

Headaches in children

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No conflict of interest to disclose

H/A - LEARNING OBJECTIVES

- Recognize the emergencies
- Become familiar with the four main spheres of H/A presentations: acute, acute recurrent, chronic progressive, chronic non progressive – and their most common etiologies
- Decide to proceed – or not – to investigation(s) based on a classic diagnostic process
- Brain MRI > CT scan (except urgent condition or limitation to MRI access)
- Adapt the therapeutic choices to the etiology

Tom, 12-year-old

- Headaches for 2 years
 - Unilateral headache, pulsating, bifrontal, lasting 4-6 h, unable to practice physical activities
 - Twice a week, always during the day
 - Nausea, photophobia, phonophobia
 - No obvious triggering factors
- Normal physical examination
- Additional information?
- Diagnosis?
- Test(s) to be done? Brain imaging?

The International Classification of Headache Disorders, 3rd edition (ICHD-3)

Cephalalgia

33(9) 629–808

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Migraine

Diagnostic criteria:

- A. At least five attacks¹ fulfilling criteria B–D
- B. Headache attacks lasting 4–72 hours (untreated or unsuccessfully treated)^{2,3} 2–72 h in < 18 y-old
- C. Headache has at least two of the following four characteristics:
 - 1. unilateral location Bilateral in < 18 y-old, frontotemporal
 - 2. pulsating quality
 - 3. moderate or severe pain intensity
 - 4. aggravation by or causing avoidance of routine physical activity (e.g. walking or climbing stairs)
- D. During headache at least one of the following:
 - 1. nausea and/or vomiting
 - 2. photophobia and phonophobia
- E. Not better accounted for by another ICHD-3 diagnosis.

Probable migraine: All except one A-D criteria + E

Migraine with aura

Diagnostic criteria:

- A. At least **two attacks** fulfilling criteria B and C
- B. One or more of the following fully reversible aura symptoms:
- | | |
|---------------------------|--|
| 1. visual | In children atypical bilateral visual aura |
| 2. sensory | 1. dysarthria |
| 3. speech and/or language | 2. vertigo |
| 4. motor | 3. tinnitus |
| 5. brainstem | 4. hypacusis |
| 6. retinal | 5. diplopia |
| | 6. ataxia |
| | 7. decreased level of consciousness |
- C. At least two of the following four characteristics:
1. at least one aura symptom spreads gradually over ≥ 5 minutes, and/or two or more symptoms occur in succession
 2. each individual **aura symptom lasts 5-60 minutes¹**
 3. at least one aura symptom is unilateral²
 4. the aura is accompanied, or followed within 60 minutes, by headache
- D. Not better accounted for by another ICHD-3 diagnosis, and transient ischaemic attack has been excluded.

Abortive treatments of migraine

First line:

- Quiet room, rest, darkness
- Ibuprofene 10 mg/kg
- Acetaminophen 15 mg/kg
- Control triggering factors:
snack food, glutamate, chocolate,
tea, coffee, nitrate, cheese...

Second line:

- Axert (Almotriptan): 6.25-12.5 mg PO
- Maxalt (Rizatriptan): 5-10 mg PO
- Imitrex IN (Sumatriptan)
European agency approval and
FDA approval) 6 y old

Combined treatments

Prophylactic treatments of migraine

Evidence level A



- Flunarizine 5 mg PO DIE
- Topiramate 2-3 mg/kg/d

Evidence level B-C



- Vitamin B2 200-400 mg/d
- Propranolol (Inderal[°]) 1-3 mg/kg/d
- Valproic acid 20-30 mg/kg/d
- Amitriptyline (Elavil[°]) 10-20 mg/d
- ...

Cassandra, 15 year-old

- No previous medical history
- Daily and constant headaches for 1 year
- Photophobia occasionally
- Ibuprofen and acetaminophen were ineffective
- Physical examination is entirely normal

- Diagnosis?
- Treatment?

Chronic tension-type headache

The International Classification of Headache Disorders, 3rd edition (ICHD-3)

Diagnostic criteria

- A.** Headache occurring on 15 days per month on average for >3 months (180 days per year), fulfilling criteria B-D
- B.** Lasting hours to days, or unremitting
- C.** At least two of the following four characteristics:
 - 1. bilateral location
 - 2. pressing or tightening (non-pulsating) quality
 - 3. mild or moderate intensity
 - 4. not aggravated by routine physical activity such as walking or climbing stairs
- D.** Both of the following:
 - 1. no more than one of photophobia, phonophobia or mild nausea
 - 2. neither moderate or severe nausea nor vomiting
- E.** Not better accounted for by another ICHD-3 diagnosis.

