HOW TO NOT MISS A BRAIN TUMOR IN PRIMARY CARE

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October 20, 2011
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Objectives

- Review the signs & symptoms of a brain tumor
- Pop-quiz: case-based multiple choice questions
- Review classic case presentations

Signs & Symptoms

- Increased intracranial pressure
- Localized symptoms

Ventricular System & CSF flow

Hydrocephalus

Patient with hydrocephalus

Patient with normal pressure

Localized Signs & Symptoms
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QUESTIONS: disclaimer

- I am not a professional question writer
- I am likely biased by my experience in this specialty
- These questions are intended to bring out teaching points about brain tumors in children

QUESTION

You NOTICE this growth curve abnormality after this 18-month old girl has left your clinic. What is the best plan?

A. Wait until her next routine visit to re-assess, knowing that there were no other concerns raised on the history or exam
B. Have the patient return to clinic the following day and repeat the measurement yourself
C. Have parent re-measure it at home
D. Erase the measurement

Correct answer: B

Increased intracranial pressure in infants

- Macrocephaly in infants and toddlers
- Irritability
- Lethargy
- Feeding difficulties & failure to thrive

QUESTION

What is the approximate prevalence of headache in elementary school age children?

A. Under 10%
B. 10 - 20%
C. 20 - 30%
D. 40 - 50%
E. Over 60%

Correct answer: D

QUESTION

What is the approximate prevalence of headache in high-school age children?

A. Under 10%
B. 10 - 20%
C. 20 - 30%
D. 40 - 50%
E. Over 60%

Correct answer: E
Headache in brain tumor patients

- Overall: gradually worsening
- Timing: when recumbent
- Associated symptoms:
  - Vomiting with relief
  - "Dizziness" (unsteady or vertigo)
  - Personality change or school problems
  - Triggered by straining
  - Numbness or weakness

> 98% have abnormal:
- Mental status
- Optic discs
- Eye movement
- Motor exam (hemiparesis)
- Tandem gait OR
- Deep tendon reflexes
The rest have seizures!

On evaluation of a patient complaining of headaches, which elements of the physical exam are critical to perform?

A. Evaluation of mental status
B. Fundoscopic exam and examination of eye movements
C. Motor exam and deep tendon reflexes
D. Tandem gait assessment
E. All of the above

Correct answer: E

On evaluation of a patient who is complaining of headaches and is showing no other signs of increased intracranial pressure, you are unable to adequately examine the patient’s optic discs. What is the best plan?

A. Ask a colleague in the office to attempt to examine
B. Refer for ophthalmology or neurology evaluation
C. Order MRI of the brain
D. Pretend you saw normal discs and hope for the best
E. A and/or B

Correct answer: E

On evaluation of a patient complaining of headaches, which feature of the headaches alone warrants urgent neuro-imaging?

A. Occipital location
B. Temporal location
C. Squeezing quality
D. Pulsing quality
E. None of the above

Correct answer: A

Which of the following signs is NOT suggestive of possible imminent danger requiring emergent neurosurgical evaluation in a child with a suspected (or known) CNS tumor?

A. Bradycardia
B. Mental status changes
C. Hypertension
D. Midline back pain with associated point tenderness
E. Seizure

Correct answer: E
**Increased intracranial pressure**

- Headaches
- Vomiting
- Papilledema
- **Mental status changes**
  - Bradycardia
  - Irregular respirations
  - Hypertension

**QUESTION**

- You are on call for your practice and the E.R. calls to tell you they are seeing one of your colleagues’ 3yo patients for fever, vomiting, and mental status changes. Which element of their diagnostic and treatment plan should be performed last (if at all)?

  A. Give IV fluid bolus over 1 hour for evidence of dehydration
  B. Perform lumbar puncture for cell count, gram stain, culture
  C. Perform head CT
  D. Review vital signs carefully & perform neurologic exam
  E. None of the above

Correct answer: B

**QUESTION**

- Which statement is FALSE with regard to indications for neuroimaging in the setting of seizures?

