# Posttraumatic headache

Posttraumatic headache (PTH) is defined by the International Headache Society as: “a headache developing within seven days of the injury or after regaining consciousness”.

During the first 3 months from onset, PTH is considered acute. Persistent PTH was described as headache of greater than 3 months’ duration caused by traumatic injury to the head. The term persistent has been adopted in place of chronic [1)].

Patients with traumatic brain injury (TBI) can have only a brief change in mental status, such as confusion, disorientation, loss of memory, or loss of consciousness (LOC) for less than 30 min, without serious permanent neurological deficits even if they have abnormal radiological findings. Previously, studies that addressed patients with neurologically asymptomatic minimal traumatic intracranial hemorrhage (mTIH) received little attention as the clinical course of most patients with mTIH is good, without morbidity or mortality. However, they frequently experience post-traumatic headache (PTH) that may affect the quality of life [2)].

Although most PTHs resolve within 6 to 12 months after injury, approximately 18–33% of PTHs persist beyond 12 months [3)].

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No evidence is available on the risks of neurologically asymptomatic minimal traumatic intracranial hemorrhage (mTIH) in patients with traumatic brain injury (TBI) for posttraumatic headache (PTH).

Moderate-to-severe PTH can be expected after TBI in patients with mTIH and posttraumatic seizure. PTH occurs more frequently in patients with mTIH than in those without mTIH [4)]

Brain injury is one of the most common injuries in the pediatric age group, and posttraumatic headache is one of the most common symptoms following mild traumatic brain injury in children.

There are surprisingly few preclinical studies that have investigated overlapping mechanisms between posttraumatic headache and migraine, especially considering the prevalence and debilitating nature of posttraumatic headache. Given this context, posttraumatic headache is a field with many emerging opportunities for growth. The frequency of posttraumatic headache in the general and military population is rising, and further preclinical research is required to understand, ameliorate, and treat this disabling disorder [5)].

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A comprehensive history and physical examination are fundamental to identifying the headache type(s). Identifying the precise headache phenotype is important to help guide treatment. Most of the post-traumatic headaches are migraine or tension type, but occipital neuralgia, cervicogenic headache, and medication overuse headache also occur. Postconcussive signs often resolve within 1 month, and individuals whose signs persist longer may benefit from an interprofessional approach.

Rigorous evaluation and diagnosis are vital to treating posttraumatic headaches effectively. A multifaceted approach is needed to address all the possible contributing factors to the headaches and any comorbid conditions that may delay recovery or alter treatment choices [6)].

The course of headache in patients with mild traumatic brain injury continuously improved until 36-month follow-up. However, 13.1% of patients still suffered from moderate-to-severe headache at 36-month follow-up, for whom post-traumatic seizure and traumatic intracranial hemorrhage might be risk factors [7].

## Etiology

Signaling between neurons and proliferating microglia in the trigeminal pain system may contribute to the initiation of acute headache after concussion or other traumatic brain injuries [8].

## Pathophysiology

Preclinical models of traumatic brain injury are finally revealing some of the mechanisms of PTH, including the significant role that inflammatory neuropeptides like calcitonin gene-related peptide (CGRP) play in the initiation and persistence of symptoms. To effectively treat post-traumatic headache (PTH), one needs to understand the pathophysiology behind the initiation and persistence of symptoms. Recent animal models are starting to elucidate these mechanisms, but effective treatment will also likely rely on the identification of patients who are most at risk for persistent PTH. Trials of early, targeted therapy for at-risk patients will be needed to validate these hypotheses. Additionally, high-powered clinical trials are lacking in the field of persistent PTH for medications that are known to be effective in primary headache disorders. Effective treatment for persistent PTH also requires understanding how headache interacts with the complex nature of persistent post-concussion symptoms, as this disease often necessitates a multi-disciplinary approach. Regardless, with the knowledge gained by new PTH models cited in this paper, and the increasing availability of novel headache medications, more effective treatment models are on the horizon [9].

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