Chronic Daily Headache in Children and Adolescents

Jack Gladstein, MD, and A. David Rothner, MD

Chronic daily headaches (CDH) in children and adolescents is reviewed. Three major forms of CDH exist: transformed migraine, chronic tension type headache, and new-onset daily persistent headache. Diagnostic criteria, epidemiology, pathophysiology, evaluation, differential diagnosis, and treatment options are discussed.
Semin Pediatr Neurol 17:88-92 © 2010 Published by Elsevier Inc.

Tension-type headache in childhood and adolescence

Pirjo Anttila

Lancet Neurol 2006; 5: 268-74 The prevalence of non-migrainous headache is 10-25% in childhood and adolescence. Although

- Reassurance that no organic disorder is present is needed... no test
- Frank discussion of the role of stress
- Lifestyle*: regular schedule, 8 hours of sleep, adequate hydration (4-6 glasses of water per day), 3 meals per day, daily exercise
- Discontinuing the overuse of analgesic medication, using them no more than twice weekly for bad headaches
- School attendance: no missed school. Patients do not get better if they continue to overuse medication and miss school.
- Combine psychological and medical interventions
- Other medication: B2, amitriptyline...??
- Role of psychopathology, prognosis?

Conclusion: The results from the present study show that overweight, smoking, or low physical activity are independently and in combination associated with recurrent headache among adolescents. The associations observed and the additive effect of these negative lifestyle factors on the prevalence of recurrent headache indicates possible targets for preventive measures. *Neurology*[®] 2010;75:712-717