  A. Non-urgent neuroimaging should be seriously considered in a child under 1 year of age with new-onset of seizures
  B. A child with history and EEG findings consistent with absence seizure does not require neuroimaging
  C. A child under the age of 6 years has his first seizure. It lasts under 15 minutes, has no focal features, and occurs during a febrile illness. He does not need neuroimaging.
  D. If a neuroimaging study is obtained, MRI of the brain with & without contrast is the preferred modality
  E. Emergent neuroimaging should be performed in a child of any age with a post-ictal focal deficit (Todd’s paresis) that resolves in 2 hours

Correct answer: E

**Neuroimaging for seizures**

- Detailed practice parameter for first non-febrile seizure in children: American Academy of Neurology


**Eye Movements**

- ABNORMALITIES BEYOND 2 - 3 MONTHS OF AGE SHOULD...
  - Be seen by an ophthalmologist
  - Be evaluated with neuro-imaging (MRI)
QUESTION

A 5yo patient comes for well-child check and the mother tells you the child has a “lazy eye”. The eye exam is shown here. What is the best plan?

A. Re-assure mother, this is likely strabismus, consider ophthalmology referral
B. Send patient to E.R. for urgent neuro-imaging
C. Order outpatient non-urgent MRI of the brain

Correct answer: A

Eye Movements

ANY CHILD WITH AN ACQUIRED EYE MOVEMENT DISORDER SHOULD...
- Be seen by an ophthalmologist
- Undergo neuro-imaging (MRI)

Torticollis and brain tumors

Brain tumor is a RARE cause of torticollis
- Due to 4th cranial nerve palsy
  - Affected eye is extorted
  - tilt head to prevent diplopia
  - Vertical diplopia worse in downgaze
  - Old photos: congenital cases
  - MRI warranted if palsy is acquired finding
  - Refer to ophthalmology if suspected
- Often a presenting feature of ependymoma
- Ependymoma is rare but prognosis entirely dependent on ability to completely resect

QUESTION

A toddler comes in for a well-child check and you notice this adorable picture on the mother’s keychain. When you point it out she says, “Isn’t it cute how he holds his head? All of his pictures are like that this month.” Which statement about this condition is NOT true?

A. Facial asymmetry is characteristic of a congenital cause
B. A child with this finding and a neurologic abnormality should undergo MRI of the head and neck
C. Children with strabismus may tilt their heads to avoid double vision
D. A brain tumor is a relatively common cause of this finding
E. None of the above

Correct answer: D

QUESTION

A 5yo patient comes for well-child check. You notice intermittent deviation of one eye while talking to your patient. When you ask the mother about it, she says he has a “lazy eye” and that it has been the same for at least a year. The eye exam is shown here, the remainder of the history & physical exam is normal. What is the best plan?

A. Re-assure mother, this is likely strabismus, consider ophthalmology referral
B. Send patient to E.R. for urgent neuro-imaging
C. Order outpatient MRI of the brain (to be done within a few days) & refer to ophthalmology

Correct answer: C

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Correct answer: D

Brain tumor is a RARE cause of torticollis
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QUESTION

Which of the following children should undergo MRI evaluation for a possible CNS tumor?

A. A 5yo girl with midline back pain, associated tenderness, no history of trauma, & recent recurrence of bedwetting
B. An 18-month old who started walking at 12-months of age, and after a recent viral illness has been more clumsy (parental report and wobbly gait noted on exam)
C. A 4yo boy who tilts his head back when playing video games and seated at the level of the screen (see illustration)
D. A and B
E. All of the above

Correct answer: E
Back pain in children

- Abnormal in children
- Complaint in 80% of patients with cord compression
- Compression originating from:
  - intrinsic CNS tumor
  - bony disease originating in a vertebral body
  - paraspinal soft tissue tumor infiltrating through an intervertebral foramina
- Etiology:
  - sarcomas, lymphoma, leukemia, neuroblastoma, germ cell tumors, spinal cord tumors, and metastatic brain tumors

Specific sign of pineal region tumors

- Parinaud Syndrome
  - Upgaze paralysis
  - Poor pupillary constriction with light
  - Convergence retraction nystagmus

QUESTION

- Which screening studies are appropriate for patients with Neurofibromatosis Type I?
  A. MRI of brain
  B. MRI of spine
  C. Yearly ophthalmologic examination
  D. All of the above
  E. None of the above

Correct answer: C

Neurofibromatosis Type I

- On yearly ophthalmologic exam for a patient with Neurofibromatosis Type I, visual acuity in the right eye is found to be 20/40 (decreased from 20/20 the year prior). Which of the following is/are appropriate?

