Peritumoral edema

It is well known, that intracranial tumors can induce peritumoral brain edema of variable extension. Some authors describe a dependency between malignancy of tumor and size of perifocal edema. It is generally accepted that metastases induce the largest perifocal edema [1].

The most common intracranial malignant neoplasms, astrocytomas are characterized by high neovascularization and severe peritumoral edema.

Radiosurgery

Single fraction radiosurgery may carry a higher risk of symptomatic peritumoral edema than conventionally fractionated radiotherapy, with a reported incidence of 2.5% to 37%. Previous research has shown that larger tumor volume and margin dose >14 Gy are associated with increased risk of toxicity. Parasagittal location has been associated with toxicity in some studies, but not in others.

Prior external beam radiotherapy, tumor volume, and tumor grade are risk factors for postradiosurgical symptoms (PRS)., while pretreatment edema approached statistical significance. Peritumoral edema is the predominant mechanism of significant PRS, and skull base tumors have a lower risk of post treatment edema [2].

Diagnosis

Pope et al observed that brain edema evaluated by magnetic resonance imaging (MRI) was an independent prognostic factor in patients with malignant gliomas and that patients with gliomas accompanied by severe brain edema often experienced poor clinical outcomes [3].

Peritumoral edema impedes the full delineation of fiber tracts due to partial volume effects in image voxels that contain a mixture of cerebral parenchyma and extracellular water.

Incorporating biophysical models of edema can increase the sensitivity of tractography in regions of peritumoral edema, allowing better tract visualization in patients with high-grade glioma s and metastases [4].

Outcome

2 studies found that pre-operative peritumoral edema was an independent prognostic factor for decreased survival. 1 study found that survival was dependent on the severity of the peritumoral edema (minimal and severe: increased survival; moderate: decreased survival). 2 studies found that pre-operative peritumoral edema was a predictor of decreased survival based on univariate but not multivariate analysis. 1 study found that there was no relationship between pre-operative peritumoral edema and survival, while the remaining study found that patients with peritumoral edema had decreased survival compared with patients without peritumoral edema. There was considerable heterogeneity between the studies regarding the patient characteristics. The results are inconclusive; the available evidence does not definitely support or rule out an association between pre-operative peritumoral edema and survival. Hence, further, well-designed, prospective studies are clearly

needed [5].

Treatment

see Peritumoral edema treatment.

Vestibular schwannomas

see Peritumoral edema in vestibular schwannoma.

Case series

1984

Seventy patients with brain tumors (34 glioblastomas, 21 meningiomas and 13 metastatic tumors) were examined by CT scan with and without contrast medium infusion and by postoperative histologic verification in all cases. Peritumoral hypodensity areas on CT scan have generally been interpreted as cerebral edema. Peritumoral edema as seen in CT scan was classified into four grades according to the ratio of the largest diameter of tumor and the size of the zone of edema. Grade 0: no peritumoral low density area is seen in CT scan. Grade I: a small amount of peritumoral low density area is seen in CT scan. Grade II: a moderate amount of peritumoral low density area is seen is CT scan. Grade III: a large amount of peritumoral low density area is seen in CT scan. Twenty-five out of 34 glioblastomas and all of 15 metastatic tumors demonstrated moderate or severe peritumoral edemas such as Grade II or III. However 16 out of 21 meningiomas demonstrated mild peritumoral edemas such as Grade 0 or I. The grade of peritumoral edema was closely related to the degree of malignancy of the brain tumors. 8 out of 9 glioblastomas which demonstrated slight peritumoral edema, Grade I, had large cystic formations which seemed to serve as buffer action to compression mechanism by brain tumors. The grade of peritumoral edema was also related to the location of the tumor and venous involvement [6].

Meningioma peritumoral edema

see Meningioma peritumoral edema

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