Chronic Daily Headache in Children and Adolescents

= Chronic tension headache ICD 3 2013

Jack Gladstein, MD, and A. David Rothner, MD

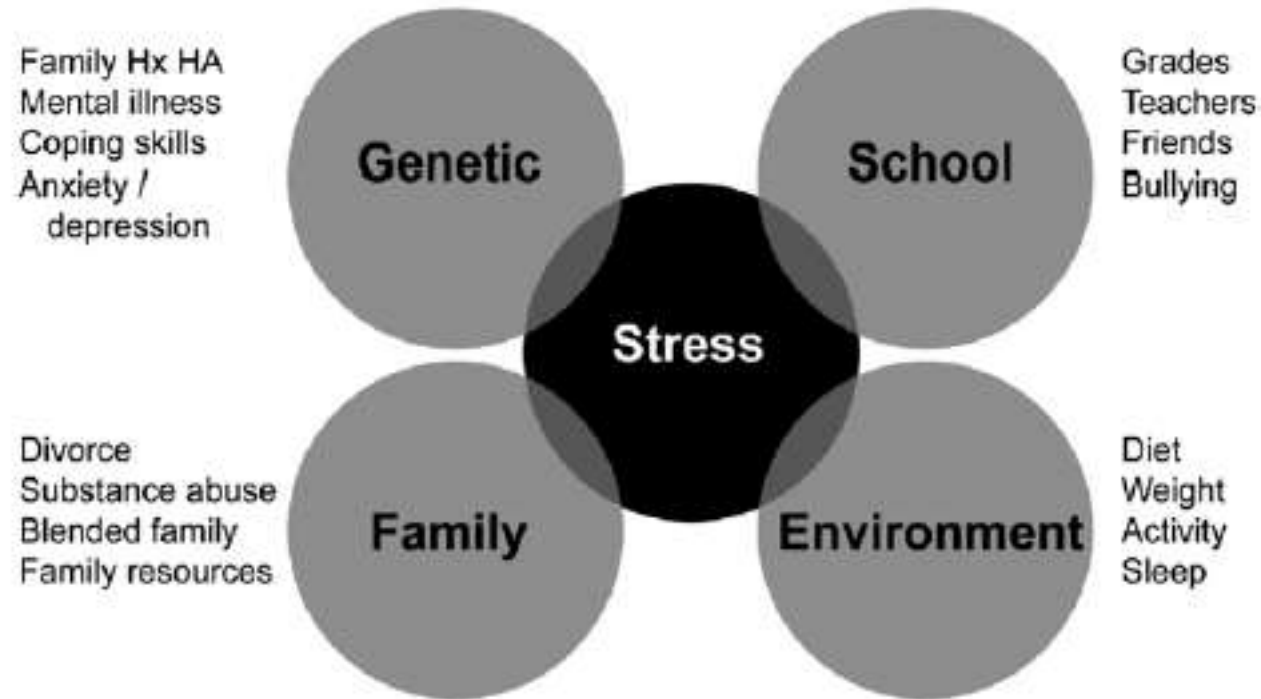


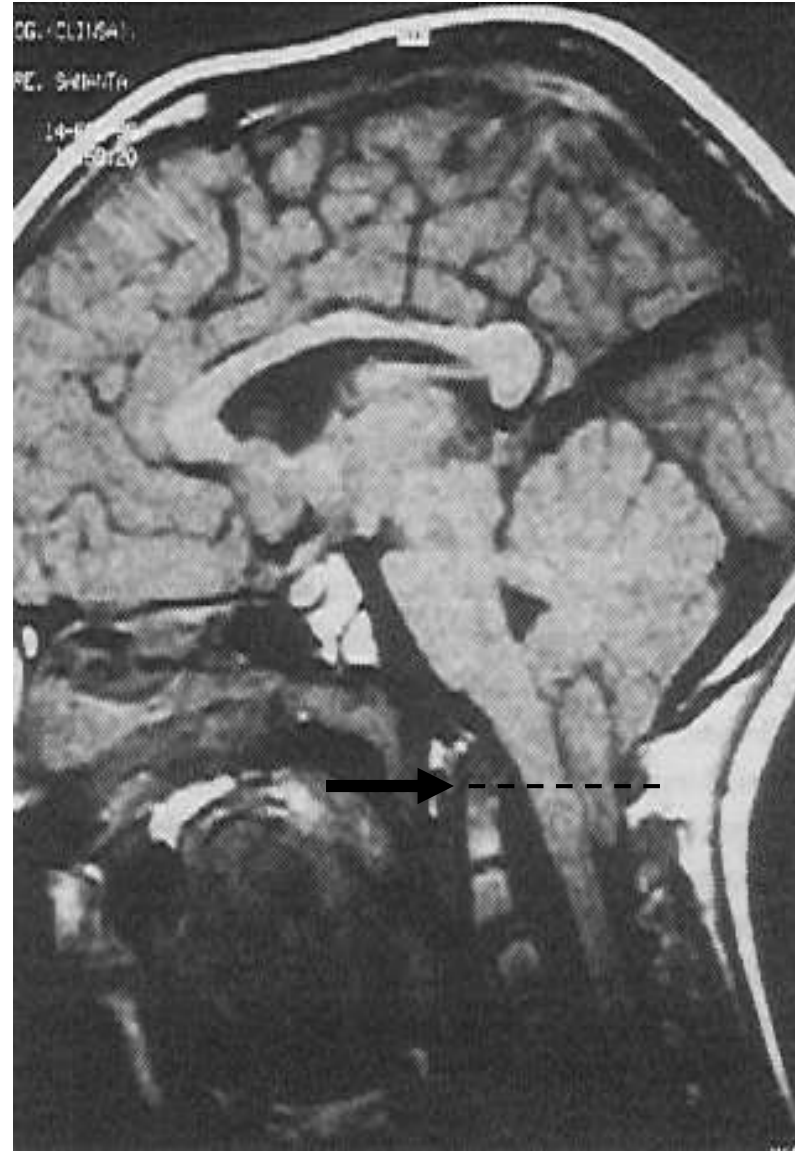
Figure 4 Chronic daily headache substrate.

Charlotte, 4 year-old

- Paroxysmal headache for 2 years:
 - Occipital
 - Triggered or increased by activities ; disappearing at rest
 - Nausea
 - Lasting less than 15 min
 - One episode/1-3 months
- Physical exam:
 - Spontaneous horizontal « micro » nystagmus.
- Diagnostic hypothesis?
- Tests?

