

1. Head trauma [One of the following]

A. Minor or mild acute closed head trauma without neurologic deficit adult

1. Glasgow Coma Scale ≥ 13

B. Mild or moderate acute closed head injury under age 2

C. Minor or acute closed head injury with focal neurologic deficit

D. Moderate or severe acute closed head trauma

E. Subacute or chronic closed head trauma with cognitive and/or neurologic deficit (MRI without contrast)

F. Suspected carotid or vertebral dissection (CTA or MRA of head and neck)

G. Penetrating injury, stable neurologically intact

H. Focal neurologic finding [One of the following]

1. Motor weakness affecting a limb, or one side of the face or body

2. Decreased sensation affecting a limb, or one side of the face or body

3. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)

4. Confusion including memory loss and disorientation

5. Impaired vision, including amaurosis fugax, visual field loss and diplopia

6. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)

7. Dysarthria (speech disorder resulting from neurological injury)

8. Dysphagia with no GI cause

9. Vertigo with either headache or nystagmus

10. Numbness, tingling, paresthesias

11. Decreased level of consciousness

12. Papilledema

13. Stiff neck

14. Drowsiness

15. New onset of vomiting

16. Nystagmus

17. Cranial nerve palsy

18. Gait disturbance

- 19. Personality or behavioral changes
- 20. New seizure
- 21. Hearing loss or new onset tinnitus
- 22. Agitation
- 23. Somnolence
- 24. Slow response to verbal communication
- 25. Sudden falls
- 26. Balance problems

I. Drug or alcohol intoxication and evaluation is suboptimal or inadequate

J. Skull fracture

2. Abrupt onset of a neurologic deficit(including stroke and TIA) [One of the following]

A. Motor weakness affecting a limb, or one side of the face or body

B. Decreased sensation affecting a limb, or one side of the face or body

C. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)

D. Confusion including memory loss and disorientation

E. Impaired vision, including amaurosis fugax, visual field loss and diplopia

F. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)

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M. Stiff neck

N. New onset of severe headache

O. Drowsiness

P. New onset of vomiting

Q. Nystagmus

R. Cranial nerve palsy

S. Gait disturbance

T. Personality or behavioral changes

U. New seizure

- V. Hearing loss or new onset tinnitus
- W. Agitation
- X. Somnolence
- Y. Slow response to verbal communication
- Z. Sudden falls
- AA. Balance problems

3. Re-evaluation after stroke [One of the following]

- A. Anti-coagulation planned
- B. Deteriorating clinical status with new or worsening neurologic findings [One of the following]
 - 1. Motor weakness affecting a limb, or one side of the face or body
 - 2. Decreased sensation affecting a limb, or one side of the face or body
 - 3. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
 - 4. Confusion including memory loss and disorientation
 - 5. Impaired vision, including amaurosis fugax, visual field loss and diplopia
 - 6. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
 - 7. Dysarthria (speech disorder resulting from neurological injury)
 - 8. Dysphagia with no GI cause
 - 9. Vertigo with either headache or nystagmus
 - 10. Numbness, tingling, paresthesias
 - 11. Decreased level of consciousness
 - 12. Papilledema
 - 13. Stiff neck
 - 14. New onset of severe headache
 - 15. Drowsiness
 - 16. New onset of vomiting
 - 17. Nystagmus
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 - 20. Personality or behavioral changes
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- 27. Balance problems

C. Repeat after recent hemorrhagic stroke

4. Headache, indications for imaging MRI preferred [One of the following] (except for D, J, and K which is CT preferred)

- A. Papilledema
- B. Worsened by Valsalva maneuver, coughing straining or postural changes
- C. Wakens from sleep

D. Suspected subarachnoid hemorrhage (CT in early phase) with one of the following

- 1. With sudden onset of severe, exertional, or “thunderclap” headache
- 2. Associated with nausea, vomiting, diplopia, seizure, mental status change, or
- 3. History of prior known (documented on CTA, MRA, or angiogram) aneurysm or AVM

E. Infection in an extracranial location

F. Change in mental status, personality, or level of consciousness

G. Suspected carotid or vertebral artery dissection or unilateral Horner’s syndrome (Headache may be unilateral) (CTA or MRA or MRI) [One of the following]

- 1. Neck pain
- 2. Unilateral facial or orbital pain
- 3. Unilateral headaches
- 4. Horner’s syndrome, miosis and ptosis (contraction of the iris, drooping eyelid) or
- 5. Transient ischemic attacks (TIA)
- 6. Minor neck trauma
- 7. Rapid onset of headache with strenuous exercise or Valsalva maneuver

H. Head pain that spreads into the lower neck and between the shoulders (may indicate meningeal irritation due to either infection or subarachnoid blood; it is not typical of a benign process)

