Headaches – when to worry – is a scan always needed?

Regan Solomons
Introduction

- Headache is a common problem in childhood
- Up to 25% of school children suffer from chronic recurrent headaches
- Primary headaches more common than secondary—the latter causes most anxiety for families
- Logical approach to investigating and managing headaches
Part I: The Primary headaches
1. Migraine
2. Tension-type headache
3. Cluster headache and other trigeminal autonomic cephalagias
4. Other primary headaches
International Classification of Headache Disorders II (cont)

- Part II: The Secondary Headaches
  5. Headache attributed to head/neck trauma
  6. Headache attributed to cranial or cervical vascular disorder
  7. Headache attributed to non-vascular intracranial disorder
  8. Headache attributed to substance or its withdrawal
  9. Headache attributed to infection
  10. Headache attributed to disorder of homeostasis
  11. Headache or facial pain attributed to disorder of cranium, neck, eyes, nose, sinuses, teeth, mouth or other facial or cranial structures
  12. Headache attributed to psychiatric disorder
How frequent are daily headaches?

- Wang et al (Neurology 2006)
  - 7900 middle school children age 12-14
    - 2.4% of middle school girls
    - 0.8% of middle school boys
  - 67% had migraine
  - 5% consulted neurologist

- Arruda et al (Neurology 2010)
  - 1547 children aged 5-12 in Brazil
  - 2.2% of girls, 1.1% of boys daily headache
Definition Of Chronic Daily Headache

- Chronic Daily Headache
  - More than 15 headache days per month
  - More than 3 months

- Types of Chronic Daily Headache
  - Chronic Migraine 54%
  - New Daily Persistent Headache 23%
  - Tension-Type Headache 20%
  - Continuous Unilateral Headache 3%

- When we looked at characteristics of these headache patients, there are more similarities than differences. But there are differences......
What is Chronic Migraine?

- International Headache Society (IHS) Criteria
- HA > 15 days/month > 3 months
- > 8 days/month has features of a migraine
  - Unilateral (Bilateral in children)
  - Pulsating
  - Moderate or severe intensity
  - Worse with activity
  - Nausea and/or vomiting
  - Photo- or phonophobia
Chronic Migraine Has Multiple Headache Types

- Low grade 24/7 headache
  - Pain is continuous, lower grade
  - May be worse at particular time of day
  - Will often have migrainous features such as throbbing, nausea, photophobia
  - Would best be described as a tension type headache
Chronic Migraine Has Multiple Headache Types

- Low grade 24/7 headache
- **Severe intermittent headache (migraine)**
  - Similar characteristics to 24/7 headache
  - More photophobia, nausea, need for sleep
  - Worse with exercise
  - Will often occur several times a week
  - Frequently occur in the morning
Chronic Migraine Has Multiple Headache Types

• Low grade 24/7 headache
• Severe intermittent headache (migraine)
• Primary Stabbing Headaches
  • Occur in a small percentage of patients
  • Seconds to minutes in duration
  • Located on different spots on head
  • May be Indomethacin responsive
Chronic Daily Headache Subtypes: NDPH

• New Daily Persistent Headache
  • Sudden onset. Some patients remember the specific hour or day the headaches began
  • No past history of headache
  • May have some migraine features
  • More common in teens than adults
  • Often associated with viral illness
  • Many patients complain of dizziness
Orthostatic Intolerance (dizziness) and NDPH

- Patients with chronic daily headaches have migraines, and many are dizzy during the severe migraine attack
- Ask the patient if they are dizzy “in between” the severe migraine attacks, and 60% respond yes
  - Typically orthostatic (with standing)
  - Varies in severity
- Very prominent in NDPH, particularly in the first few months
Orthostatic Intolerance and NDPH

- The symptoms of dizziness may have to be treated separately from the headache
  - First, increase fluid intake, salt intake
  - Second, use beta-blocker to counteract tachycardia
    - Metoprolol (Toprol) 25 mg in am and at noon
  - If significant hypotension, consider alpha-adrenergic agonist
Chronic Daily Headache Subtypes: Hemicrania Continua