Charlotte: Brain MRI

Brain MRI
T1 weighted



Diagnosis: CMI

H/A attributed to Chiari malformation type 1 (CM-1)

Diagnostic criteria

- A. Headache fulfilling criterion C
- B. Chiari malformation type 1 (CM1) has been demonstrated
- C. Evidence of causation demonstrated by at least two of the following:
 - 1. either or both of the following:
 - a) headache has developed in temporal relation to the CM1
 - b) Headache resolved within 3 months after successful treatment of CM1
 - 2. headache has at least one of the following three characteristics:
 - a) precipitated by cough or other Valsalva-like manoeuvre
 - b) occipital or suboccipital location
 - c) lasting <5 minutes
 - 3. headache is associated with other symptoms and/or clinical signs of brainstem, cerebellar, lower cranial nerve and/or cervical spinal cord dysfunction
- D. Not better accounted for by another ICHD-3 diagnosis.

Charlotte, 4 year-old

- Neurosurgical treatment: posterior fossa decompression
- No recurrence of symptom

CM-1 in childhood

- n = 68
- Age: 17 month - 20 ans (M : 11 y-old)
- Symptoms : headache (60%), head tilt, muscle weakness (20%), appendicular and/or axial ataxia (15%)
- Physical exam : cranial nerves anomalies (20%), spinal cord involvement (30%), cerebellar signs (15%), scoliosis (20%)

Headache in Children With Chiari I Malformation

Irene Toldo, MD PhD; Marta Tangari, MD; Rodica Mandari, MD; Egle Perissinotto, MD;
Stefano Sartori, MD PhD; Michela Gatta, MD; Milena Calderone, MD; Pier Antonio Battistella, MD

(*Headache* 2014;54:899-908)

Brief duration of pain
Occipital pain
Headache triggered by physical activity

Clinical Data

Total Study
Population
(N = 45)

Age at onset (years), mean \pm SD (range)	6.2 \pm 4.6 (1-18)
Age at diagnosis (years), mean \pm SD (range)	9.7 \pm 4.7 (1-18)
Sex, Female/Male	20/25
Symptomatic patients, N (%)	21 (47)
Signs or symptoms N (%)	
Headache	29 (64)
CMH*, N (%)	9 (20)
Neck pain, N (%)	8 (17.8)
Paraesthesia, N (%)	5 (11.1)
Back pain, N (%)	3 (6.7)
Vertigo, N (%)	2 (4.4)
Tinnitus, N (%)	2 (4.4)
Visual disorders, N (%)	1 (2.2)
Snoring, N (%)	9 (20)
→ Persisting hiccup, N (%)	6 (13.3)
Ataxia, N (%)	3 (6.7)
Sleep apnea, N (%)	3 (6.7)
Hearing loss, N (%)	2 (4.4)
Opisthotonus, N (%)	1 (2.2)
→ Head tilted, N (%)	1 (2.2)
Dysphagia, N (%)	1 (2.2)
Drooling, N (%)	1 (2.2)

Julia, 10 year-old

- Familial history of migraine
- Headaches:
 - Increasing frequency for 1 month
 - episodes < 48h, often when she awakes up
 - bitemporal, throbbing
 - nausea, occasionally vomiting
- Physical examination: doubt about papilloedema
- Diagnostic hypothesis?
Test(s)?

Julia – Brain MRI

- Normal brain MRI
- LP
 - Pressure: 50 cm H₂O
 - Biochemistry, cytology N



Diagnosis: Pseudotumor cerebri

Cause? Treatment ?

H/A attributed to idiopathic intracranial hypertension (IIH) - ICHD-3

Diagnostic criteria:

A. Any headache fulfilling criterion C

B. Idiopathic intracranial hypertension (IIH) has been diagnosed, with CSF pressure >250 mm CSF (measured by lumbar puncture performed in the lateral decubitus position, without sedative medications, or by epidural or intraventricular monitoring)

C. Evidence of causation demonstrated by at least two of the following:

1. headache has developed in temporal relation to IIH, or led to its discovery
2. headache is relieved by reducing intracranial hypertension
3. headache is aggravated in temporal relation to increase in intracranial pressure

D. Not better accounted for by another ICHD-3 diagnosis.

Etiologies of IIH ?

