Glioblastoma extent of resection case series

2020

Laurent et al. queried all patients with glioblastoma surgery at the Lillian S. Wells Department of Neurosurgery, Preston A. Wells Center for Brain Tumor Research, College of Medicine, University of Florida, Gainesville, between January 2011 and May 2017. Pre- and postoperative magnetic resonance imaging were analyzed for EOR. Each chart was reviewed to determine the incidence of patient safety indicators (PSIs) and hospital-acquired conditions (HACs).

A total of 284 patients met the inclusion criteria. EOR ranged from 39.00 to 100%, with a median of 99.84% and a mean of 95.7%. There were 16 PSI, and 13 HAC, events. There were no significant differences in the rates of PSIs or HACs when compared between patients stratified by gross total resection (EOR ≥ 95%) and subtotal resection (EOR < 95%). The odds of encountering a PSI or HAC were 2.5 times more likely in the subtotal resection group compared to the gross total resection group (P = .58). After adjusting for confounders, the odds of encountering a PSI or HAC in the subtotal resection group were 3.9 times greater than for the gross total resection group (P < .05).

Gross total resection of GBM is associated with a decreased incidence of patient safety indicators (PSIs) and hospital-acquired conditions (HACs), as compared to subtotal resection [1].

2019

Data from Glioblastoma extent of resection patients who underwent gross total resection (GTR), subtotal resection (STR), or open biopsy between 2005 and 2014 were retrieved from the Surveillance, Epidemiology, and End Results database in the Seoul National University College of Medicine.

Univariate and multivariate analyses for overall survival (OS) were performed. Between 2005-2009 and 2010-2014, the proportion of GTR and STR performed increased from 41.4 to 42.3% and 33.0 to 37.1%, respectively. EOR only affected OS in the 3 years after diagnosis. Median survival in the GTR (n = 4155), STR (n = 3498), and open biopsy (n = 2258) groups was 17, 13, and 13 months, respectively (p < .001). STR showed no significant difference in OS from open biopsy (p = .33). GTR increased OS for midline-crossing tumors. Although STR was more frequently performed than GTR for tumors ≥ 6 cm in size, GTR significantly increased the OS rate relative to STR for tumors 6-8 cm in size (p = .001). For tumors ≥ 8 cm, STR was comparable to GTR (p = .61) and superior to open biopsy (p = .05). GTR needs to be performed more frequently for glioblastoma measuring ≥ 6 cm or that have crossed the midline to increase OS. STR was marginally superior to open biopsy when the tumor was ≥ 8 cm [2].

2017

Esquenazi et al. retrospectively evaluated 86 consecutive patients with primary GBM, managed by the senior author, using a subpial resection technique with or without carmustine wafer implantation. Multivariate Cox proportional hazards regression was used to analyze clinical, radiological, and

outcome variables. Overall impacts of extent of resection (EOR) and BCNU wafer placement were compared using Kaplan-Meier survival analysis.

Mean patient age was 56 years. The median OS for the group was 18.1 months. Median OS for patients undergoing gross total, near-total, and subtotal resection were 54, 16.5, and 13.2 months, respectively. Patients undergoing near-total resection (P = .05) or gross total resection (P < .01) experienced statistically significant longer survival time than patients undergoing subtotal resection as well as patients undergoing ≥95% EOR (P < .01) when compared to <95% EOR. The addition of BCNU wafers had no survival advantage.

The subpial technique extends the resection beyond the contrast enhancement and is associated with an overall survival beyond that seen in similar series where resection of the enhancement portion is performed. The effect of supratotal resection on survival exceeded the effects of age, Karnofsky performance score, and tumor volume. A prospective study would help to quantify the impact of the subpial technique on quality of life and survival as compared to a traditional resection limited to the enhancing tumor [3)].

2015

Coburger et al. prospectively enrolled 33 patients with GBMs eligible for gross-total-resection(GTR) and performed a combined approach using 5-ALA and iMRI. As a control group, we performed a retrospective matched pair assessment, based on 144 patients with iMRI-assisted surgery. Matching criteria were, MGMT promotor methylation, recurrent surgery, eloquent location, tumor size and age. Only patients with an intended GTR and primary GBMs were included. We calculated Kaplan Mayer estimates to compare OS and PFS using the Log-Rank-Test. We used the T-test to compare volumetric results of EoR and the Chi-Square-Test to compare new permanent neurological deficits (nPND) and general complications between the two groups.

Median follow up was 31 months. No significant differences between both groups were found concerning the matching criteria. GTR was achieved significantly more often (p <0.010) using 5-ALA&iMRI (100%) compared to iMRI alone (82%). Mean EoR was significantly (p<0.004) higher in 5-ALA&iMRI-group (99.7%) than in iMRI-alone-group (97.4%) Rate of complications did not differ significantly between groups (21% iMRI-group, 27%5-ALA&iMRI-group, p<0.518). nPND were found in 6% in both groups. Median PFS (6 mo resp.; p<0.309) and median OS (iMRI:17 mo; 5-ALA&iMRI-group: 18 mo; p<0.708)) were not significantly different between both groups.