- Hemicrania Continua
  - Unilateral, side-locked
  - Continuous with exacerbations
  - Autonomic features
    - Ptosis
    - Nasal congestion
    - Conjunctival injection
  - Indomethacin responsive
Chronic Daily Headache Subtypes: Hemicrania Continua

• Hemicrania continua reported as young as 8 years of age

• Unilateral CDH occurs in approximately 3% (17/589) of patients but typically do not meet full IHS criteria for HC (Ji and Mack, Headache 2009)

• Trial of indomethacin should be considered
  • 25 mg tid x 3 days, then if needed
  • 50 mg tid x 3 days, then if needed
  • 75 mg tid x 3 days
Chronic Daily Headache Prognosis

• Wang et al, Neurology 2009
  • 50% improved after 1 year
  • 75% improved after 2 years
  • 12% had CDH 8 years latter
History

• A detailed history vital in identifying the characteristics of the headache
• Exclude secondary causes of headache
Basic headache questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Clinical features</th>
<th>Likely diagnosis</th>
<th>Management pointer</th>
</tr>
</thead>
<tbody>
<tr>
<td>When did the headache start?</td>
<td>Acute, non-progressive</td>
<td>Local cause</td>
<td>Not pathological, analgesics</td>
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<tr>
<td></td>
<td>Acute, evolving</td>
<td>Possible brain tumour</td>
<td>Refer, neuro-imaging</td>
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<td></td>
<td>Chronic</td>
<td>Migraine</td>
<td>Non-pharmacological and pharmacological</td>
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<td>approaches</td>
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<td>Analgesics</td>
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<tr>
<td>What is the pattern of headache?</td>
<td>Intermittent</td>
<td>Tension-type headache</td>
<td>Non-pharmacological and pharmacological</td>
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<td>Worsening</td>
<td>Migraine</td>
<td>approaches</td>
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<td></td>
<td>Chronic, non-progressive</td>
<td></td>
<td>Analgesics</td>
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<tr>
<td>What is the headache frequency?</td>
<td>Daily to few times a week</td>
<td>Intracranial pathology</td>
<td>Refer, neuro-imaging</td>
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<tr>
<td></td>
<td>Weekly to monthly</td>
<td>Tension-type headache</td>
<td>Analgesics</td>
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<td></td>
<td>Clusters of few times a week for</td>
<td>Migraine</td>
<td>Non-pharmacological and pharmacological</td>
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<td>a few weeks, long asymptomatic</td>
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<td>approaches</td>
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<tr>
<td></td>
<td>periods</td>
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<td>Analgesics</td>
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<tr>
<td>Do the headaches occur at a specific time?</td>
<td>Night or early morning</td>
<td>Cluster headache</td>
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<td>Is an aura or prodrome present?</td>
<td>Present</td>
<td></td>
<td></td>
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<tr>
<td>Where is the pain?</td>
<td>Unilateral persistent</td>
<td>Migraine</td>
<td>Non-pharmacological and pharmacological</td>
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<td>Bifrontal</td>
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<td>approaches</td>
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<td>Refer, neuro-imaging</td>
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<tr>
<td></td>
<td>Diffuse</td>
<td>Intracranial pathology</td>
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<td></td>
<td>Intermittent nausea, vomiting,</td>
<td>Secondary cause</td>
<td>Refer, neuro-imaging</td>
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<td></td>
<td>photophobia</td>
<td>Migraine</td>
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<td></td>
<td>Persistent nausea, vomiting,</td>
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<td>Refer, neuro-imaging</td>
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<td></td>
<td>photophobia</td>
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<tr>
<td>Are there any associated symptoms?</td>
<td>Relief with analgesics</td>
<td>Tension-type headache</td>
<td>Analgesics</td>
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<td></td>
<td></td>
<td>Migraine</td>
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<td>Relief with sleep</td>
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<td>approaches</td>
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<td></td>
<td>Intracranial pathology</td>
<td>Refer, neuro-imaging</td>
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<tr>
<td>Are there any aggravating or relieving factors?</td>
<td>Relief with analgesics</td>
<td>Migraine, tension-type</td>
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<td></td>
<td></td>
<td>headache</td>
<td>Non-pharmacological and pharmacological</td>
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<td>Worsened by light, noise, activity</td>
<td>Migraine</td>
<td>approaches</td>
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<td></td>
<td>Refer, neuro-imaging</td>
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<tr>
<td></td>
<td>Worsened by lying down</td>
<td>Raised intracranial pressure</td>
<td>Refer, neuro-imaging</td>
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Headache questions (cont)

