POST-TRAUMATIC HEADACHE ASSESSMENT

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INTRODUCTION

- Post-traumatic headache (PTHA) or cephalalgia is often diagnosed after closed head injury and traumatic brain injury (TBI) but remains poorly understood on multiple levels.
- The assessment methodologies for PTHA have not been well studied.
- The history and physical exam are two critical pieces of any clinician’s assessment that serve to guide a correct diagnosis, as well as correct treatment.
Using only the International Headache Society Classification can lead to false positive headache diagnoses.

Aching, throbbing pain can be seen with migraine, tension-type headache (TTHA), temporomandibular joint disorder (TMJD), site of impact injuries and referred cervicogenic pain.

Autonomic concomitants can be seen with migraine, TTHA, and certain referred headache pains.
Unilateral versus bilateral headache can be seen with numerous different PTHA disorders.
Laterality or absence thereof is not pathognomonic for any particular PTHA phenotype.
SYMPTOMS POTENTIALLY ASSOCIATED WITH PTHA

- Irritability
- Depression
- Anxiety
- Cognitive impairment
- Phonosensitivity
- Photosensitivity
- Tinnitus
- Insomnia
- Blurred vision
- Nausea but rarely emesis
- Aura (migraine specific)
Clinicians should not only rely on classification systems but more importantly on PTHA history, physical exam and a knowledge of the known PTHA pain generators.

The first goal should be to use good differential diagnosis to identify the most likely PTHA pain generators.

Don’t stop after just the first one as there are often more than one cause.
There are no standardized or evidence based exam protocols for any sub-type of PTHA.

There is a high degree of examiner variability in how long is spent in PTHA evaluation, what historical information is garnered and how thoroughly the patient is actually examined.
HISTORY OF PTHA

- Pre-injury headache history
- Family headache history
- Temporal relationship of headache with injury
- Evolution of headache symptoms over time
- Prior treatment for headache
- Treatment response history
“Colder” mnemonic

Severity and frequency

Time of day

Prodromal symptoms

Triggers

Associated headache symptoms

Functional consequences

Dietary, lifestyle, hormonal and/or genetic influences?
EXAMINATION

- **INSPECTION:**
  - Body asymmetries including shoulder droop, pelvic asymmetry, hemiatrophy, leg length discrepancy (may be functional), and hemi-gait.
  - Posture including head forward posture, loss of cervical lordosis, rounded shoulders, kyphosis, dystonic posturing, spastic posturing.
  - Range of motion assessment - jaw range of motion (ROM), cervical spinal ROM.
http://en.memory-alpha.org/wiki/Vulcan_mind_meld
EXAMINATION

- Auscultation:
  - TMJ as indicated
  - Bruit check – 4 sites – as indicated

- Palpation:
  - Shoulder girdle, neck, face (masticatory muscles) and head including TMJ
  - Assess muscle turgor, soft tissue irritability, vertebral somatic dysfunction, trigger vs. tender points, sensory changes (allodynia, dysesthetic, etc.), + Tinel’s
EXAMINATION

- Screening neurological exam
- Response bias assessment
- Psychoemotional evaluation
  - Adjustment disorder
  - Depression
  - Anxiety
  - PTSD
  - Stress tolerance and coping
MAJOR PTHA SUBTYPES

- Cervicogenic
- Musculoskeletal
- Myofascial
- TMJD
- Neuritic and neuralgic
- Migraine
- Tension
- Medication overuse headache (MOH)
- Medication induced headache (MIH)
There are unusual and uncommon causes of PTHA – know them!
Not all PTHA is in fact post-traumatic – keep in mind other non-traumatic headache disorders, temporal onset may lead to misattribution:
- Pre-existing headache disorders (may be exacerbated or aggravated) by trauma
- Substance abuse
- Sinus disease
- Temporal arteritis
- Space occupying lesions
- Caffeine withdrawal
UNCOMMON CAUSES OF PTHA

- Cluster headache
- Paroxysmal hemicrania
- Late or slow extra-axial bleeds
- Post-traumatic epilepsy
- Intracranial pressure abnormalities
- Tension pneumocephalus
- Carotid cavernous fistula
- Post-traumatic sinus headache
Cervicogenic headaches may be related to dysfunction of the facet joints (Bogduk, 2005).