We found a significant increase of EoR when combining 5-ALA&iMRI compared to use of iMRI alone. Maximizing EoR did not lead to an increase of complications or neurological deficits if used with neurophysiological monitoring in eloquent lesions. No final conclusion can be drawn whether a further increase of EoR benefits patient's progression free survival and overall survival [4)].

2014

A retrospective review of 128 patients who underwent primary resection of supratentorial GBM followed by standard radiation/chemotherapy was undertaken utilizing quantitative, volumetric analysis of pre- and postoperative MR images. The results were compared with clinical data obtained from the patients' medical records.

At analysis, 8% of patients were alive, and no patients were lost to follow-up. The overall median survival was 13.8 months, with a median Karnofsky Performance Scale (KPS) score of 90 at presentation. The median contrast-enhancing preoperative tumor volume (CE-PTV) was 29.0 cm3, and CE-RTV was 1.2 cm3, equating to a 95.8% median EOR. The median T2/F-RV was 36.8 cm3. CE-PTV, CE-RTV, T2/F-RV, and EOR were all statistically significant predictors of survival when controlling for age and KPS score. A statistically significant benefit in survival was seen with a CE-RTV less than 2 cm3 or an EOR greater than 98%. Evaluation of the volumetric analysis methodology was performed by observers of varying degrees of experience-an attending neurosurgeon, a fellow, and a medical student. Both the medical student and fellow recorded correlation coefficients of 0.98 when compared with the attending surgeon's measured volumes of CE-PTV, while for CE-RTV, correlation coefficients of 0.67 and 0.71 (medical student and fellow, respectively) were obtained.

CE-RTV and EOR were found to be significant predictors of survival after GBM resection. CERTV was the more significant predictor of survival compared with EOR, suggesting that the volume of residual contrast-enhancing tumor may be a more accurate and meaningful reflection of the pathobiology of GBM [5)].

2013

Of 345 patients, 273 underwent open tumor resection and 72 biopsies; 125 patients had gross total resections (GTRs) and 148, incomplete resections. Surgery-related morbidity was lower after biopsy (1.4% versus 12.1%, P = 0.007). 64.3% of patients received radiotherapy and chemotherapy (RT plus CT), 20.0% RT alone, 4.3% CT alone, and 11.3% best supportive care as an initial treatment. Patients ≤60 years with a Karnofsky performance score (KPS) of ≥90 were more likely to receive RT plus CT (P < 0.01). Median overall survival (OS) (progression free survival; PFS) ranged from 33.2 months (15 months) for patients with MGMT-methylated tumors after GTR and RT plus CT to 3.0 months (2.4 months) for biopsied patients receiving supportive care only. Favorable prognostic factors in multivariate analyses for OS were age ≤60 years [hazard ratio (HR) = 0.52; P < 0.001], preoperative KPS of ≥80 (HR = 0.55; P < 0.001), GTR (HR = 0.60; P = 0.003), MGMT promoter methylation (HR = 0.44; P < 0.001), and RT plus CT (HR = 0.18, P < 0.001); patients undergoing incomplete resection did not better than those receiving biopsy only (HR = 0.85; P = 0.31).

The value of incomplete resection remains questionable. If GTR cannot be safely achieved, biopsy only might be used as an alternative surgical strategy [6)].

1999

retrospectively analyzed preoperative and postoperative radiographic tumor volumes in 92 patients who underwent hemispheric glioblastoma multiforme operations (107) to determine the factors that affect time to tumor progression (TTP) and overall survival.

METHODS: Quantification of tumor volumes was based on a previously described method involving computerized image analysis of contrast enhancing tumor on computerized tomography or magnetic resonance imaging scans.

RESULTS: Among the variables analyzed, preoperative Karnofsky Performance Status (KPS) (p < 0.05), chemotherapy (p < 0.05), percent of resection (POR) (p < 0.001), and volume of residual disease (VRD) (p < 0.001) had a significant effect on TTP. Factors that affected survival were age (p < 0.05), preoperative KPS (p = 0.05), postoperative KPS (p < 0.005), POR (p < 0.0005), and VRD (p <

0.0001). Greater resections did not compromise the quality of life, and patients without any residual disease had a better postoperative KPS than those patients who received less than total resections.

CONCLUSIONS: The extent of tumor removal and the amount of residual tumor volume, documented on postoperative imaging studies, are highly significant factors affecting the median time to tumor progression and median survival for patients with glioblastoma multiforme of the cerebral hemisphere [7].

References

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