Headache Medicine

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Persistent post-traumatic headache after mild traumatic brain injury associated with vertigo and memory deficit: a case report

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Introduction
Persistent post-traumatic headache (PPTH), defined by the International Classification of Headache Disorders (ICHD-3), develops after head trauma and persists for more than three months. It is one of the most frequent and disabling manifestations following mild traumatic brain injury (mTBI), affecting up to 30% of patients. Beyond headache, vestibular and cognitive symptoms frequently coexist, constituting post-concussion syndrome and contributing to prolonged functional impairment. We report a case of PPTH associated with vertigo and memory deficit two years after mTBI.

Case presentation
A 41-year-old female presented with a history of mild traumatic brain injury secondary to a fall approximately two years earlier. At emergency evaluation, Glasgow Coma Scale was 15 and cranial CT demonstrated only a subgaleal hematoma. Following trauma, she developed recurrent daily headache, predominantly right-sided, pulsatile, moderate to severe, associated with photophobia and phonophobia, with partial and unsatisfactory response to dipyrone. Concurrently, she reported recurrent vertigo triggered by head movement and fixation memory deficit with occupational impact. During outpatient follow-up, she remained conscious, oriented and without focal neurological deficits. Positional maneuvers were negative for nystagmus and outpatient cranial MRI showed no abnormalities. Comorbidities included hypertension and class III obesity (BMI 41.05 kg/m²). A diagnostic hypothesis of persistent post-traumatic headache integrated into post-concussion syndrome was established. Initial prophylactic treatment with amitriptyline, symptomatic analgesia optimization and neurological referral were instituted.

Discussion
The pathophysiology of PPTH involves a complex neurometabolic cascade triggered by shear forces, resulting in diffuse microscopic axonal dysfunction, ionic imbalance, neurotransmitter release, chronic neuroinflammation and central sensitization. These mechanisms may perpetuate symptoms despite normal neuroimaging findings. Vestibular manifestations and cognitive deficits frequently coexist with headache and are recognized components of post-concussion syndrome. Persistent vertigo and memory impairment may reflect dysfunction of vestibular-thalamic and prefrontal networks. Additionally, hypertension and severe obesity may contribute to pain perpetuation and headache chronification through systemic inflammatory mechanisms.

Conclusion
This report reinforces the need for high clinical suspicion of persistent post-traumatic headache after mTBI, demonstrating that normal neuroimaging does not exclude clinically significant dysfunction. Early recognition of associated vestibular and cognitive symptoms, accurate headache phenotyping and specialized neurological follow-up are essential to reduce morbidity and improve long-term functional outcomes.

Keywords:
Post-traumatic headache
Mild traumatic brain injury
Post-concussion syndrome
Vertigo
Memory deficit

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