Others have hypothesized that chronic pain following cervical acceleration-deceleration type injuries may be due to central sensitization (Curatolo, Arendt-Nielsen, Petersen-Felix, 2004).
CERVICOCOGENIC HEADACHE

- Cervicogenic headache is quite common following trauma.
- Some have argued that it is likely the most common etiology of post-traumatic headache.
- Numerous treatments have been assessed, most with sub-optimal study methodologies.
Whiplash Injuries (Head and Neck)

Used with permission from: http://alliancerehab.info/conditions-we-treat/whiplash.html
Most patients present with unilateral (albeit sometimes bilateral) sub-occipital pain as well as secondary oculo-frontotemporal discomfort/pain.

Dysfunction of the cervical zygapophyseal joints, particularly at C2 and C3 may refer pain into the head.
Controversial issues:

- Ligamentous referred pain (e.g. transverse ligament of the atlas)
- Cervical instability as a cause of pain and headache
- Methods for assessing instability
- What defines clinically significant instability?
CERVICAL INSTABILITY

- Cervical instability is commonly associated with the upper cervical spine.
- The alar and transverse ligaments provide the primary source of stability for the upper spine.
Up to 3 mm of displacement of the atlas on the axis implies that the transverse ligament is likely intact, while ligament laxity and even rupture are implied if displacement is from 3–5 mm.

When displacement exceeds 5 mm, it may be assumed that the ligament has ruptured and the accessory ligaments are stretched and partially deficient.
The alar ligaments connect the cranium to C1 from the sides of the dens to the lateral borders of the foramen magnum.

The alar ligaments function to prevent excessive rotation at the atlanto-occipital joint and is most commonly injured in MVA’s.

Less likely to lead to neuro-vascular injury.
The transverse ligament is located across the arch of the atlas and positions the dens against the anterior arch of the atlas.

Limits flexion and provides support from anterior translation of C1.

If the transverse ligament is disrupted by injury, neural or vascular compromise could occur due to the proximity of the cord and vertebral arteries.
CLINICAL BEDSIDE TESTING FOR UPPER CERVICAL INSTABILITY

- Sharp-Purser test - + test if decrease in symptoms and/or clunk and no sliding with posterior to anterior movement
- Alar ligament stress test - + test if with passive movement there is a lag or delay of C2 spinous process movement
- Anterior shear test or transverse ligament test - + test if there is a sensation of lump in the throat or the presence of cardinal signs
Sharp-Purser Test

Photo Source: Physiopedia.com
Alar ligament stress test
Anterior shear test or transverse ligament test
In contrast to the upper cervical spine, the frontal plane orientation of facet joints of the lower cervical spine serves as the primary source of stability.

Spinal segments contributing to lower cervical spinal syndrome (LCSS) include ligamentum nuchae, anterior longitudinal ligament, posterior longitudinal ligament and the ligamentum flavum.
Dull aching type pain
Tends to be constant
Typically improves with time
Activity and barometric pressure changes may exacerbate the headache
Most common PTHA variant
Pressure/tension
Worse with stooping bending and exertion
May be associated with dizziness and photosensitivity
Referred pain patterns critical to understand
Patients may present with unusual symptoms associated with myofascial pain dysfunction zone of referred pain that CPT can explain.

Myofascial pain is very common in the sternocleidomastoid (SCM) and trapezius after whiplash or inertial injury.