I. Suspected subdural hematoma with history of major head trauma or minor head trauma in an

individual on anticoagulants

J. Thunderclap headache (CT)

K. Worst headache of life (CT)

L. New headache [One of the following]

1. Abnormal neurologic examination [One of the following]

- a. Motor weakness affecting a limb, or one side of the face or body
- b. Decreased sensation affecting a limb, or one side of the face or body
- c. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
- d. Confusion including memory loss and disorientation
- e. Impaired vision, including amaurosis fugax, visual field loss and diplopia
- f. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
- g. Dysarthria (speech disorder resulting from neurological injury)
- h. Dysphagia with no GI cause
- i. Vertigo with either headache or nystagmus
- j. Numbness, tingling, paresthesias
- k. Decreased level of consciousness
- l. Papilledema
- m. Stiff neck
- n. New onset of severe headache
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- s. Gait disturbance
- t. Personality or behavioral changes
- u. New seizure
- v. Hearing loss or new onset tinnitus
- w. Agitation
- x. Somnolence
- y. Slow response to verbal communication

z. Sudden falls

aa. Balance problems

2. Aural temperature $>38.3^{\circ}\text{C}$ or 100.9°F
3. Stiff neck (nuchal rigidity)
4. History of HIV infection
5. History of TB
6. History of sarcoidosis
7. Age 5 years or less
8. Over age 50
9. Pregnancy
10. Headache with exertion
11. Documented infection outside the brain
12. Mental status changes
13. Extracranial malignancy

M. Chronic daily headache – headache for 15 or more days a month for at least 3 months

1. New neurologic deficit (See L1 above) (MRI without and with contrast)

2. Imaging is not medically necessary if there is a normal neurologic examination and no new features of the headache

N. Known neurofibromatosis

O. Rapidly increasing frequency of headache

P. **Personal history of cancer and new headache (MRI without and with contrast)**

5. Seizure (MRI with gadolinium) [One of the following]

- A. Refractory seizures in a candidate for surgery
- B. New onset of seizures unrelated to trauma with drug use
- C. New onset of seizures unrelated to trauma with alcohol use
- D. New-onset seizure unrelated to trauma age 18-40
- E. New onset of seizure unrelated to trauma older than age 40
- F. New onset of seizures with focal neurologic deficit unrelated to trauma
- G. New onset of seizures older than 18 following acute trauma
- H. New-onset seizure older than 18 post subacute or chronic trauma
- I. Suspicion of migration anomalies or other morphologic brain abnormalities in children

J. Suspicion of cortical dysplasia

K. Partial seizures

L. Epilepsy

6. CNS infection (MRI without and with contrast) [(Both A and B for new infection) or C or D or E or F]

A. Findings suggesting infection [One of the following]

1. Aural temperature $>38.3^{\circ}\text{C}$ or 100.9°F
2. Leukocytosis, $\text{WBC} >11,500/\text{cu.mm}$
3. Known infection elsewhere
4. Immunocompromised patient

B. Other clinical findings [One of the following]

1. Headache
2. Acute or subacute ataxia
3. Drowsiness or confusion
4. Focal neurological findings
5. Vomiting
6. Seizure
7. Stiff neck
8. Photophobia
9. Recurrence of symptoms after antimicrobial therapy

C. Creutzfeldt-Jakob disease

D. Bickerstaff encephalitis – usually follows a viral illness [Both of the following]

1. Ophthalmoplegia
2. Cerebellar ataxia

E. Fisher syndrome [Both of the following]

1. Ophthalmoplegia
2. Cerebellar ataxia

F. Follow-up during and after completion of therapy to assess effectiveness

7. Brain tumor

A. Evaluation of known primary brain tumor [One of the following]

1. New signs and symptoms or worsening neurological condition [One of the following]
 - a. Motor weakness affecting a limb, or one side of the face or body

- b. Decreased sensation affecting a limb, or one side of the face or body
 - c. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
 - d. Confusion including memory loss and disorientation
 - e. Impaired vision, including amaurosis fugax, visual field loss and diplopia
 - f. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
 - g. Dysarthria (speech disorder resulting from neurological injury)
 - h. Dysphagia with no GI cause
 - i. Vertigo with either headache or nystagmus
 - j. Numbness, tingling, paresthesias
 - k. Decreased level of consciousness
 - l. Papilledema
 - m. Stiff neck
 - n. New onset of severe headache
 - o. Drowsiness
 - p. New onset of vomiting
 - q. Nystagmus
 - r. Cranial nerve palsy
 - s. Gait disturbance
 - t. Personality or behavioral changes
 - u. New seizure
 - v. Hearing loss or new onset tinnitus
 - w. Agitation
 - x. Somnolence
 - y. Slow response to verbal communication
 - z. Sudden falls
 - aa. Balance problems
2. Interval re-evaluation of known brain tumor
- a. Anaplastic astrocytoma, anaplastic oligodendroglioma or glioblastoma multiforme or any high grade or aggressive primary brain tumor [One of the following]
 - i. Re-image after surgery (complete or subtotal)
 - ii. Image 2-6 weeks after completion of radiation therapy