• Is there any head injury assoc with headache onset?
• Were there any convulsions?
• Have there been any changes in walking, balance, vision, behaviour, speech, school performance?
General examination

- Vital signs, incl BP and temp
- Meningitis excluded if pyrexia
- Skin features of neurocutaneous syndromes
- Increased head circumference can reflect chronically raised intracranial pressure
- Exclude non-neurologic causes of headache by exam of ENT, sinuses, teeth, TMJ & c/spine
- Evaluate visual acuity by a Snellen’s chart to exclude refractive errors
Neurological examination

- Majority of children- normal neurological examination
- Neuro clues indicating a secondary cause of headache-
  - depressed or altered level of consciousness
  - meningism
  - papilloedema (useful in older children to confirm raised intracranial pressure)
  - focal signs, including cranial nerve palsies and hemiparesis
- Headache assoc with papilloedema and abducens palsy as the only abn neuro findings, common presentation of benign intracranial hypertension
Investigations

- Guided by history and clinical findings
- Most headaches idiopathic

- Brain tumour rare cause; 3-5 per 100,000
  - of these 10% presents with headache as only symptom
  - For every child with brain tumour presenting with headache as only feature, at least 50,000 with recurrent headache

- Investigating all children with chronic headache & normal neuro exam by neurimaging therefore not feasible
Investigations 2

- Neuroimaging yield in uncomplicated migraine 3.7% chronic migraine 16%
- Abnormalities incidental- arachnoid cysts, Chiari I, sinus dx, occult vasc malformations, dilated Virchow-Robin spaces- none needed surgical intervention

- The utility of neuroimaging in the evaluation of children with migraine or chronic daily headache who have normal neurological examinations. Lewis, Dorbad. Headache. 2000;40(8):629
Investigations 3

- Neuroimaging indicated in certain situations
- MRI is neuroimaging of choice but in resource limited settings, CT is the logical alternative
Indications for neuroimaging in children with headache

1. Abn neuro exam - focal neuro signs, abn eye movements, ataxia, hemiparesis, papilloedema

2. Headache characteristics such as:
   - headache on awakening
   - headaches always occurring on the same side of the head
   - headaches with change of posture/sneezing/coughing
   - unusual location eg occipital headaches
   - headaches causing sleep interruption
   - worst headache of life
   - chronic-progressive pattern
Indications for neuroimaging in children with headache 2

3. Deterioration in school work & personality change
4. Presence of VP shunt
5. Presence of neurocutaneous features
6. Headache in child under 3 years of age
Management of primary headache

- Multi-disciplinary approach involving GP or paediatrician, schoolteacher, dietician and psychologist

- Input from the family essential to ensure successful treatment of a condition as complex as childhood headaches

- Pharmacologic and non-pharmacologic approaches
Non-pharmacological management

- Bio-behavioural treatment comprises treatment adherence, lifestyle management & psychological interventions

- TREATMENT ADHERENCE
  - Keeping a headache diary useful
  - Provides info regarding pattern & frequency of headaches and response to interventions
Non-pharmacological management 2

- LIFESTYLE MANAGEMENT
  - good sleep hygiene
  - regular exercise
  - decreasing amount of caffeinated drinks

- PSYCHOLOGICAL INTERVENTIONS
  - Includes relaxation therapy
Drawings

- Obtaining a history difficult in young children

- Children’s drawings very useful in the diagnosis of paediatric headaches

- In a large study, identification of elements of children’s drawings enabled differentiation between migraine, tension-type headache & other headaches
Drawings 2
Drawings 2

Migraine

Tension-type headache
Acute pharmacologic management

- Aim of acute pharmacologic Rx is rapid return to normal function with minimal s/e
- Ibuprofen 10mg/kg/dose shown to be superior to placebo
  - Equiv to acetaminophen 15mg/kg/dose in Mx of paediatric migraine
- If non-steroidals ineffective, serotonin-receptor agonists option
  - Nasal sumatriptan 10mg (20 to 39kg) and 20mg (>39kg) shown to be effective 8-17 yrs
  - Oral rizatriptan 5mg (20-39kg) and 10mg (>39kg) 8-17 yrs
Acute pharmacologic management 2

- Analgesic headache occurs when drugs given for the treatment of headache aggravates headache symptoms.