- Vascular: Sinoveinous thrombosis
- Inflammatory: meningitis
- Iatrogenic: tetracycline, corticotherapy weaning
- Hyper- hypo-vitamin A
- Idiopathic

Julia, 10 year-old

- Treatment
 - Acetazolamide 10 mg/k/d BID, PO, 2 months
 - disappearance of papilledema (M1)
- Evolution
 - Relapse at M4
 - Good response to acetazolamide 10mg/k/d BID, PO, 4 month
 - VA, VF, vision of colours: normal
 - Full recovery and no recurrence (4 year f/u)

Take home messages: IIH

- Epidemiology: obesity, sex ratio (F>M), endocrinopathy?
- Diagnosis: fundoscopy, MRI, CSF
- Treatments: acetazolamide (10 mg/kg/d), prednisone (1 mg/kg/d), surgical (ventriculopéritoneal shunt), optic nerve fenestration

Risk: irreversible optic neuropathy (10-15%) !

Maya, 10 year-old

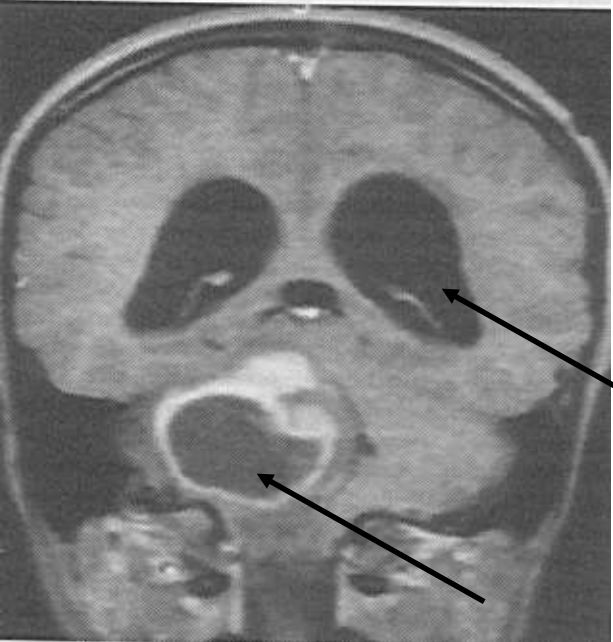
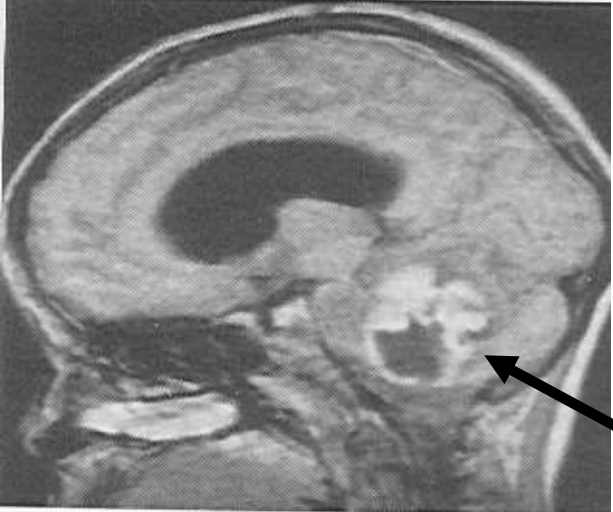
- H/A at awakening with progressive worsening for 3 months, fatigue
- Physical exam : dysmetria of the right hand

Diagnosis ?

Tests ?

Maya, 10 year-old

Brain MRI
T1 + gadolinium



Post-ictal H/A

ICH 2013 pp 722-723

- H/A caused by and occurring within 3 h after an epileptic seizure, and remitting within 72 h after seizure termination.
- Arising from various seizures (generalized tonic-clonic ++)
- Over 40% of patients with temporal and frontal lobe epilepsies, and in up to 60% of patients with occipital lobe epilepsy. More
- Non specific H/A
- Sometimes inaugural