- iii. Following completion of chemotherapy
- iv. Every 60-120 days for 2-3 years if asymptomatic and then less often
- v. New signs and symptoms (See 1 above) regardless of date of last imaging
- b. Adult low-grade infiltrative supratentorial astrocytoma or oligodendroglioma
 - i. **MRI every 3-6 months for 5 years then annually**
- c. Adult ependymoma
 - i. Following resection
 - ii. Every 3-4 months for a year then every 4-6 months for 2nd year then every 6-12 months
- d. Adult medulloblastoma and supratentorial PNET
 - i. Post operative restaging
 - ii. Every 3 months for 2 years then every 6 months for 3 years then annually
- e. Meningioma
 - i. If unresected or WHO Grade 1 (benign) or 2 (atypical), image at 3, 6, 12 months after diagnosis then every 6-12 months or 5 years then every 1-3 years
 - ii. WHO Grade 3 (malignant) image at least at 3, 6, 12 months and then every 6-12 months or 5 years and then every 1-3 years more frequent imaging may be required
- f. Other primary intracranial cancers may be imaged at completion of treatment and thereafter at 90 to 180 day intervals if clinically stable and then annually
- g. New signs and symptoms or worsening neurological condition [One of the following]
 - i. Motor weakness affecting a limb, or one side of the face or body
 - ii. Decreased sensation affecting a limb, or one side of the face or body
 - iii. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
 - iv. Confusion including memory loss and disorientation
 - v. Impaired vision, including amaurosis fugax, visual field loss and diplopia
 - vi. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
 - vii. Dysarthria (speech disorder resulting from neurological injury)
 - viii. Dysphagia with no GI cause
 - ix. Vertigo with either headache or nystagmus
 - x. Numbness, tingling, paresthesias
 - xi. Decreased level of consciousness
 - xii. Papilledema

- xiii. Stiff neck
- xiv. New onset of severe headache
- xv. Drowsiness
- xvi. New onset of vomiting
- xvii. Nystagmus
- xviii. Cranial nerve palsy
- xix. Gait disturbance
- xx. Personality or behavioral changes
- xxi. New seizure
- xxii. Hearing loss or new onset tinnitus
- xxiii. Agitation
- xxiv. Somnolence
- xxv. Slow response to verbal communication
- xxvi. Sudden falls
- xxvii. Balance problems

B. Evaluation for known or suspected brain metastases in patients with known extracranial malignancy (MRI without and with contrast) [One of the following]

1. Routine initial staging for one of the following
 - a. Sarcoma
 - b. Melanoma stage II or higher
 - c. Small-cell lung cancer
 - d. Non-small cell lung cancer for stage IB and higher
2. **New neurological signs or symptoms with any known malignancy** [One of the following]
 - a. Motor weakness affecting a limb, or one side of the face or body
 - b. Decreased sensation affecting a limb, or one side of the face or body
 - c. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
 - d. Confusion including memory loss and disorientation
 - e. Impaired vision, including amaurosis fugax, visual field loss and diplopia
 - f. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
 - g. Dysarthria (speech disorder resulting from neurological injury)
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 - s. Gait disturbance
 - t. Personality or behavioral changes
 - u. New seizure
 - v. Hearing loss or new onset tinnitus
 - w. Agitation
 - x. Somnolence
 - y. Slow response to verbal communication
 - z. Sudden falls
 - aa. Balance problems
3. Prior to prophylactic cranial irradiation for small cell lung cancer
4. Follow-up known brain metastases during or after chemotherapy [One of the following]
- a. Follow-up after intervention to establish a new baseline
 - b. Imaging (MRI without and with contrast, every 3 months for 1 year after completion of therapy)**
 - c. After one year imaging is performed based on clinical signs and symptoms (See 2 above)
 - d. Melanoma stage IIB or higher annually
5. Follow-up known brain metastases after whole brain radiation therapy [One of the following]
- a. Follow-up after intervention to establish a new baseline then every 6 weeks for 3 months and then
 - b. Imaging (preferably MRI) every 3 months for 1 year after completion of therapy**
 - c. After one year imaging is performed based on clinical signs and symptoms
 - d. Melanoma stage IIB or higher annually

6. Follow-up known brain metastases after stereotactic or CyberKnife® radiation treatment
 - a. Every 6 weeks x 2, then every 12 weeks x 2, then every 3-6 months if stable
7. Follow-up known brain metastases after surgery [One of the following]
 - a. Follow up after intervention to establish a new baseline then every 6 weeks for 3 months and then
 - b. **Imaging (preferably MRI) every 3 months for 1 year after completion of treatment**
 - c. After one year imaging is performed based on clinical signs and symptoms
 - d. Melanoma stage IIB or higher annually
8. Known brain metastasis with new or worsening symptoms as indicated in number VII.B.2.

