Purpose/Objective(s): Bifocal germinomas (BFG) are a rare subset of pediatric intracranial neoplasms comprising 6-25% of intracranial germinomas. Therapy for BFG is controversial - some believe that BFG are a manifestation of disseminated disease and advocate craniospinal irradiation (CSI), while others believe that BFG represents regional disease, and support the use of limited fields (whole brain or whole ventricular irradiation; WB, WVI). The purpose of our study is to review our own treatment experience in addition to the reported literature to help determine the appropriate radiotherapy fields for BFG.

Materials/Methods/Results: We analyzed 20 BFG patients at our institutions; 95% were male, with a mean age of 21 years, and all had classic bifocal lesions (pineal gland and suprasellar region); 35% had positive CSF. 11 patients received CSI alone, while 7 received WB/WVI with chemotherapy; 2 received local or WB radiation without chemotherapy. Median follow-up was 120 months, with no recurrence observed. Additionally, we were able to identify 56 BFG patients from the literature. Patients with atypical bifocal tumors (involving sites other than the pineal and suprasellar regions) and those with disease outside the neuraxis were excluded, as were patients for whom treatment or outcome data were unavailable. Our combined data on 76 patients represents the largest reported series on BFG. We identified 51 patients with bifocal lesions only (Group I), and 25 with bifocal lesions and ventricular or CSF disease (Group II). Median follow-up was 61 months, and recurrence was observed in 8 patients (89% progression free survival). Overall PFS was 94% for Group I and 76% for Group II. We next analyzed patient outcome by treatment approach (radiation fields +/- chemotherapy). For patients in Group I there were no failures in patients receiving CSI (n=11), 2 spinal failures in patients receiving WB/WVI or local treatment (GTV) without chemotherapy (n=17), and 1 spinal failure in patients receiving WB/WVI/GTV plus chemotherapy (n=23). For patients in Group II, there were no failures in patients receiving CSI (n=11), but 4 spinal failures were observed in patients receiving WB/WVI/GTV plus chemotherapy (n=13), and 1 patient who received WB treatment without chemotherapy (n=1) failed in the spine and brain.

Conclusions: CSI is associated with excellent PFS in BFG. In typical BFG patients (Group I), we find that treatment with chemotherapy and radiation that omits spinal fields is associated with greater than 95% PFS. Patients with ventricular dissemination or CSF positive disease (Group II) are best treated with CSI.

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