

**Headache after Traumatic Brain Injury**

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**Headache**

Primary

HEADACHE TYPE

Sinus      Tension      Migraine      Cluster

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**Headache**

Secondary

- Hypothyroidism
- Hypertension
- Pregnancy
- Acute sinusitis
- Carbon monoxide poisoning
- Dehydration/metabolic issues
- Systemic issues, such as infection
- Rebound or medication overuse
- Stroke
- Tumor

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### Headache after TBI

- Is the most common physical symptom secondary to TBI
- Incidence (71%) and prevalence (44% at 1 year) for moderate to severe TBI
- Incidence (91%) and prevalence (58% at 1 year) for mild TBI
- Post-traumatic headache (PTH) classified as a secondary headache disorder in the International Classification of Headache Disorders (ICHD-3)

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### Diagnosis of PTH

- Onset of headache within 7 days of the injury, or alternatively within 7 days of regaining consciousness or recovering to the ability to sense and report pain
- Beyond 7 days, but within first 3 months after injury is considered “delayed onset” acute PTH
- In cases where there is a pre-existing primary headache D/O, diagnosis of PTH requires worsening of pre-existing headache in close temporal relationship to injury

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### Differences/similarities in PTH by severity of TBI

- mTBI survivors have reported more severe headaches relative to survivors of moderate to severe TBI
- The frequency of headaches was not significantly different between mTBI and moderate to severe TBI survivors
- mTBI survivors reported more impact of headaches on daily functioning

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### Differences/similarities in PTH by severity of TBI

- Providers should be aware of the association between headache secondary to injury and emotional disruption
- The degree of depressive symptoms does not appear to differ on the basis of severity of TBI

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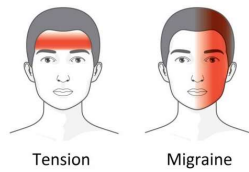
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### Types of post-traumatic headaches

- Migraine headaches (migraine-like phenotype) tend to be the most common type of headache following injury
- Tension headaches are the second-most reported PTH type

#### HEADACHE TYPE



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### Types of post-traumatic headaches

- Data within studies reflect headache classifications that vary substantially and are typically reported as migraine/possible migraine, tension, cervicogenic, or unclassifiable.

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## Migraine PTH

- Controversy regarding classification as secondary
- Diverse presentation qualities
- General descriptors and associated symptoms



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## Tension headache

- Secondary to muscle tension
- Secondary to problems in bones, joints, or nerves in neck
- When mixed with neurological symptoms directly attributable to TBI, can confound Dx



Muscle tension in the face, neck, and shoulders may cause tension headache

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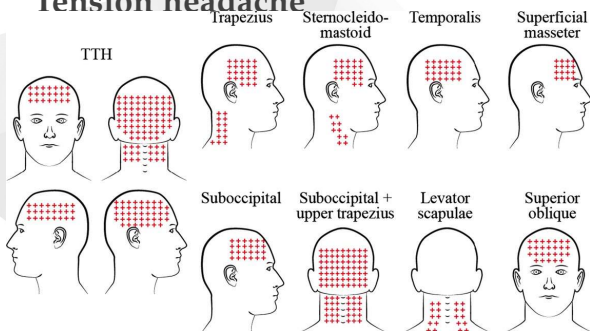
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## Tension headache



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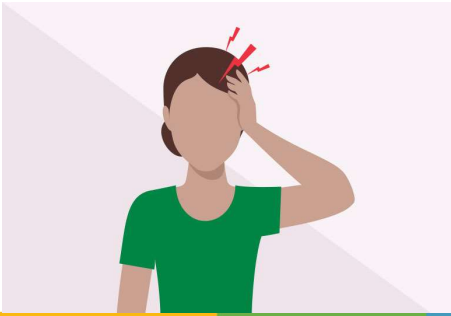
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### Risk factors for PTH



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### Risk factors for acute PTH