C. Cranial nerve palsy (MRI without and with contrast) [One of the following]

1. Anosmia
2. Weakness or paralysis of muscles of mastication
3. Sensory loss in the head and neck
4. Weakness or paralysis of facial expression
5. Weakness of the palate
6. Vocal cord paralysis
7. Weakness or paralysis of the sternocleidomastoid muscle
8. Weakness or paralysis of the trapezius
9. Weakness or paralysis of the tongue

D. Suspected brain tumor (MRI without and with contrast)

1. New onset of neurologic findings [One of the following]
 - a. Motor weakness affecting a limb, or one side of the face or body
 - b. Decreased sensation affecting a limb, or one side of the face or body
 - c. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
 - d. Confusion including memory loss and disorientation
 - e. Impaired vision, including amaurosis fugax, visual field loss and diplopia
 - f. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
 - g. Dysarthria (speech disorder resulting from neurological injury)
 - h. Dysphagia with no GI cause
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- q. Nystagmus
- r. Cranial nerve palsy
- s. Gait disturbance
- t. Personality or behavioral changes
- u. New seizure
- v. Hearing loss or new onset tinnitus
- w. Agitation
- x. Somnolence
- y. Slow response to verbal communication
- z. Sudden falls
- aa. Balance problems

8. Suspected pituitary disease (microadenoma, macroadenoma) [One of the following]

A. Elevated pituitary hormones including precocious puberty [One of the following]

- 1. Prolactin (PRL) >20ng/mL [micrograms/L]
- 2. Growth hormone (GH) ≥ 5 ng/mL [micrograms/L]
- 3. Thyroid stimulating hormone (TSH) >4U/mL [mIU/L]
- 4. Follicular stimulating hormone (FSH)
 - a. Male: >10 mIU/mL
 - b. Female: (mIU/mL)
 - i. Follicular phase >13
 - ii. Luteal phase >13
 - iii. Midcycle >22
 - iv. Postmenopausal >150
- 5. Luteinizing hormone (LH)
 - a. Male: >8 mIU/mL
 - b. Female: (mIU/mL)
 - i. Follicular phase >12
 - ii. Luteal phase >15
 - iii. Midcycle peak >77
 - iv. Postmenopausal >40
- 6. Adrenocorticotrophic hormone (ACTH) >46 pg/mL (Cushing's disease)

B. Hypopituitarism including hypogonadism [One of the following]

1. Pituitary apoplexy [One of the following]
 - a. Acute headache with vomiting
 - b. Ophthalmoplegia
 - c. Amaurosis
 - d. Depressed level of consciousness
 - e. Bitemporal hemianopsia
2. Acquired hypopituitarism [One of the following]
 - a. Cranial irradiation
 - b. Brain surgery
 - c. Head trauma
 - d. Empty sella
 - e. Hemochromatosis
 - f. Prior brain infection
 - g. Known pituitary tumor
 - h. Langerhans cell histiocytosis of the pituitary
3. Gonadotropin deficiency or hypogonadism [One of the following]
 - a. Male [All of the following]
 - i. History [One of the following]
 01. Loss of libido
 02. Impotence
 03. History of undescended testicle or cryptorchidism
 04. History of testicular failure
 05. History of chemotherapy or radiation therapy
 06. Visual field disorder
 07. Decreased body hair
 08. Galactorrhea
 09. Gynecomastia
 - ii. Laboratory tests
 01. Low to normal free testosterone, LH and FSH (the laboratory values may be requested)
 - b. Female [All of the following]
 - i. Oligomenorrhea or amenorrhea
 - ii. Low normal LH, FSH
4. TSH deficiency < 0.4 and low to low-normal T4 and T3
5. ACTH deficiency (Addison's disease)
6. ADH deficiency (diabetes insipidus)
7. Growth hormone deficiency [One of the following]
 - a. Adults [One of the following]
 - i. History of radiation or surgery to the pituitary or hypothalamic region
 - ii. Decreased levels of 3 or more pituitary hormones (TSH, LH, FSH, ACTH, GHRH, ADH)
 - iii. Decreased levels of IGF-I (insulin-like growth factor I) based on laboratory normal range
 - iv. Insulin tolerance test (contraindicated in individuals with history of seizures or coronary artery disease)
 01. Growth hormone response ≤ 10 ng/mL

[micrograms/L]

v. Arginine stimulating test

01. Growth hormone response ≤ 10 ng/mL

[micrograms/L]

b. Children with no evidence of malignancy, Crohn's disease, renal disease, hypothyroidism, or Turner's syndrome, and one of the following

i. Bone age more than 2 standard deviations below the mean for age

ii. History of surgery or radiation in the pituitary or hypothalamus regions

iii. Growth hormone levels below normal (≤ 10 ng/mL [micrograms/L])

iv. History of intrauterine growth retardation

v. Prader-Willi syndrome

vi. Children over the age of 1

01. Insulin tolerance test positive with GH response ≤ 10 ng/mL [micrograms/L]

vii. Neonate random growth hormone level < 20 ng/mL [micrograms/L]

