

Airplane headache – an underestimated problem?

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Abstract

The airplane headache is an incident of severe, clinically stereotypical pain during ascent or descent of an airplane. The entity is considered rare; however growing number of passengers in air transport results in better recognition of the problem. The airplane headache typically lasts less than 30 minutes and is unilateral, most often in fronto-orbital region and is connected with take-off or (more often) landing of the aircraft. The most important causative factor is sinus barotrauma attributed to changes in air pressure in passenger airliners during different phases of flight. So far there are only single cases or case series described in the literature. However, the problem can affect even a few percent of airline passengers. The condition is rare

among children. The most effective treatment are triptans, but naproxen, paracetamol and nasal decongestants may play an important role either. There is an urgent need to conduct more researches on epidemiology, pathogenesis and treatment of the headache attributed to airplane travel.

Key words

Headache; Aircraft; Triptans; Barotrauma

Introduction

The airplane headache, sometimes referred to as a 'headache attributed to airplane travel' is a medical condition in which an individual experiences a severe, painful, clinically stereotypical headache during ascent or descent of a commercial aircraft. The condition entered the International Classification of Headache Disorders (ICHD-3) in 2013, shortly after criteria proposal in 2012 case series article by Mainardi et al. [1, 2, 3]. Due to the constantly increasing number of passengers in air transport (4.1 billion passengers worldwide in 2017), the problem of passengers suffering from serious headache episodes occurring during flight has begun to be noticed [4]. In this review article we will present the causes, clinical manifestation, cases and possible treatment of airplane headache, according to studies from the last 10 years accessible in Pubmed database. To diagnose airplane headache, other causes should be excluded.

Clinical characteristics

The airplane headache manifests stereotypically as lasting less than 30 minutes, unilateral, recurrent, severe pain that can be stabbing, pulsating and is most intense in orbito-frontal region, more often in men than women, mainly during landing phases rather than after take-off [3, 5, 6, 7]. The pain is not connected with any accompanying symptoms, although some case reports suggest, that dizziness and facial pallor can occur [8, 9]. To diagnose airplane headache it is substantial to exclude primary headaches and other secondary headaches [3, 10]. Upper respiratory tract infections should be also ruled out [2]. However, additional conditions such as chronic rhinosinusitis may probably increase the duration of pain (although diagnostic criteria indicate that sinus disorders should be rather excluded) [11]. What is also invariable in different studies, that there are no radiological manifestations that could explain the clinical symptoms [8, 12]. The ICHD-3 criteria of the airplane headache are depicted in Table No. 1.

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: <ol style="list-style-type: none"> 1. headache has developed during the aeroplane flight 2. either or both of the following: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> a) unilateral location¹ b) orbitofrontal location² c) jabbing or stabbing quality³
D	Not better accounted for by another ICHD-3 diagnosis ⁴
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.	

Table No. 1. Diagnostic criteria for the headache attributed to aeroplane travel according to International Classification of Headache Disorders (ICHD-3) [1].

Possible causes

Conditions inside a passenger airliner stay different than outside on the ground level, which may attribute to the development of airplane headache in an individual. A passenger cabin is not pressurized accordingly to the sea level, but to the equivalent of altitude of between 1,500 and 2,400 meters above the sea level. This fact results in a quite rapid pressure changes inside the airliner during ascent and descent. Moreover, the air humidity in commercial airliners is very low and ranges from 10 to 20%, which can lead to slight dehydration of passengers' airways [13]. Possible health risks during flight are depicted in Table No. 2.

Health risks	Potential effects
Lowered air pressure	Decrease of blood oxygen saturation; exacerbation of chronic diseases, headaches
Low air humidity	Dehydration of airways and mucous membranes
Jet lag syndrome	Sleep disorders, headaches, weakening of cognitive functions
Long-lasting sitting position	Deep venous thrombosis, exacerbation of chronic diseases
Pathogenic agents	Air-borne, food-borne and water-borne diseases

Table No. 2. Potential effects of possible health risks related to aircraft travel [13, 14].

Sinus barotrauma, related to the air pressure changes (mainly before landing), seems to be the leading cause of the airplane headache. A 2017 review of 39 studies involving headache attributed to airplane travel indicates the barotrauma as the main causative factor, although

states that further research on pathophysiology of this condition should be conducted [5]. A large case series study of 75 patients from 2012 confirms that barotrauma is the main cause of the airplane headache, however, possibly not the only one, because most patients suffering from this condition do not have any evident disorders affecting paranasal sinuses [7]. A study of first three cases of airplane headaches in children from 2010 suggests, that irritation of branches of trigeminal nerve (related to barotrauma) may also play a role in a development of symptoms [15]. An interesting observation was made during 2017 research experiment, when 14 (including 7 with previous incidents of airplane headache) volunteers were closed in a pressure chamber with conditions similar to these in a passenger airliner and had salivary PGE₂, cortisol, SPO, HR, RR and facial thermo-images controlled. All of the patients with diagnosed airplane headache had an attack during experiment, which was accompanied by higher concentrations of salivary PGE₂, cortisol and higher oxygen blood saturation [16]. This finding may be helpful in searching for other possible trigger factors for airplane headache.

Epidemiology

There are limited literature data on headache attributed to airplane travel occurrence. The first case was described in 2004 and since then mainly single cases were reported [3, 6, 17], although larger examined groups involving, subsequently, 22 and 75 patients were also described [7, 18]. On the basis of hitherto studies, it seems that the airplane headache affects more often males; passengers in two age groups are at higher risk: between 20-40 and between 12-14 years of age, although childhood headache attributed to airplane travel is considered rare [3, 7, 8]. The first three cases of airplane headache in children were reported in 2010. What is worth mentioning, among those children, two girls were affected by sinusitis or rhinitis and one boy was suffering from tonsillitis. In all three cases the causative treatment of the basic disease (antibiotic therapy, antihistamines, tonsillectomy) resulted in remission of the airplane headache during next flights [15].

