Brain and Spine Tumors

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Brain Tumors

Brain Tumor Basics
Types of Tumors
Cases
Brain Tumors

- Skull is a fixed space
- Symptoms develop due to compression of normal brain
Brain Tumors
Brain Tumors

Inflammation/Edema occurs in the surrounding normal brain
Brain Tumors

- Tumors cause edema and irritation of normal brain
- Breakdown of BBB
- Corticosteroids for edema
- Anti-epileptics to prevent seizures
Corticosteroids

- Dexamethasone traditionally used
- Reduces vasogenic edema
- GI prophylaxis
Steroids

Multiple side effects:

- Diabetes
- Myopathy
- Infection
- LE edema
- Weight gain
- Wound issues
Anti-Epileptic Drugs

- Used for cortical lesions
- Not required for cerebellar lesions
- Dilantin – requires monitoring
- Keppra
Tumor Types

- Gliomas
- Meningiomas
- Metastatic Tumors
- Pituitary Tumors
Gliomas

Arise from native cells within the brain
Gliomas

- WHO I – Pilocytic Astrocytoma
- WHO II – Fibrillary Astrocytoma
- WHO III – Anaplastic Astrocytoma
- WHO IV – Glioblastoma Multiforme
Gliomas – WHO I
Gliomas – WHO II & III
WHO IV - GBM
Glioblastoma Multiforme

- Most common primary brain tumor in adults
- Average survival from diagnosis ~ 13 months
- Young age, High Karnofsky score associated with increased survival
Gliomas - Treatment

Start steroids and anti-epileptics
Gliomas - Treatment

- Surgery
- Biopsy
- External Beam XRT
- Chemotherapy (Temodar)
Increased survival associated with 97% or greater resection

Gliadel wafers can be inserted

Standard postoperative therapy is Temozolomide and External Beam Radiation
Meningiomas
Meningiomas

- Develop from arachnoid cap cells
- More common in females
- Most are WHO I
- WHO II, III, IV “malignant meningiomas”
Meningiomas
Meningiomas - Treatment

- Anti-epileptics, steroids in some instances
- Observation
- Gamma Knife (<3 cm)
- Open Surgery
Meningiomas

62 yo female presented with gait instability
On PE, had an ataxic gait and lower extremity hyperreflexia
Meningiomas
Meningiomas

- 60 yo female presents with change of personality
- Over the past 6 months – 1 year, patient has been confused and has poor short-term memory
- Always pleasant, which is unusual
- Diagnosed with “Depression with psychotic features”
Meningiomas

Exam:
- Awake and pleasant
- Obese
- Confused, poor recall
- No sense of smell
- Some difficulty moving legs
Meningiomas
Meningiomas
Meningiomas

- Patient started on steroids and anti-epileptics
- Underwent bifrontal craniotomy for tumor removal
Meningiomas
Meningiomas

- Patient has had slow recovery over 6 months
- Edema slowly resolving
- Now doing crosswords, but still a short-term memory deficit
Metastatic Tumors
Metastatic Tumors

- Single lesion < 3 cm – Gamma Knife
- Single lesion > 3 cm – Open Surgery
- Multiple lesions: Gamma Knife vs. XRT
Gamma Knife Radiosurgery
Gamma Knife Radiosurgery
Gamma Knife Radiosurgery
Gamma Knife Radiosurgery
Gamma Knife Radiosurgery
Leptomeningeal Disease

- Poor prognosis
- Patients may develop cranial nerve palsies
Leptomeningeal Disease

Intrathecal chemotherapy
Leptomeningeal Disease
Leptomeningeal Disease

Hydrocephalus

Cerebrospinal fluid build-up resulting in an increased intracranial pressure
Hydrocephalus

Patients develop symptoms from increased intracranial pressure

Headaches, N/V, confusion, lethargy, coma
Hydrocephalus

Can be communicating or obstructive
Hydrocephalus

Treatments include VP Shunt and Endoscopic Third Ventriculostomy (ETV)
Hydrocephalus

- 58 yo man with a history of colon cancer with worsening headaches and confusion
- Patient had just completed external beam radiation tx for multiple brain metastases
- On PE he was confused and sleepy
Pituitary Tumors
Pituitary Tumors

Pituitary gland is a marble-sized gland at the base of the brain that controls hormone regulation in the body.
Pituitary Tumors

- Most common Pituitary Adenomas (non-secreting)
- Cushing's Disease
- Acromegaly
- Prolactinomas
Pituitary Adenoma

- Benign Tumor
- Seen in ~5% of “normal population”
- Microadenoma < 1 cm
- Macroadenoma > 1 cm
- Treat with observation
Pituitary Adenoma