8. Visual problems [One of the following]

a. Bitemporal visual field loss – loss of peripheral vision bilaterally

b. Optic atrophy

c. Drooping eyelid

d. Diabetes insipidus

C. Known pituitary tumor (adenoma, microadenoma, macroadenoma)

1. Following transsphenoidal resection

2. Following radiation therapy

3. New signs or symptoms such as visual changes, new headache, new onset of vomiting, papilledema, drooping eyelid, optic atrophy

4. Follow-up of asymptomatic nonfunctioning microadenoma < 10 mm in size

a. MRI at one year

b. MRI every 1-2 years for 3 years and then less frequently as long as tumor does not increase in size

5. Follow-up of asymptomatic nonfunctioning macroadenoma 6 months after the initial diagnosis and then annually

9. **Evaluation after intervention or surgery (CT should be performed for this indication if MRI is absolutely contraindicated) [One of the following]**

A. New or worsening neurologic condition [One of the following]

1. Motor weakness affecting a limb, or one side of the face or body

2. Decreased sensation affecting a limb, or one side of the face or body

3. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)

4. Confusion including memory loss and disorientation

5. Impaired vision, including amaurosis fugax, visual field loss and diplopia

6. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)

7. Dysarthria (speech disorder resulting from neurological injury)
 8. Dysphagia with no GI cause
 9. Vertigo with either headache or nystagmus
 10. Numbness, tingling, paresthesias
 11. Decreased level of consciousness
 12. Papilledema
 13. Stiff neck
 14. New onset of severe headache
 15. Drowsiness
 16. New onset of vomiting
 17. Nystagmus
 18. Cranial nerve palsy
 19. Gait disturbance
 20. Personality or behavioral changes
 21. New seizure
 22. Hearing loss or new onset tinnitus
 23. Agitation
 24. Somnolence
 25. Slow response to verbal communication
 26. Sudden falls
 27. Balance problems
- B. Aneurysm clip [One of the following]
1. Stable with no change in neurologic findings
 - a. Annual
 2. New neurologic findings (See A above)

10. Suspected acoustic neuroma (schwannoma) or cerebellar pontine angle tumor [One of the following] (preferably MRI)

- A. Findings/test results [One of the following]
1. Asymmetric sensorineural hearing loss by audiometry
 2. Facial weakness
 3. Altered sense of taste
 4. Tinnitus
 5. Balance problems
 6. Facial numbness
- B. Neurofibromatosis

11. Hydrocephalus [One of the following]

- A. Suspected obstructive hydrocephalus [Clinical findings and supportive history]
1. Clinical findings [One of the following]
 - a. Headache
 - b. Papilledema
 - c. Diplopia
 - d. Mental status changes
 - e. Gait disturbance or ataxia (People with ataxia experience a failure of muscle control in their arms and legs, resulting in a lack of balance and coordination or a disturbance of gait)
 - f. Seizure

2. History of [One of the following]
 - a. Arteriovenous malformation (AVM)
 - b. Aneurysm
 - c. Intraventricular or SAH
 - d. Meningitis
 - e. Known hydrocephalus
- B. Normal pressure hydrocephalus (NPH) [One of the following]
 1. Gait disturbance (shuffling, magnetic, wide based, disequilibrium, and slow gait)
 2. Motor perseveration (tremors)
 3. Urinary incontinence, urgency or frequency
 4. Dementia
 5. Known NPH with worsening symptoms
- C. Suspicion of VP (ventriculoperitoneal) shunt malfunction
12. **Evaluation of tinnitus (ringing, hissing, buzzing, roaring, clicking, or rough sounds heard by patient) (preferably MRI)**
13. **Arnold-Chiari malformation (preferably MRI) [One of the following]**
 - A. Cranial nerve palsy
 - B. Headache
 - C. Incontinence
 - D. Lumbar myelomeningocele
 - E. Neck or back pain
 - F. Sensory loss
 - G. Tethered cord
 - H. Unsteady gait
 - I. Lower extremity spasticity
 - J. Follow up known Chiari with new or changed symptoms
14. **Craniosynostosis**
15. **Fibrous dysplasia**
16. **Macrocephaly**
 - A. Head circumference greater than 2 standard deviations average for age
17. **Microcephaly**
 - A. Head circumference smaller than 2 standard deviations average for age
18. **Encephalocele**
19. **Cephalohematoma**
20. **Proptosis including thyroid eye disease and exophthalmos [One of the following]**
 - A. Orbital asymmetry in a child with visual loss
 - B. Adult with painful visual loss
 - C. Hyperthyroidism with visual loss or visual compromise (Graves' disease)
21. **Visual field deficit (preferably MRI) [One of the following]**
 - A. Bitemporal hemianopsia (loss of peripheral vision)
 - B. Homonymous hemianopsia (loss of vision in the nasal half of one eye and the outer half of the other eye)
 - C. Scotoma (loss of central vision)
 - D. Heteronymous hemianopsia (loss of vision in either the nasal half or the outer half of both eyes)