Zone of referred pain for the SCM extends to retro- and peri-orbital areas.
CONVERGENCE PROJECTION THEORY AND MYOFASCIAL PAIN

- Overlap exists in the sensory dermatomes for the SCM and the trigeminal tract.
- The second order neurons from CN VII, IX and X are located nearby in the nucleus caudalis of V.
- The zone of referred pain to the ear overlaps with the vagus sensory area.
Sternocleidomastoid

Source: http://round-earth.com/HeadPainIntro.html, with permission to use by C.M. Shifflett
Splenius cervicis

Source: http://round-earth.com/HeadPainIntro.html with permission to use by C.M. Shifflett
Semispinalis capitis

Source: [http://round-earth.com/HeadPainIntro.html](http://round-earth.com/HeadPainIntro.html) with permission to use by C.M. Shifflett
Sub-occipital muscles

Source: http://round-earth.com/HeadPainIntro.html with permission to use by C.M. Shifflett
Occipitofrontalis

Source: [http://round-earth.com/HeadPainIntro.html](http://round-earth.com/HeadPainIntro.html) with permission to use by C.M. Shifflett
Upper crossed syndrome
HEADACHE SYMPTOMS ASSOCIATED WITH POST-TRAUMATIC TMJ

- Localized ache
- MPD > Intra-articular injury
- Jaw ROM test
CRANIOMANDIBULAR PTHA

- A frequently overlooked cause of PTHA.
- Clicking, popping or malocclusion of the joint may occur.
- Non-traumatic causes are common:
  - stress
  - dental malocclusion
  - prior psychosexual abuse
Neuritic scalp pain may occur from local blunt trauma, surgical scalp incision or penetrating scalp injuries.

Occasionally, neuromatous lesions may form after scalp nerve injury and serve as a pain nidus.

Pain complaints may vary from only reports of dysesthetic “numbness” discomfort on touching to lacinating type pain that spontaneously occurs without provocative measures.
Occipital nerve pain is typically felt at the craniocervical junction and the sensory distribution of the nerve (e.g. C2).

The affected nerve is tender to palpation.

Palpation generally replicates the pain associated with the headache (e.g. stabbing quality).

There is frequently referral of pain into the ipsilateral frontotemporal scalp and less frequently retro-orbitally.
Holliday’s Facial Pain Map 10/30/08
Supraorbital Neuralgia pain in right eye and cheek constant for 14 years.
Pain level at 8 - 10 jabbing & stabbing pain.

Auriculotemporal nerve
Zygomaticotemporal nerve

Supraorbital nerve
Supratrochlear nerve

Supraorbital Neuralgia
red = pain areas

Source: Brain Injury Medicine, 2013
NEUROMA AND NEURALGIC HEADACHE

- For greater occipital nerve or lesser occipital nerve in particular, clinicians should be familiar with the anatomy of the region given risks of vascular trauma with aberrantly placed injections.
- In either situation, myofascial pain may be a secondary or perpetuating pain generator and must be treated as well (typically first).
Possible findings during a migraine include the following:
- Cranial/cervical muscle tenderness
- Horner syndrome (relative miosis with 1-2 mm of ptosis on the same side as the headache)
- Conjunctival injection
- Tachycardia/bradycardia
Hypertension/hypotension
Hemisensory or hemiparetic neurologic deficits (implies complicated migraine)
Adie-type pupil (poor light reactivity, with near dissociation to light)
Look for nociceptive afferent pain generators
Findings in TTHA:
- Normal neurologic examination
- Tenderness may be elicited in the scalp or neck, but no other positive physical exam findings should be noted.
- Pain should not be elicited over temporal arteries or positive trigger zones.
Some patients with occipital tension headaches may be very tender when upper cervical muscles are palpated.

Pain associated with neck flexion and stretching of paracervical muscles must be distinguished from nuchal rigidity associated with meningeal irritation.

Look for nociceptive afferent pain generators
Understanding how to take a PTHA history can significantly improve the clinician’s odds of honing in on the specific pain generators involved in headache production.

Understanding the complexities of the PTHA physical exam are crucial to confirmation of headache pain generators and to guiding appropriate PTHA treatment.

Strong PTHA headache assessment skills are crucial to optimizing patient clinical outcomes.
QUESTIONS AND ANSWERS
Thank You

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