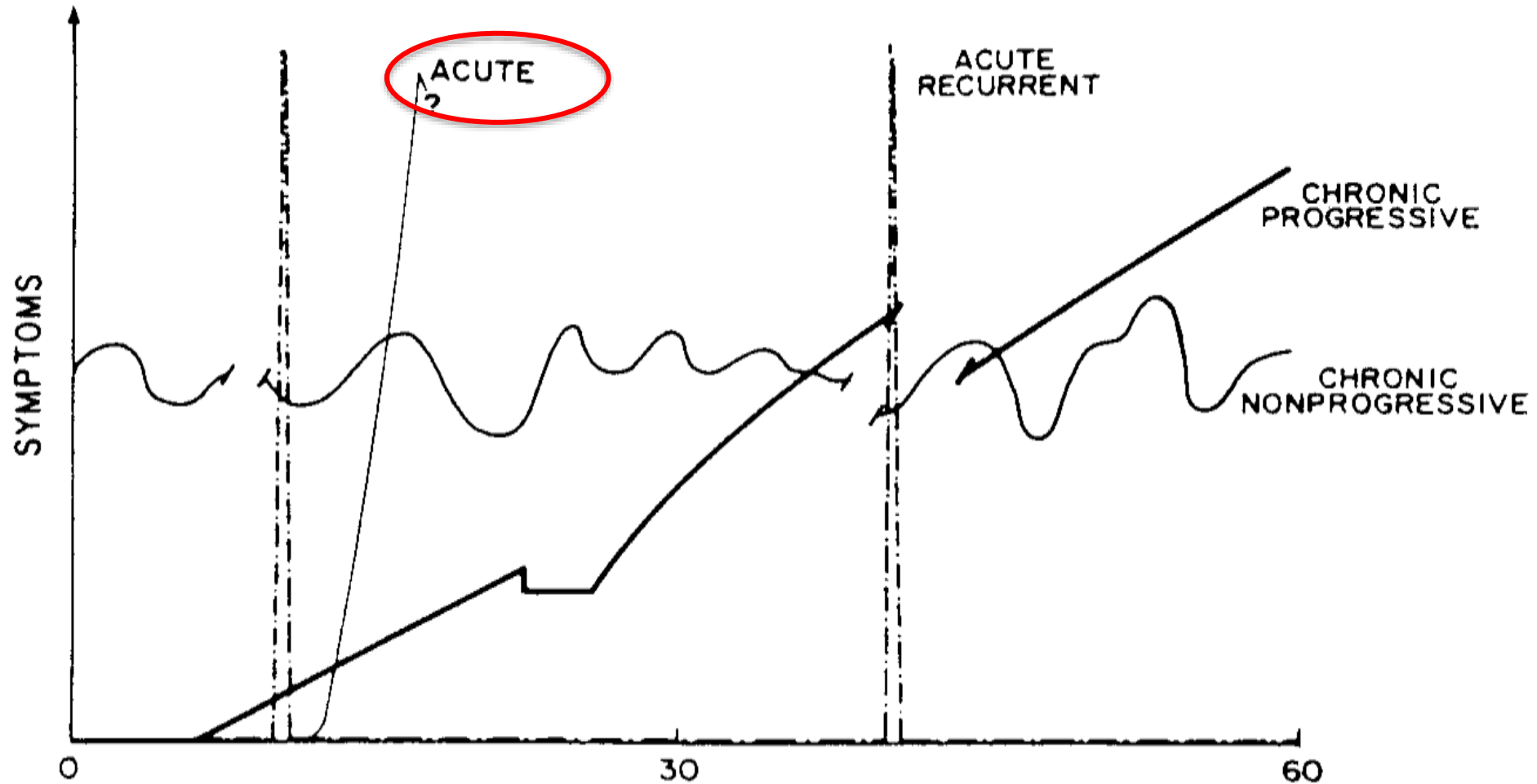
H/A: Main take home messages

The essential of the diagnostic process

- Age, familial and personal history, psychological context, lifestyle
- Evolution profile +++
- **Character of the pain:** triggering factors, severity type, location, duration, timing, associated symptoms: digestive, visual, ENT, dental, head tilt ...
- Physical exam neurological, fundus
- Diagnostic hypothesis ?
- To test or not to test ?