22. Hearing loss [One of the following]

A. Suspected cholesteatoma and audiogram demonstrating conductive hearing loss (CT of the temporal bone) and one of the following

1. Acute and intermittent vertigo
2. Painless otorrhea
3. Purulent drainage from the ear or mastoid area
4. Purulent drainage and granulation tissue in the ear

B. Conductive hearing loss

1. Must have audiogram documenting conductive hearing loss

C. Total deafness, congenital hearing loss (CT of the temporal bone)

D. Preoperative planning for cochlear implant (CT of the temporal bone)

E. Fluctuating hearing loss

1. History of meningitis

F. Glomus tumor (preferably MRI)

1. Reddish-blue mass in the ear

G. Sensorineural hearing loss on recent audiogram (MRI of the head without and with contrast)

H. Mixed conductive and sensorineural hearing loss on recent audiogram

23. Vertigo

A. Episodic with or without associated hearing loss or tinnitus

B. Central vertigo with or without other symptoms (MRI of the brain without and with contrast)

24. Follow up proven hematoma, epidural, subarachnoid, or intracerebral (parenchymal) hemorrhage [One of the following]

- A. Motor weakness affecting a limb, or one side of the face or body
- B. Decreased sensation affecting a limb, or one side of the face or body
- C. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
- D. Confusion including memory loss and disorientation
- E. Impaired vision, including amaurosis fugax, visual field loss and diplopia
- F. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
- G. Dysarthria (speech disorder resulting from neurological injury)
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- K. Decreased level of consciousness
- L. Papilledema
- M. Stiff neck
- N. New onset of severe headache
- O. Drowsiness
- P. New onset of vomiting
- Q. Nystagmus
- R. Cranial nerve palsy
- S. Gait disturbance
- T. Personality or behavioral changes
- U. New seizure
- V. Hearing loss or new onset tinnitus

- W. Agitation
- X. Somnolence
- Y. Slow response to verbal communication
- Z. Sudden falls
- AA. Balance problems
- BB. Follow up within 36 hours of initial presentation if not performed previously**
- CC. Interval follow up with or without change in clinical signs or symptoms

25. Suspected intracranial hemorrhage [One of the following]

A. Head trauma [One of the following]

1. Amnesia
2. Altered level of consciousness or loss of consciousness
3. Vomiting
4. Neurologic symptoms
5. Seizure
6. Coagulopathy previously diagnosed (or current treatment with heparin or Coumadin®)
7. Skull fracture
8. Ataxia
9. Aphasia
10. Decreased sensation in a limb
11. Visual field loss
12. Double vision
13. Memory loss

B. Suspicion of acute subarachnoid hemorrhage [One of the following]

1. Vomiting
2. Sudden onset of severe hypertension
3. Decreased level of consciousness
4. Thunderclap headache
5. Worst headache of one's life
6. Headache and known aneurysm
7. Headache and first degree relative with aneurysm
8. Treated aneurysm and/or AVM with new headache or findings on neurologic examination
9. Stiff neck
10. Seizure
11. Third nerve palsy

C. Intracerebral (parenchymal) hemorrhage [One of the following]

1. Hypertension with new onset headache
2. Known brain metastases with change in neurologic status
3. New onset of neurologic symptoms [One of the following]
 - a. Motor weakness affecting a limb, or one side of the face or body
 - b. Decreased sensation affecting a limb, or one side of the face or body
 - c. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
 - d. Confusion including memory loss and disorientation
 - e. Impaired vision, including amaurosis fugax, visual field loss and diplopia

- f. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
- g. Dysarthria (speech disorder resulting from neurological injury)
- h. Dysphagia with no GI cause
- i. Vertigo with either headache or nystagmus
- j. Numbness, tingling, paresthesias
- k. Decreased level of consciousness
- l. Papilledema
- m. Stiff neck
- n. New onset of severe headache
- o. Drowsiness
- p. New onset of vomiting
- q. Nystagmus
- r. Cranial nerve palsy
- s. Gait disturbance
- t. Personality or behavioral changes
- u. New seizure
- v. Hearing loss or new onset tinnitus
- w. Agitation
- x. Somnolence
- y. Slow response to verbal communication
- z. Sudden falls
- aa. Balance problems
- 4. Follow-up within 36 hours of initial presentation if not performed previously
- 5. Interval follow-up with or without change in signs and symptoms

26. Papilledema or increased intracerebral pressure (preferably MRI)

27. Acute, chronic or progressive mental status changes (preferably MRI)

- A. Deteriorating cognitive function [One of the following]
 - 1. Progressive loss of memory
 - 2. Confusion
 - 3. Disorientation
 - 4. Personality changes