- If it is growing, or putting pressure on surrounding structures should be treated
- Endocrine function
- Visual field testing
Pituitary Adenoma

Transsphenoidal Resection
Cushing’s Disease

- ACTH-secreting tumor
- Treat with surgical resection
Acromegaly

- Excess growth hormone secretion
- Enlarging hands and feet
- Bilateral carpal tunnel syndrome
- Diabetes mellitus
- Dilated cardiomyopathy
Acromegaly

- Measure IGF-1
- Can try somatostatin analogs
- Oftentimes requires surgical resection
Prolactinoma

- Patient may have nipple discharge
- Elevated Prolactin
- Usually greater than > 200 ng/mL
- Can be treated with Bromocriptine
Spinal Metastatic Disease
Spinal metastatic disease

- Most frequent area of spine for metastases is vertebral body
- May present with pain or neurologic deficit
Spinal metastatic disease

Spinal Cord Compression:
- Myelopathy – hyperreflexia, clonus
- Numbness
- Weakness
- Incontinence
Spinal metastatic disease

General Indications for surgery:
- Neurologic deficit
- Spinal Instability
Spinal Metastatic Disease

Direct decompressive surgical resection in the treatment of spinal cord compression caused by metastatic cancer: a randomised trial.

Patchell RA, Tibbs PA, Regine WF, Pajak TF, Barter S, Kyriacou R, Mohiuddin M, Young J.
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Abstract

BACKGROUND: The standard treatment for spinal cord compression caused by metastatic cancer is corticosteroids and radiotherapy. The role of surgery has not been established. We assessed the efficacy of direct decompressive surgery.

METHODS: In this randomised, multi-institutional, non-blinded trial, we randomly assigned patients with spinal cord compression caused by metastatic cancer to either surgery followed by radiotherapy (n=50) or radiotherapy alone (n=51). Radiotherapy for both treatment groups was given in ten 3 Gy fractions. The primary endpoint was the ability to walk. Secondary endpoints were urinary continence, muscle strength and functional status, the need for corticosteroids and opioid analgesics, and survival time. All analyses were by intention to treat.

FINDINGS: After an interim analysis the study was stopped because the criterion of a predetermined early stopping rule was met. Thus, 123 patients were assessed for eligibility before the study closed and 101 were randomised. Significantly more patients in the surgery group (42/50, 84%) than in the radiotherapy group (29/51, 57%) were able to walk after treatment (odds ratio 6.2 [95% CI: 2.0–19.8] p=0.001). Patients treated with surgery also retained the ability to walk significantly longer than did those with radiotherapy alone (median 122 days vs 13 days, p=0.003). 32 patients entered the study unable to walk; significantly more patients in the surgery group regained the ability to walk than patients in the radiation group (10/16 [62%] vs 3/16 [19%], p=0.01). The need for corticosteroids and opioid analgesics was significantly reduced in the surgical group.

INTERPRETATION: Direct decompressive surgery plus postoperative radiotherapy is superior to treatment with radiotherapy alone for patients with spinal cord compression caused by metastatic cancer.
Patchell Study

- Non-blinded randomized controlled trial
- Patients with metastatic disease causing spinal cord compression
- Radiation alone (n=51)
- Surgery + Radiation (n=50)
- Primary endpoint ability to ambulate
Patchell Study

Surgical group:

- Improved ambulation
- Improved survival and functional status
- Decreased need for steroids and opioids
Spinal Metastatic Disease
Spinal Metastatic Disease

- **<3 months prognosis** – Surgery not indicated
- **3-6 months prognosis** – Grey zone
- **>6 months prognosis** – Consider surgery
Spine Case
42 yo female with colon adenocarcinoma and back pain
PET scan “hot” in thoracic spine
Full strength on exam, hyperreflexic
Underwent thoracic corpectomy and fusion followed by radiation
Case

Intradural Intramedullary Metastasis
Intradural Intramedullary Metastasis

- 66 yo Left LE pain and weakness
- Hx of Renal mass removed 2 years ago at OSH without follow-up
- L4 radiculopathy and Left 4/5 dorsiflexion
Summary

- Consider surgery when evaluating patients with spinal metastatic disease.
- Patients with a neurologic deficit from spinal compression and > 6 months prognosis are the best candidates.
Learning Points

- Dexamethasone Side Effects
- High Grade glioma = GBM
- Meningioma
- Hydrocephalus
- Intrathecal Chemotherapy
- Leptomeningeal Disease
- Acromegaly and Cushing’s Disease
- Indications for Spine surgery
Thank you!