Ask for a log of H/A and their features

Four evolution profiles of pediatric headache

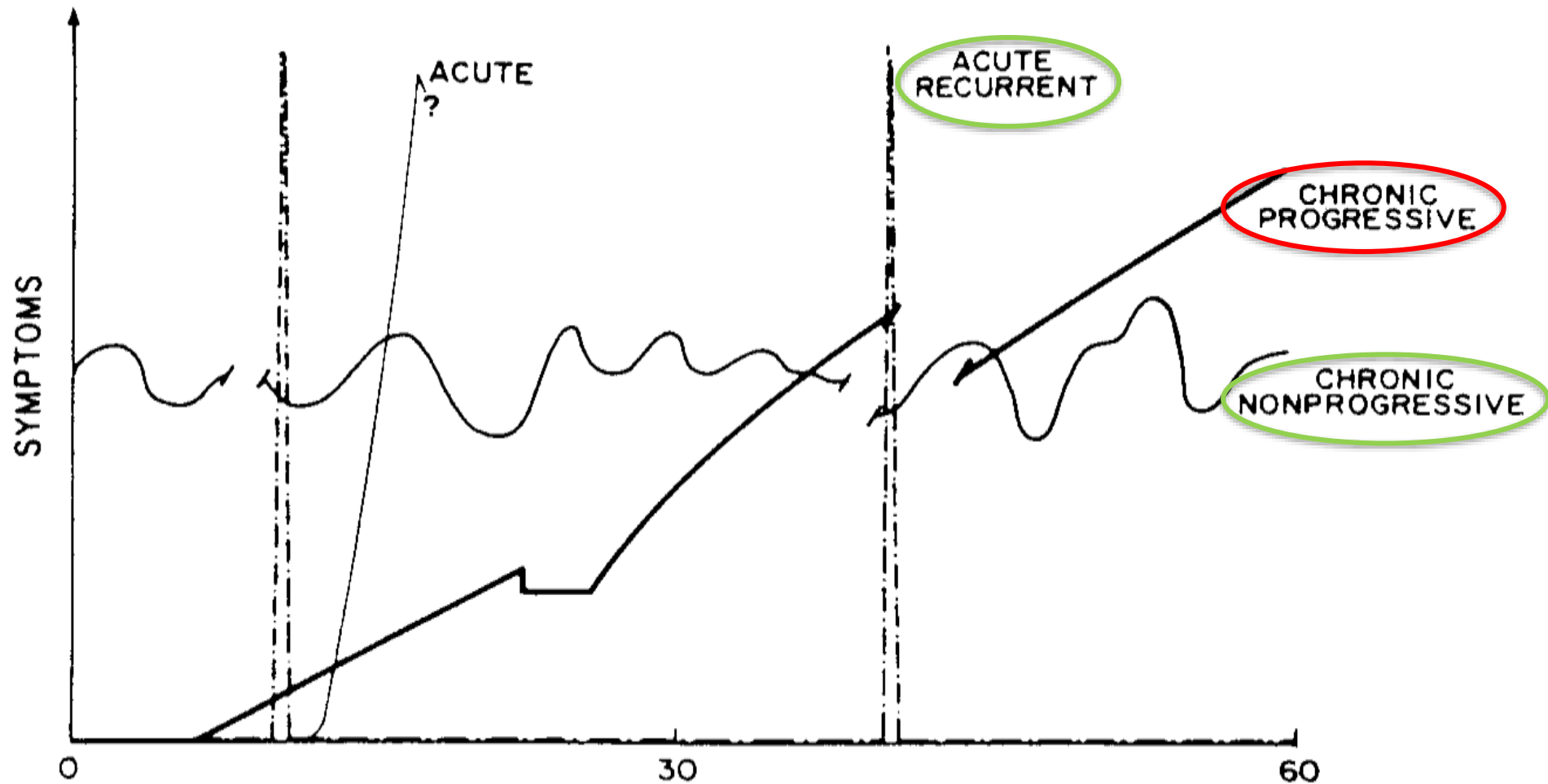


Profiling the H/A: Since when do you have H/A? How often?
Gradual worsening?

Most frequent causes of acute headaches

- Meningitis
- High ICP: tumor, hydrocephalus...
- Idiopathic intracranial hyperpressure
- Sino-venous thrombosis
- More rarely:
 - SAH
 - Toxic (CO, nitrites, glutamate de sodium)
 - Post traumatic
 - Abscess