- Recognised in children and may be induced by mild analgesics eg paracetamol, used in isolation.

- Diagnosis confirmed when abrupt withdrawal of analgesic drugs leads to headache resolution.
Prophylactic management

- Children with frequent headaches that interfere with daily lifestyle & result in functional disability

- Prospective RCT’s evaluating preventative Rx in children are scanty

- Few studies published hampered by placebo response rates as high as 50%
Prophylactic management (cont)

- Children with frequent headaches that interfere with daily lifestyle & result in functional disability
- Prospective randomized-controlled trials evaluating preventative Rx in children are scanty
- Goals
  - Reduce headache frequency by 50%
  - Rare to get zero headache
  - 1-2 HA per month is great control
  - Aim for 6 months of good HA control
- Few studies published hampered by placebo response rates as high as 50%
Complete List of Randomized Controlled Trials In Children & Adolescents
Randomized Controlled Trials In Adults

• Topiramate
  • Silberstein et al, Headache, 2009
  • In adults with CDH, RCT showed a reduction in headache days, and improvement in quality of life. Still the effect was mild, with only 37% of topiramate Treated patients (versus 28% of placebo treated) showing a greater than 50% reduction in the number of headache days.

• Lewis et al, Pediatrics, 2009
  • In adolescents with EM, it was shown in an intent to treat RCT study that 100 mg/day of topiramate was effective in reducing monthly migraine days (72% vs 44%), whereas 50 mg/day was no different than placebo.
Randomized Controlled Trials In Adults

• Amitriptyline

• Descombes et al, Headache 2001
  • 10 vs 7 patients. Headache frequency decreased by 45% in amitriptyline group (25-75 mg/day) versus 28% in active placebo (2 mg trihexyphenidyl) from baseline of 25 days/month.

• Hershey et al, Headache 2000
  • There are no RCTs in children with CM
    Amitriptyline (up to 1 mg/kg/day) was used in an uncontrolled retrospective study looking at 192 children with migraine, both EM and CM. 84% of children reported feeling better, with a reduction in mean headache days from 17 to 9 days per month. Severity of headaches was also decreased. The subgroup analysis also revealed these improvements in patients with daily headaches.
Randomized Controlled Trials In Adults

• Valproate
  • Freitag et al, Headache 2001
    • Retrospective chart review in adult CDH patients who use valproate, that reported 93 of 138 patients experiencing a > 50% reduction in headache frequency.

• Yurekli et al, J Headache Pain 2008
  • A smaller (40 vs 30) prospective double blind RCT demonstrated that VPA effective in reducing pain severity and frequency in adults with CM/CTTH.

• Apostol, Lewis et al, Headache 2009
  • Large open label childhood study of valproate in EM, at a dose of 250-1000 mg/day, which showed a reduction in headache frequency from 4 days/month to 1 day/month.
Randomized Controlled Trials In Adults

- **Gabapentin**
- Spira et al, Neurology 2003
  - A placebo-controlled RCT study of adults with CDH showed a modest 9% benefit in headache free days with gabapentin *(30 days to 27 days)*, and severity
  
  - up to 2400 mg of **gabapentin** per day
Randomized Controlled Trials In Adults

- **Propranolol**
  - There are no trials comparing propranolol to placebo in CDH
  - Silberstein et al, Neurology, 2012
  - Add-on trial to topiramate- either propranolol or placebo. Primary outcome was 28-day moderate to severe headache rate reduction. **No significant difference.**
Randomized Controlled Trials In Adults

• Botox
• Aurora, Diener, Dodick et al Cephalalgia 2010
  • Recent double-blind placebo-controlled trials of Botox has shown a decreased number of headache days (-7.8 vs -6.4 days/28) in adults with chronic migraine.
    Started at 20 HA days/28 at baseline
  • $450 per headache day
  • $81 per headache day w/ placebo effect