PINEAL GERMINOMA

Epidemiology

CNS germ cell tumors (GCT) were seen almost exclusively in individuals between birth and 34 years of age, with a peak incidence of 0.2 per 100,000 person-years at ages 15-19 (1). The peak incidence of intracranial GCT is during the second decade of life, with a median age at diagnosis of 10 to 12 years. There is a male preponderance of between 2:1 to 3:1,especially with tumors in the pineal region (2).

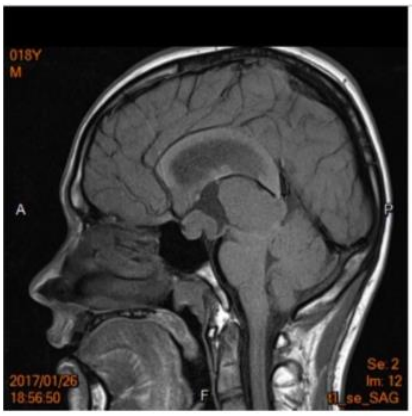
Overall, seminoma risk was increased significantly with HIV/AIDS (standardized incidence ratio (SIR), 1.9; 95% CI, 1.6-2.2). Extratesticular GCT risk also was increased (SIR, 2.1; 95% CI, 1.1-3.7). The risk was not related to CD4 count and duration of HIV/AIDS (3).

Clinical manifestation

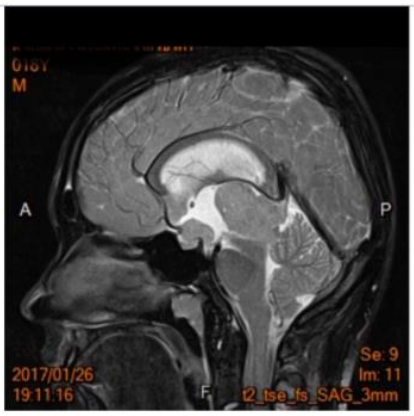
- Parinaud syndrome (present in up to 50%) is an important clinical presentation of pineal germinomas(4) caused by direct compression of the quadrigeminal plate.
- Increase intracranial pressure (ICP) due to obstruction to CSF flow by compression of the aqueduct. The raise ICP can cause headache, projectile vomiting, and papilledema
- Endocrinological manifestations
  - Diabetes insipidus (83-88%)(5, 6)
  - Hypogonadism (17-100%)(5, 6)
  - Hyperprolactinemia (85%)(5)
  - Hypothyroidism (75-77%)(5, 6)
  - Others
    - Precocious puberty
    - Neurofibromatosis type 1, Klinefelter syndrome and Down syndrome have been shown to associated with intracranial GCTs(7)

Diagnosis

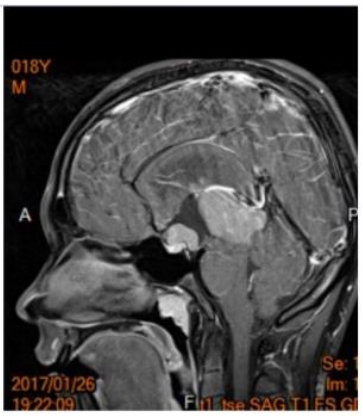
- **Histologic examination** is needed to establish a definitive diagnosis of an intracranial GCT.
- **Tumor markers** such as AFP and beta-hCG are helpful in making this distinction. Pure germinomas and mature teratomas typically present with normal levels of AFP and beta-hCG in both serum and CSF.
- **Magnetic resonance imaging (MRI)** is the preferred imaging technique for diagnosis and staging. The solid portions of GCTs are isointense or hypointense on T1-weighted images and isointense or hyperintense on T2-weighted images with homogenous enhancement in gadolinium-diethylenetriamine penta-acetic acid contrast studies. MRIs cannot reliably distinguish germinomas from NGGCTs(8-10). MRI of the entire spine is imperative for adequate staging of intracranial GCTs, since 10-15% of patients will have leptomeningeal spread diagnosis(2, 11).



MRI brain Sagittal T1



Sagittal T2 with FS



Sagittal T1, FS with GAD

- **CSF** should be obtained during staging of an intracranial GCT. CSF cytology helps in identifying the spread of a pineal germinoma through the ventricular system and the spinal subarachnoid region(12, 13).
- **Surgery** should be considered to establish a histologic diagnosis. Immediate neurosurgical intervention is indicated for obstructive hydrocephalus from a pineal mass.

Treatment

The treatment protocols are primarily radiation based. 90% of patients with pure intracranial germinomas can be treated successfully by radiation therapy(14).

Neoadjuvant chemotherapy with bleomycin, etoposide, and either cisplatin (BEP) or carboplatin (BEJ) allows for the reduction of both the dose and volume of without compromising long-term progression free survival (15-18). Chemotherapy alone has resulted in unacceptable tumor recurrence rates.

Prognosis

The 5-year survival rate of patients treated with radiotherapy is more than 90%(19). Pure germinomas have a good prognosis and a low recurrence rate after total resolution. Germinomas usually invade locally into the ventricular system and then seed via the subarachnoid space(19).

Follow-up

Initial follow-up exams after completion of chemotherapy must be performed at short intervals(20). Treatment response is evaluated by follow-up MRI scans every 6 months for 3 year after diagnosis and then at 1-year intervals. Clinical remission is defined by the normalization of tumor markers and the absence of residual tumor. The recurrence of tumors is rare and related to sampling error or negative biopsy which leads to inadequate treatment(21). The major recurrence sites for germinomas are the suprasellar compartment and the ventricular walls. The rate of recurrence after appropriate radiation therapy is around 10– 17%, and usually occurs within the first 2 years of the eradication of the initial tumor(21).

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