Cystic glioblastoma

Cystic glioblastoma is a descriptive term to one form of glioblastoma that contains large cystic component, rather than being a pathological subtype.

Epidemiology

It is a rare disease whose exact prevalence is unknown. Glioblastoma is usually seen as a unilateral solid tumor more commonly in the supratentorial compartment. The presence of cyst in the GBM is rare. Bilateral large cystic GBM is still rarer [1].

Tumor cysts may be a nutrient reservoir for brain tumors, securing tumor energy metabolism and synthesis of cell constituents. Serum is one likely source of cyst fluid nutrients. Nutrient levels in tumor cyst fluid are highly variable, which could differentially stimulate tumor growth. Cyst fluid glutamate, lactate, and phosphate may act as tumor growth factors; these compounds have previously been shown to stimulate tumor growth at concentrations found in tumor cyst fluid.

GBM cysts contained glucose at 2.2 mmol/L (median value; range <0.8-3.5) and glutamine at 1.04 mmol/L (0.17-4.2). Lactate was 7.1 mmol/L (2.4-12.5) and correlated inversely with glucose level (r = -0.77; P < .001). Amino acids, including glutamate, varied greatly, but median values were similar to previously published serum values. Ammonia was 75 µmol/L (11-241). B vitamins were present at previously published serum values, and riboflavin, nicotinamide, pyridoxal 5´-phosphate, and cobalamin were higher in cyst fluid than in cerebrospinal fluid. Inorganic phosphate was 1.25 mmol/L (0.34-3.44), which was >3 times higher than in ventricular cerebrospinal fluid: 0.35 mmol/L (0.22-0.66; P < .001). Tricarboxylic acid cycle intermediates were in the low micromolar range, except for citrate, which was 240 µmol/L (140-590). In cystic metastatic malignant melanomas and lung tumors values were similar to those in GBMs. [2].

Cystic GBM may be confused rarely on radiology with tuberculoma as both may show a mass lesion with hypodense centre surrounded by a ring of enhancement. Peroperative cytological examination of smears prepared from fluid aspirated from cysts by rapid Diff-Quik method may prove beneficial for immediate diagnosis in suspicious cases and appropriate patient management may be carried out [3].

Outcome

The presence of cystic features in glioblastoma (GBM) has been described as a favorable prognostic factor, possibly because cystic GBMs showed comparatively little infiltration of the peritumoral brain parenchyma [4].

Case series

2011

A retrospective review of 354 consecutive patients treated with resection of primary GBM was performed using medical records and imaging information obtained at the University of California, San Francisco from 2005 to 2009. Within this cohort, 37 patients with large cysts (≥ 50% of tumor) were identified. Clinical presentations and surgical outcomes were statistically compared between the cystic and noncystic patients.

There were no statistically significant differences in clinical presentation between groups, including differences in age, sex, presenting symptoms, tumor location, or preoperative functional status, with the exception of tumor size, which was marginally larger in the cystic group. Surgical outcomes, including extent of resection and postoperative functional status, were equivalent. The median actuarial survival for the patients with cystic GBM was 17.0 months (95% CI 12.6-21.3 months), and the median survival for patients with noncystic GBM was 15.9 months (95% CI 14.6-17.2 months). There was no significant between-groups difference in survival (p = 0.99, log-rank test). A Cox multivariate regression model was constructed, which identified only age and extent of resection as independent predictors of survival. The presence of a cyst was not a statistically significant prognostic factor.

This study, comprising the largest series of cases of primary cystic GBM reported in the literature to date, demonstrates that the presence of a large cyst in patients with GBM does not significantly affect overall survival as compared with survival in patients without a cyst. Preoperative discussions with patients with GBM should focus on validated prognostic factors. The presence of cystic features does not confer a survival advantage [5].

2004

A retrospective analysis was conducted in 22 patients by using imaging information and chart reviews of operative reports of GBMs with large cysts (> or = 50% of tumor volume) at The University of Texas M. D. Anderson Cancer Center between 1993 and 2002. Clinical and neurosurgical outcomes and recurrence rates were studied. A statistical comparison was made with a matching cohort of 22 patients with noncystic GBMs. No significant differences in clinical variables were found between the cohort with cystic GBMs and the matched cohort with noncystic GBMs. To avoid bias in preoperative assessment of tumor volume, the tumor burden was compared in patients whose tumors had cysts (excluding the cystic mass) and in patients whose tumors did not contain cysts. There was no statistically significant difference between the two groups (p = 0.8). In patients with cystic GBMs the median survival time after surgery was 18.2 months (95% confidence interval [CI] 11.9-24.5 months) and at 2 years 43% of the patients were still alive. In comparison, in patients with noncystic GBMs, the median survival time was 14.3 months (95% CI 12.1-16.4 months) and only 16% of patients were alive at 2 years. The median time to tumor recurrence was 7.6 months (95% CI 0.01-18 months) in patients harboring cystic GBMs and 4.2 months (95% CI 1.8-6.6 months) in the matched cohort (log-rank test, p = 0.04). In the cystic GBM group, no recurrence was observed in 53% of patients at 6 months, 45% at 1 year, and 38% at 2 years after surgery, whereas the corresponding numbers for the noncystic group were 36, 14, and 9%, respectively.

The results indicate that patients harboring a GBM that contains a large cyst survive longer and have a longer time to recurrence than those who lack such a cyst. This is the first such observation in the literature [6].

1)
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