28. Evaluation of psychiatric disorders

29. Bell's palsy, with unusual presentation[One of the following] (preferably MRI)

- A. No improvement in facial paresis after one month
- B. Hearing loss
- C. Multiple cranial nerve deficits
- D. Weakness or sensory loss in an extremity
- E. Bilateral symptoms

30. Planning for stereotactic or gamma knife surgery- may be approved with MRI of the brain

Diagnosis

CTA of the Head

1. **Subarachnoid hemorrhage (SAH) [One of the following]**
 - A. Subarachnoid hemorrhage by CT or lumbar puncture
 - B. Proven subarachnoid hemorrhage with negative angiogram requiring follow up imaging
2. **Proven intracerebral hemorrhage or hematoma**
 - A. CT or MRI positive for intracerebral bleed or hemorrhage or hematoma
3. **Recent stroke by history**
4. **Cerebral aneurysm**
 - A. Screening study for cerebral aneurysm [One of the following]
 1. First degree relative with history of cerebral aneurysm
 2. Two or more relatives with a history of SAH
 3. Polycystic kidney disease
 4. Multiple meningiomas
 5. Type IV Ehlers-Danlos syndrome
 - B. Suspected cerebral aneurysm [One of the following]
 1. SAH or intracerebral hematoma on prior imaging
 2. Isolated cranial nerve (CN) deficit
 - C. Known cerebral aneurysm documented by CTA, MRA or angiography [One of the following]
 1. Follow-up after intervention (embolization or surgery)
 - a. Shortly after an interventional procedure (i.e., surgery or embolization)
 - b. Every 6 months after embolization
 - c. Untreated, unruptured intracerebral aneurysms image at 6-12 month intervals
 2. New or worsening clinical findings [One of the following]
 - a. Motor weakness affecting a limb, or one side of the face or body
 - b. Decreased sensation affecting a limb, or one side of the face or body
 - c. Acute ataxia (unsteady and clumsy motion of the limbs or trunk)

- d. Confusion including memory loss and disorientation
- e. Impaired vision, including amaurosis fugax, visual field loss and diplopia
- f. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
- g. Dysarthria (speech disorder resulting from neurological injury)
- h. Dysphagia with no GI cause
- i. Vertigo with either headache or nystagmus
- j. Numbness, tingling, paresthesias
- k. Decreased level of consciousness
- l. Papilledema
- m. Stiff neck
- n. New onset of severe headache
- o. Drowsiness
- p. New onset of vomiting
- q. Nystagmus
- r. Cranial nerve palsy
- s. Gait disturbance
- t. Personality or behavioral changes
- u. New seizure
- v. Hearing loss or new onset tinnitus
- w. Agitation
- x. Somnolence
- y. Slow response to verbal communication

3. Interval evaluation for stability in an asymptomatic individual

- a. Aneurysm 5mm or less annually for up to 5 years and then every other year or
- b. Aneurysm more than 5 mm every 6 months for up to 5 years and then annually

D. Neurofibromatosis

- E. Visual field loss
- F. Thunderclap headache
- G. Exertional headache
- H. Preoperative planning for cerebral aneurysm management (surgical or interventional)

5. **Pre-operative study, carotid endarterectomy planned [One of the following]**

- A. Asymptomatic patient with carotid stenosis of 60% or more by carotid duplex US
- B. Symptomatic carotid stenosis with carotid duplex US showing 60% stenosis or
- C. Carotid duplex US showing ulcerated plaque

6. **Abrupt onset of a neurologic deficit (stroke and TIA) [One of the following]**

- A. Motor weakness affecting a limb, or one side of the face or body
- B. Decreased sensation affecting a limb, or one side of the face or body
- C. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
- D. Confusion including memory loss and disorientation
- E. Impaired vision, including amaurosis fugax, visual field loss and diplopia
- F. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
- G. Dysarthria (speech disorder resulting from neurological injury)
- H. Dysphagia with no GI cause
- I. Vertigo with either headache or nystagmus
- J. Numbness, tingling, paresthesias
- K. Decreased level of consciousness
- L. Papilledema
- M. Stiff neck
- N. New onset of severe headache
- O. Drowsiness
- P. New onset of vomiting
- Q. Nystagmus
- R. Cranial nerve palsy
- S. Gait disturbance
- T. Personality or behavioral changes
- U. New seizure
- V. Hearing loss or new onset tinnitus
- W. Agitation
- X. Somnolence
- Y. Slow response to verbal communication
- Z. Sudden falls
- AA. Balance problems

7. **AVM (arteriovenous malformation) [One of the following]**

- A. Known AVM documented by CTA, MRA, MRI, catheter angiogram [One of the following]
 - 1. Immediate follow-up after a therapeutic procedure (i.e., surgery, embolization, radiosurgery)

