or with a combination of surgery and post-operative radiation therapy. While some authors recommend surgery alone as the treatment of choice, others have shown improved survival with the post-operative addition of radiotherapy (REF). To date there is no randomized data to address this issue and in order to identify prognostic factors tha may help us in the management of those patients, we reviewed our experience with low-grade pure and mixed cerebral astrocytomas treated in the CT scan era.

Methods and materials

We reviewed the charts of 63 patients diagnosed with low-grade pure astrocytoma or mixed oligo-astrocytoma treated from 1974 to 1992. The classification used at the time was Kernohan grade I and II. Four (4) patients were classified as grade I and 59 were classified as grade II.

All patients underwent CT scan pre-operatively. Pre-operative CT scan was used to determine tumor location and tumor size in three dimensions.
These dimensions were used to determine tumor volume. Tumor volume was estimated using the average radius of the tumor dimensions in three planes with the following formula for spheres: \( v = \frac{4}{3}\pi r^3 \) (\( v = \) volume, \( \pi = 3.1416 \ldots \), \( r = \) radius).

Post-operative CT scans and operative reports were used to assess extent of tumor resection.

Two groups of patients were identified. One consisted of patients having had surgery only as their initial management with radiotherapy reserved at time of recurrence (20 patients), and another where radiotherapy was delivered as part on their initial management (43 patients). Volumes ranged from 3.4 to 441 cm³. Tumors were temporal in location in 23 cases, frontal in 17, parietal in 15, occipital in 3, central in 3 and cerebellar in 2 cases. There were no significant differences in location between the two treatment groups except that all 3 centrally located tumors were treated with radiotherapy. There were 20 females and 43 males ranging in age from 12 to 73 years (median age of 33 years).

**Treatment**

Treatment parameters were as follows: 15 patients had a stereotactic biopsy as the only surgical procedure, 34 had a partial tumor resection and 14 had a...