Four evolution profiles of pediatric headache

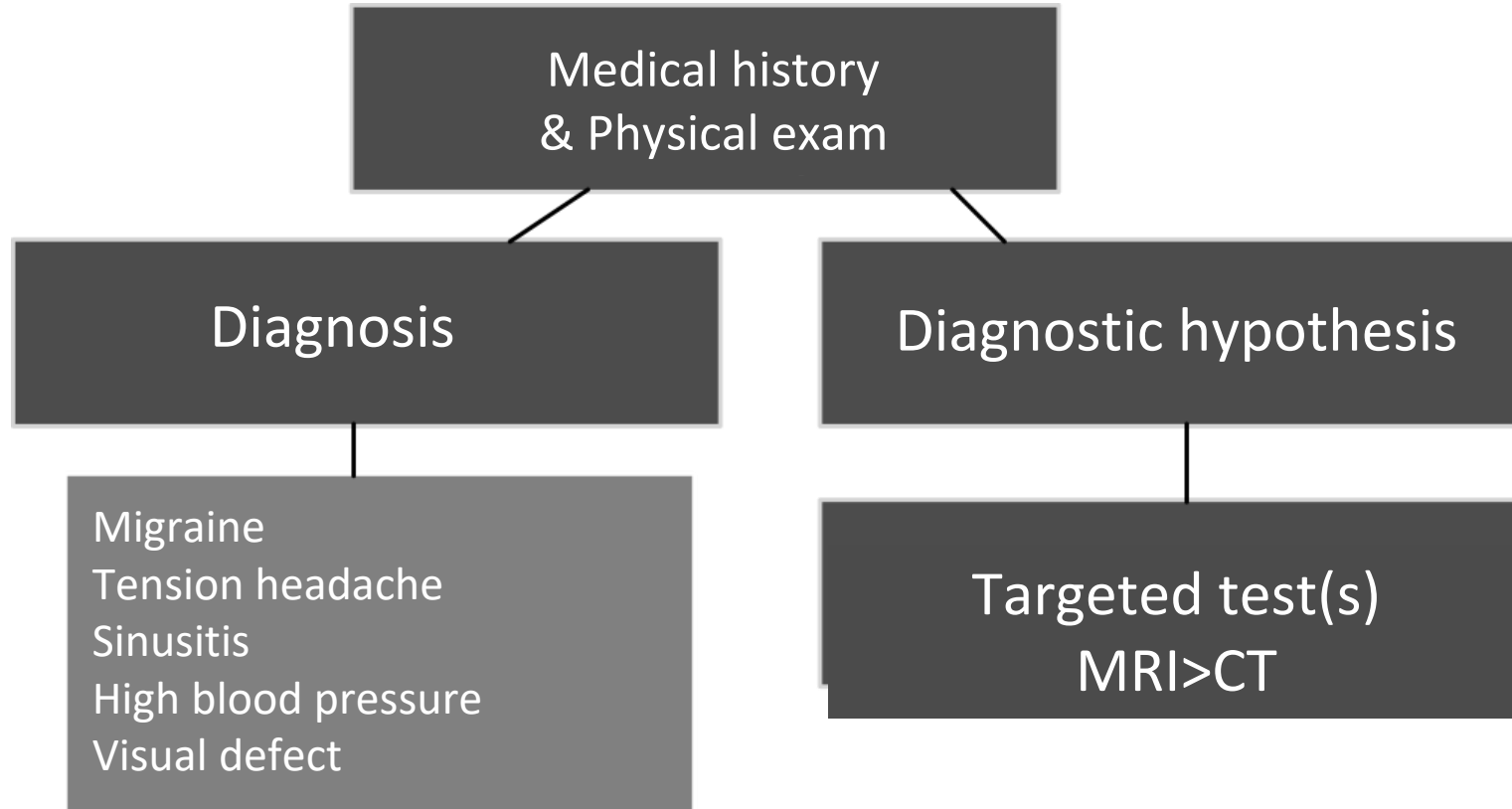


Profiling the H/A: Since when do you have H/A? How often?
Gradual worsening?

Most important points of the physical exam

- Neurological: Head circumference, gait, sensory exam, cranial nerves, ocular movements, ataxia, fundoscopy ...
- Cervical spine
- Blood pressure
- Dental
- Ophthalmology: visual acuity, papilledema
- ENT

Headache: diagnostic process and most common diagnosis



The vast majority of the diagnosis are based on a good medical history and clinical examination!

Conclusion: H/A

- Common reason of consultation
- Recognize the emergencies
- Many different diagnosis
- Targeted investigations based on accurate diagnostic approach/classic medical reasoning and hypothesis
- Brain MRI > CT scan (except urgent condition or limitation to MRI access)
- Therapeutic choices adapted to the etiology