2. Routine follow up after a therapeutic procedure
 3. New or worsening clinical findings
 - a. Motor weakness affecting a limb, or one side of the face or body
 - b. Decreased sensation affecting a limb, or one side of the face or body
 - c. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
 - d. Confusion including memory loss and disorientation
 - e. Impaired vision, including amaurosis fugax, visual field loss and diplopia
 - f. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)
 - g. Dysarthria (speech disorder resulting from neurological injury)
 - h. Dysphagia with no GI cause
 - i. Vertigo with either headache or nystagmus
 - j. Numbness, tingling, paresthesias
 - k. Decreased level of consciousness
 - l. Papilledema
 - m. Stiff neck
 - n. New onset of severe headache
 - o. Drowsiness
 - p. New onset of vomiting
 - q. Nystagmus
 - r. Cranial nerve palsy
 - s. Gait disturbance
 - t. Personality or behavioral changes
 - u. New seizure
 - v. Hearing loss or new onset tinnitus
 - w. Agitation
 - x. Somnolence
 - y. Slow response to verbal communication
 - z. Sudden falls
 - aa. Balance problems
 4. Planning of intervention (surgical or interventional)
- B. Suspected AVM [One of the following]
1. Severe unexplained headache (thunderclap headache)
 2. Altered level of consciousness
 3. Focal neurologic findings
 - a. Motor weakness affecting a limb, or one side of the face or body
 - b. Decreased sensation affecting a limb, or one side of the face or body
 - c. Acute or subacute ataxia (unsteady and clumsy motion of the limbs or trunk)
 - d. Confusion including memory loss and disorientation
 - e. Impaired vision, including amaurosis fugax, visual field loss and diplopia
 - f. Aphasia (loss or impairment of the ability to produce or comprehend language due to brain damage)

- g. Dysarthria (speech disorder resulting from neurological injury)
- h. Dysphagia with no GI cause
- i. Vertigo with either headache or nystagmus
- j. Numbness, tingling, paresthesias
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- r. Cranial nerve palsy
- s. Gait disturbance
- t. Personality or behavioral changes
- u. New seizure
- v. Hearing loss or new onset tinnitus
- w. Agitation
- x. Somnolence
- y. Slow response to verbal communication
- z. Sudden falls
- aa. Balance problems
- 4. Subarachnoid hemorrhage on recent CT or MRI of the brain
- 5. Subarachnoid hemorrhage on lumbar puncture
- 6. Intracerebral bleed or hematoma, or hemorrhage on prior CT or MRI of the brain

8. Suspected cerebral venous thrombosis [Both symptoms and risk factors](MRA, MRI)

A. Symptoms [One of the following]

- 1. Papilledema
- 2. Headaches
- 3. Mental status changes
- 4. Vomiting
- 5. Changes in vision
- 6. Seizures
- 7. Lethargy or coma
- 8. Alternating focal neurological deficits
- 9. Hemiparesis or paraparesis

B. Risk factors [One of the following]

- 1. Postpartum
- 2. Post-operative status
- 3. Skull fracture over dural sinus
- 4. Calvarial mass
- 5. Meningitis, sinusitis or middle ear infections
- 6. Hypercoagulable state [One of the following]
 - a. Personal history of cancer
 - b. Factor V Leiden mutation
 - c. MTHFR

- d. SLE
- e. Sickle cell disease
- f. Contraceptive medications
- g. Protein C deficiency
- h. Protein S deficiency
- i. Antiphospholipid antibodies
- j. Elevated lipoprotein (a)
- k. Elevated platelet count
- l. Prothrombin 20210 gene mutation
- m. Antithrombin III deficiency

7. Ear, sinus, face, mouth or neck infection

8. Brain tumor by history

9. Evaluation of tinnitus

10. Vasculitis (temporal arteritis)[Both of the following]

A. Clinical presentation [One of the following]

- 1. Headache
- 2. Seizures
- 3. Focal neurologic deficit
- 4. Altered level of consciousness
- 5. Altered mood or personality
- 6. Autoimmune disease such as but not limited to [One of the following]
 - a. Systemic lupus erythematosus (SLE)
 - b. Polyarteritis nodosa
 - c. Giant cell arteritis or temporal arteritis with temporal tenderness
 - d. Sjögren's syndrome
 - e. Behçet's syndrome
 - f. Dermatomyositis

B. Laboratory tests [One of the following]

- 1. ESR >55 mm/hr
- 2. C-reactive protein >10 mg/L
- 3. ANA positive
- 4. Anticardiolipin antibodies positive

11. Unilateral headache (suspicion of carotid or vertebral dissection or unilateral Horner's syndrome) (CTA or MRA or MRI) [One of the following]

- A. Neck pain
- B. Unilateral facial or orbital pain
- C. Unilateral headaches
- D. Horner's syndrome, miosis and ptosis (contraction of the iris, drooping eyelid) or
- E. Transient ischemic attacks (TIA)
- F. Minor neck trauma
- G. Rapid onset of headache with strenuous exercise or Valsalva maneuver
- H. Closed head injury