- Lieba-Samal et al. (2011)
  - 100 civilian adults with mTBI
  - Analyzed risk factors of age, sex, number of post-traumatic symptoms, LOC, Hx of primary headache D/O, Hx of chronic pain, current Tx for depression/anxiety
  - Only significant finding associated with number of post-traumatic symptoms

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### Risk factors for acute PTH

- Jouzdani et al. (2014)
  - 30 military adults with mTBI
  - Analyzed risk factors of age, number of post-traumatic symptoms, blast-induced versus non-blast-induced injury
  - Only significant finding associated with number of post-traumatic symptoms

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### Risk factors for acute PTH

- Kontos et al. (2013)
  - 138 athletes (high school football) with mTBI
  - Analyzed risk factors of age, history of primary headache disorder, previous TBIs, attention or learning disorders
  - No significant findings

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### Risk factors for persistent PTH

- No studies identified that reported risk factors for persistent PTH as defined by any version of ICHD criteria, but...
- Five other studies within the acute PTH systemic review defined PTH as developing at any time point during follow-up period
- Identified risk factors of younger age, prior history of headaches, prior history of TBI.
- Gender and cause of injury trended, but unclear

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### Pathophysiology of PTH

- TBI results in structural and functional changes
- Resulting imbalances between pain perception and inhibition
- Potential for cortical spreading depression which can, in turn, directly stimulate trigeminocervical system

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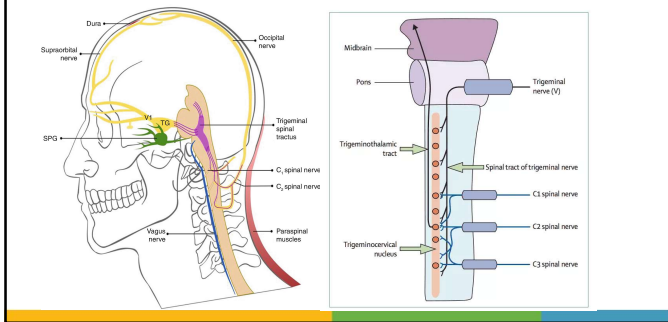
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## Pathophysiology of PTH



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## Pathophysiology of PTH

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- Potential for cortical spreading depression which can, in turn, directly stimulate trigeminocervical system
- Microglia proliferation contribute to PTH via pro-inflammatory actions and altered neuron-microglial signaling
- Neurogenic inflammation potentially associated with sensitization (resulting in long-term changes)

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## Treatment of PTH

- Typical lifestyle change recommendations
  - Sleep
  - Exercise
  - Eat regular meals and stay hydrated
  - Reduce stress
  - Avoiding caffeine and certain foods

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## Treatment of PTH

- For occasional headaches
  - OTC pain medications (acetaminophen / ibuprofen)
  - Prescription medications for migraine headaches
  - Relaxation therapy/meditation
  - Biofeedback therapy
  - Stretching and self-massage
  - Acupuncture
  - Heat or ice packs
  - Local injections

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## Treatment of PTH

- For recurrent headaches (more than 2 X per week)
  - Similar strategies as for occasional headaches
  - Addition of various prescription medications that have been utilized to treat headaches following TBI
    - Antidepressant medications
    - Antiseizure medications
    - Some blood pressure medications
    - Botulism toxin injections

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## Treatment of PTH

- Migraine-specific for relief (after onset of migraine or after first sign of oncoming migraine)
  - OTC options
  - Triptans
  - Dihydroergotamine
  - Lasmiditan
  - Ubrogapant
  - CGRP antagonists
  - Opioid medications
  - Anti-nausea drugs

(Mayo Clinic – Diagnosis and Treatment of Migraine; web-accessible at <https://www.mayoclinic.org/diseases-conditions/migraine-headache/diagnosis-treatment/drc-20360207>)

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## Wrap-up

- Headaches following TBI are a common symptom, with increased risk relative to non-injured population (and arise from a variety of possible causes)
- There is a greater likelihood of headache following mTBI (the most common type of TBI)
- Given the heightened risk of headache following TBI, assessment / treatment of PTH should be provided, and education should be provided to patients/family

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