

## CLINICAL VIGNETTE

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# An Unusual Headache Associated with Altitude Change

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A 45-year-old male with no significant past medical history presented with recurrent headaches associated with drop in altitude. The first episode occurred several years ago during descent and landing on a commercial passenger airplane. The headache felt like a severe, pressure-like sensation in the frontal region. He considered seeking emergent medical attention, but his headache resolved spontaneously after approximately 30 minutes. He subsequently experienced several more episodes of similar headaches during descent on air flights. More recently, the patient reported an episode of the headache while descending on a 10-minute tram ride from the mountain station (elevation 2,596 meters / 8,516 feet) to the valley station (elevation 806 meters / 2,643 feet). The headache started midway during the ride and resolved in approximately 30 minutes. He denied any aura, numbness, or weakness. The patient is an avid hiker but denies any headache while hiking or climbing in the mountains.

Neurological examination was non-focal. Diagnostic evaluation including computerized tomography (CT) of the brain and maxillofacial sinuses did not reveal any pathology to explain the headaches. Based on the history and the unremarkable work-up, the patient was diagnosed with airplane headache.

Airplane headache is described as a severe orbitofrontal headache that develops during airplane flight and worsens in temporal relation to ascent following take-off and/or descent before landing. Triggered by the rapid change in altitude, this type of headache differs from high altitude headache in which the headache is triggered by an attainment of a specific altitude. Airplane headache may spontaneously improve within 30 minutes upon completion of the ascent or descent of the airplane.

The condition was first reported in 2004 by Atkinson and Lee in a 28-year-old male suffering severe sharp jabbing pain between the eyes, which occurred within 10 minutes of plane ascending and lasted 20 minutes.<sup>1</sup> While there is no clear epidemiologic data on the incidence of headache attributed to airplane travel, a significant number of case reports have been presented in the literature. A 2016 Danish survey reported up to 8.3% of air-travelers experience headaches attributed to airplane travel with more than 90% of cases occurring during

landing.<sup>2</sup> In a review of 39 papers involving 275 patients, there was a male predominance of 54%.<sup>3</sup> The median age at diagnosis was  $28.7 \pm 4.8$  (mean  $\pm$  SD) years and the median age of onset of the first airplane headache attack was  $26.4 \pm 3.8$  (mean  $\pm$  SD) years (reported by 163/275 patients).<sup>3</sup>

The headache was formally classified under headache attributed to disorder of homeostasis in International Classification of Headache Disorders (ICHD)-3 in 2018 (Table 1). Of note, according to the ICHD, the presence of a sinus disorder must be excluded.<sup>4</sup> There is also a comment suggesting restlessness, nasal congestion, ipsilateral tearing, nausea, and photo/phonophobia are associated despite these symptoms not being incorporated into the formal diagnostic criteria.<sup>4</sup>

The exact mechanism of airplane headaches still remains unclear; however, there have been several different hypotheses. The most commonly proposed mechanisms of airplane headache include sinus barotrauma related to cabin pressure changes during ascent or descent, Prostaglandin E2 (PGE2) mediated vasodilation in the cerebral arteries, or cortisol induced headaches.<sup>5</sup> Some patients suffering from airplane headaches report similar headaches during snorkeling and rapid descent from mountains, suggesting these headaches are related to imbalance between intrasinus and external air pressures.<sup>4</sup>

Thus far there are no specific treatment guidelines for the headaches related to airplane travel, most likely because this type of headache is situational, short lasting and does not cause significant disability. Some study patients have been pre-medicated with decongestants, simple analgesics (acetaminophen), non-steroidal anti-inflammatory drugs (ibuprofen and naproxen), and triptans, with variable results.<sup>3</sup> Several non-pharmacological therapies, including Valsalva maneuvers, chewing, relaxation techniques, and pressure application at the pain area, have been proposed, but these measures have not consistently provided relief.<sup>3</sup>

This patient has headaches which are consistent with airplane headaches since these episodes are triggered by rapid changes in altitude rather than the altitude itself. This report highlights that this type of headache can be precipitated by the rapid descent on a tram ride, not just on air flights.

**Table 1.** ICHD diagnostic criteria for headache attributed to airplane travel<sup>4</sup>

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**Diagnostic criteria:**

- A. At least two episodes of headache fulfilling criterion C
- B. The patient is travelling by aeroplane
- C. Evidence of causation demonstrated by at least two of the following:
  1. headache has developed during the aeroplane flight
  2. either or both of the following:
    - a) headache has worsened in temporal relation to ascent following take-off and/or descent prior to landing of the aeroplane
    - b) headache has spontaneously improved within 30 minutes after the ascent or descent of the aeroplane is completed
  3. headache is severe, with at least two of the following three characteristics:
    - a) unilateral location<sup>1</sup>
    - b) orbitofrontal location<sup>2</sup>
    - c) jabbing or stabbing quality<sup>3</sup>
- D. Not better accounted for by another ICHD-3 diagnosis<sup>4</sup>.

**Notes:**

1. Side-shift between different flights occurs in around 10% of cases.
  2. Parietal spread may occur.
  3. Pulsation (throbbing) may also be noted.
  4. In particular, sinus disorder should be excluded.
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