  A. MRI of brain and orbits
  B. MRI of spine
  C. Referral to oncology
  D. A and C
  E. A, B, and C

Correct answer: D
Neurofibromatosis Type I

- Up to 20% develop intracranial tumors
- Typically low-grade
- Optic nerve most common
- Can spontaneously resolve
- Treat only those with progressive symptoms

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Cases to remember

- Father noted that cranial sutures of this 3yo boy had re-opened
- Review of systems
  - Progressive increase in head size
  - Running into walls
- Choroid plexus carcinoma

Cases to remember

- 4-day history: 3yo child tilting his head way back when playing video games
- Pineal region
- Immature teratoma

Cases to remember

- 9yo with “few days” of double vision and eyes deviated down
- PREOCIOUS PUBERTY
  - Tanner IV hair
  - Deep voice
  - Testosterone 900!
- Pineal region
- Malignant germ cell tumor (hormone secreting)

Cases to remember

- Vision problems first noted @ 4mos
- At 2.5yrs, visit to optometrist for glasses, referred immediately to ophtho
- Difficult exam due to NYSTAGMUS
- MRI done at 5yo
- Extensive low-grade astrocytoma
Cases to remember

- Pre-natal detection of hydrocephalus
  - Neurosurgery consult
  - Suspected aqueductal stenosis
  - Induced at 36wks for shunt placement

- Well-appearing infant with normal exam
  - Head circumference 34cm
  - Fontanel soft/flat
  - Face symmetric
  - Moves extremities equally, normal tone

Cases to remember

- The common story
  - 2 - 4wk history
  - Suspected common illness with vomiting +/- headaches
  - PROGRESSION instead of resolution
  - New localizing finding
    - Eye movement abnorm
    - Ataxia
  - Medulloblastoma

Cases to remember

- 11yo male with 6-month history of headaches
  - Gradually worsening
    - Increase in frequency & severity over several weeks
    - Ataxia noted on exam

Cases to remember

- Healthy 15yo with 8-month history of intermittent left hip pain, exacerbated by jarring
  - No limitation of activity
  - “X-rays & CT” normal
  - Physical therapist noted left leg weakness, inability to flex or extend ankle, difficulty standing on left foot

Cases to remember

- Atypical teratoid/rhabdoid tumor

How to NOT miss a brain tumor

- Look for and NOTICE red flags in history
- Perform short neurologic exam on ALL kids
- Ask for input from colleagues & consultants
- Order MRI with & without contrast (unless signs of increased ICP require urgent CT)
How to NOT miss a brain tumor

- Look for and **NOTICE** red flags in history
  - Progressively worsening headaches, waking at night
  - Occipital location of headaches
  - Seizures: except for absence and simple febrile
  - Acquired eye movement abnormality
  - Persistent eye movement abnormality in infant
  - Beware the cute pictures with the tilted head
  - Back pain in a child
  - New incontinence
  - Decreasing gait coordination in a toddler
  - Vision complaint in an NF patient
  - Precocious puberty

- Perform short neurologic exams on ALL kids
  - Be comfortable with normal
  - Recognize abnormal
  - Get comfortable with asking for help/input
  - Key elements
    - Mental status, optic discs, eye movement, motor exam, tandem gait, deep tendon reflexes
  - Review vital signs (bradycardia & hypertension)
  - Review head circumference

Special Thanks

- **Dr. Kellie Nazemi**
  - Director of Pediatric Neuro Oncology
  - Doernbecher Children’s Hospital
  - Contact info for Pediatric Hematology Oncology
  - 503-346-0644

Best references