IF THIS IS NOT GLIOBLASTOMA, THEN WHAT IS IT?

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I have no conflicts of interest in relation to this presentation.

Vogel FS & Burger PC

- Eby NL; Grufferman S; Flannelly CM; Schold SC Jr; Vogel FS; Burger PC: Increasing incidence of primary brain lymphoma in the US. Cancer. 62:2461-5, 1988.
- Senile dementia of Alzheimer's type and Down's syndrome
- Teaching monograph on degenerative and demyelinating diseases
- Subacute diencephalic angioencephalopathy
- Cerebrovascular diseases, including granulomatous angiitis, hemorrhagic white matter infarction
- Frozen section interpretation in surgical neuropathology
- Gamma-L-glutaminyl-4-hydroxybenzene (GHB) effect on the thyrosinase-containing cells of the mouse

... Dr. Karsner addressed me, ”Well, go ahead and make the incision.” I did without difficulty and also without difficulty removed the tumor and placed it on the cutting board. Dr. Karsner added, ”Well, cut it.” I did, and he said, ”What do you see and what does it mean?” And then he added, ”Let me clarify.” I did not say what do you know about ovarian tumors? What have you been told, what have you read about ovarian tumors?” I described the physical characteristics of the mass as best I could and suggested that perhaps it was a benign granulosa cell tumor. Dr. Karsner said, ”Son, no matter what branch of medicine you enter, when you approach a patient and have the opportunity to see a disease process, always ask yourself, ‘what do I see and what does it mean?’” I have followed Dr. Karsner's suggestion even that which he added when he apologized and said, ”I have a dinner date and must leave early.”
Goal & Objectives

Goal:
• To identify histologic mimics of glioblastoma

Objectives:
• Review the classical clinical, radiologic and histologic features of glioblastoma
• Learn the characteristic clinical, radiologic and histologic findings that alert to the presence of another lesion
• List the main lesions in the differential diagnosis of glioblastoma and their distinguishing findings
• Describe the differential diagnostic work-up of glioblastoma and their mimics

GLIOBLASTOMA (GB)

• 15% of all intracranial neoplasms; 50-60% of all astrocytic tumors
• Cerebral hemispheres with involvement of deep structures, widely-infiltrative; leptomeningeal infiltration rare
• Relatively acute presentation; within months
GB, HISTOLOGIC VARIABILITY (i.e., MULTIFORME)
- GB, NOS
- Small cell GB
- Giant cell GB
- With PNET-like differentiation
- With oligodendroglioma component
- Rhabdoid/epithelioid GB
- Glandular/adenoid GB, epithelial and/or mesenchymal metaplasia
- Gliosarcoma

RADIOLOGIC MIMICS
- Ring enhancing lesions:
  Glioblastoma, metastatic carcinoma, abscess, demyelinating pseudotumor,...lymphoma, toxoplasmosis
- Heterogeneously-enhancing mass:
  High-grade neoplasm vs. nonneoplastic processes
- Cyst and (homogeneously-)enhancing mural nodule:
  Pilocytic astrocytoma, ganglioglioma, angiocentric glioma, pleomorphic xanthoastrocytoma

LOCATION
- Involvement of corpus callosum (if not necessarily a butterfly lesion):
  Glioblastoma, metastatic carcinoma, lymphoma, tumefactive demyelination
- Multiplicity:
  Metastases, lymphoma, infections (bacterial or amebic abscesses, toxoplasmosis)
- Superficial: Metastases
- Deep white matter: Lymphoma, infection
HISTOLOGIC MIMICS

- Pleomorphic xanthoastrocytoma (PXA) vs giant cell GB
- Ganglioglioma (GG)
- Subependymal giant cell astrocytoma (SEGA)
- Anaplastic oligodendroglioma vs small cell GB
- Metastatic small cell carcinoma/PNET-embryonal tumors vs GB with PNET-like differentiation
- Metastatic carcinoma vs GB with epithelioid features
- Abscess vs. GB with inflammatory reaction vs infections (ameba, toxoplasma vs other necrotic lesions such as granulomata)
- Infarct vs GB (granular cell) vs demyelinating pseudotumor/tumefactive demyelination
- Sarcoma/gliosarcoma/malignant meningioma vs GB
- Radiation necrosis/reactive gliosis vs. residual/recurrent GB

Pleomorphic xanthoastrocytoma (PXA)
Ganglioglioma (GG)

Suspect something lower grade:
- Cystic component
- Prominent leptomeningeal surface involvement
- Well-circumscription
- Eosinophilic granular bodies
- Rosenthal fibers
- Calcifications

Findings commonly associated with low-grade lesions
Synapto.

Neu - Ki-67

PXA

Ganglioglioma
Ganglioglioma

Anaplastic Ganglioglioma

Ganglioglioma with glial overgrowth vs. entrapped neurons
### Giant cell GB
- Acute focal deficits; >50%
- Long history with recurrences; young adults
- Relatively younger (5th decade)
- Anywhere, deep; corpus callosum involvement
- Well-circumscribed
- Ring- or heterogeneous enhancement, irregular
- Astrocytic
- Necrosis, vascular proliferation
- Giant cells
- GFAP
- Reticulin

### PXA
- Long history with seizures; first few decades
- Temporal lobe, superficial
- Well-circumscribed
- Leptomeningeal involvement
- Cyst and enhancing mural nodule
- Pleomorphic
- Giant cells
- Mitoses, necrosis, vascular proliferation
- GFAP (Synaptophysin)
- Reticulin
- BRAF V600E

### GG
- Long history with seizures; first few decades
- Temporal lobe, superficial
- Well-circumscribed
- Mitoses, necrosis, vascular proliferation
- GFAP
- Synaptophysin
- CD34
- Neu-N
- BRAF V600E

### GB (Giant cell GB vs. recurrent/residual GB)
- - Enhancement in the wall of the resection cavity
- - PET
Lymphoma

CD20

CD3

Tumefactive demyelination; demyelinating pseudotumor (Beware of histiocytes!)

LFB/PAS

NF

CD3

CD68

Abscess

Summary

- GB, while generally a straightforward diagnosis, can be mimicked by a variety of other neoplastic or non-neoplastic lesions due to variable histology.
- Anaplastic versions of typically well-circumscribed, low grade neoplasms with large/giant cells can be especially problematic.
- Knowledge of histologic, radiologic and clinical features of alternative lesions is crucial in avoiding over-diagnosis.
- Conscious use of special stains and molecular markers help in the differential diagnosis.
**Recommended References**

**General**

**Glioblastoma**

**Neuroradiology**

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**Glioblastoma, cont’d**

**Ganglioglioma**

**Pleomorphic Xanthoastrocytoma**