A Danish survey from 2016 shows, that the scale of the phenomenon might be much greater. The researchers asked 254 respondents about their flight-related headaches experience. 89 people admitted at least mild headache incident while embarked, out of whom 21 (more than 8%) fulfilled the Mainardi's (ICHD) criteria [19].

Treatment

A few reports indicate the effectiveness of triptans usage. The drug should be administered about half an hour before the flight, and in case of long-haul flights, also an hour prior to landing. Other medicines that have been shown to be effective against airplane

headache are naproxen, paracetamol and nasal decongestants. Some maneuvers may be also helpful (see Table No. 3.).

Drugs	Non-pharmacological issues
Triptans	Valsalva maneuver
Naproxen	Chewing
Paracetamol	Relaxation techniques
Nasal decongestants	Pressing the painful area

Table No. 3. Dealing with headache attributed to airplane travel [6 ,12 ,15, 17, 19].

Conclusions

The airplane headache is reported rarely, but is possibly underdiagnosed, thus there is an urgent need to conduct more researches (including surveys) to define the pathomechanisms, actual frequency of occurrence and possible treatment strategies for the syndrome. Bearing in mind the fact, that air travelling becomes a part of everyday life for majority of world citizens, the proper dealing with this condition will become inevitable when improving the comfort, quality and safety of air travel.

References:

- [1] The International Headache Society. Headache attributed to airplane travel. International Classification of Headache Disorders – 3rd Edition (ICHD-3). 2013. [Accessed:] 10th July 2018. [Retracted from:] <https://www.ichd-3.org/10-headache-attributed-to-disorder-of-homoeostasis/10-1-headache-attributed-to-hypoxia-andor-hypercapnia/10-1-2-headache-attributed-to-aeroplane-travel/>
- [2] Mainardi F, Maggioni F, Lisotto C, Zanchin G. Diagnosis and management of headache attributed to airplane travel. *Curr Neurol Neurosci Rep.* 2013 Mar;13(3):335.
- [3] Azman F, Erkılınc B, Çabalar M, Çağırıcı S, Yayla V. [A rarely known headache: Airplane travel headache]. *Agri.* 2017 Jan;29(1):47-48.
- [4] Philbin A, Raillant-Clark W. Continued passenger traffic growth and robust air cargo demand in 2017. International Civil Aviation Organization. 2018. [Accessed:] 10th July 2018. [Retracted from:] <https://www.icao.int/Newsroom/Pages/Continued-passenger-traffic-growth-and-robust-air-cargo-demand-in-2017.aspx>
- [5] Bui SBD, Gazerani P. Headache attributed to airplane travel: diagnosis, pathophysiology, and treatment - a systematic review. *J Headache Pain.* 2017 Aug 16;18(1):84.
- [6] Nierenburg H, Jackfert K. Headache Attributed to Airplane Travel: A Review of Literature. *Curr Pain Headache Rep.* 2018 Jun 14;22(7):48.
- [7] Mainardi F, Lisotto C, Maggioni F, Zanchin G. Headache attributed to airplane travel ('airplane headache'): clinical profile based on a large case series. *Cephalalgia.* 2012 Jun;32(8):592-9.
- [8] Rogers K, Rafiq N, Prabhakar P, Ahmed M. Childhood headache attributed to airplane travel: a case report. *J Child Neurol.* 2015 May;30(6):764-6.
- [9] Kararizou E, Anagnostou E, Paraskevas GP, Vassilopoulou SD, Naoumis D, Kararizos G, Spengos K. Headache during airplane travel ("airplane headache"): first case in Greece. *J Headache Pain.* 2011 Aug;12(4):489-91.
- [10] Domitrz I. Airplane headache: a further case report of a young man. *J Headache Pain.* 2010 Dec;11(6):531-2.
- [11] Pfund Z, Trauninger A, Szanyi I, Illes Z. Long-lasting airplane headache in a patient with chronic rhinosinusitis. *Cephalalgia.* 2010 Apr;30(4):493-5.
- [12] Ipekdal HI, Karadaş Ö, Öz O, Ulaş ÜH. Can triptans safely be used for airplane headache? *Neurol Sci.* 2011 Dec;32(6):1165-9.
- [13] Thibeault C, Evans AD. AsMA medical guidelines for air travel: stresses of flight. *Aerosp Med Hum Perform.* 2015; 86(5):486–487.

- [14] Kulczyński M, Tomaszewski M, Łuniewski M, Olender A. Air transport and the spread of infectious diseases. *World Sci. News*. 2018;76:123-135.
- [15] Ipekdal HI, Karadaş O, Erdem G, Vurucu S, Ulaş UH. Airplane headache in pediatric age group: report of three cases. *J Headache Pain*. 2010 Dec;11(6):533-4.
- [16] Bui SBD, Petersen T, Poulsen JN, Gazerani P. Simulated airplane headache: a proxy towards identification of underlying mechanisms. *J Headache Pain*. 2017 Dec;18(1):9.
- [17] Cherian A, Mathew M, Iype T, Sandeep P, Jabeen A, Ayyappan K. Headache associated with airplane travel: a rare entity. *Neurol India*. 2013 Mar-Apr;61(2):164-6.
- [18] Berilgen MS, Müngen B. A new type of headache, headache associated with airplane travel: preliminary diagnostic criteria and possible mechanisms of aetiopathogenesis. *Cephalalgia*. 2011 Sep;31(12):1266-73.
- [19] Bui SB, Petersen T, Poulsen JN, Gazerani P. Headaches attributed to airplane travel: a Danish survey. *J Headache Pain*. 2016;17:33.