

A Strange Case of Headache in a Fighter Aircrew: A Case Study

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Sudden severe headache can be very debilitating and often incapacitating thereby becoming a very serious flight safety hazard. Other than intracranial causes of sudden onset of headaches, the common external causes like vascular headache including migraine, tension type head, cluster headache general are insidious in their onset and give enough time to thwart any untoward accident. But frequent attacks of headache which last for hours to days can gradually erode the flying commitments of a young budding pilot. It not only takes away valuable hours of flying but also makes one lag behind in training. This adversely affects his ratings as well as morale. Getting a stereo type label of migraine or tension headache is like a stigma for the fighter pilot and one would generally see such a case easing out of fighters to multicrew cockpits or even out of flying. It is therefore well known that aviators tend to hide their symptoms of periodic headache or take recourse to over the counter medication. It is only when the symptoms become intolerable or start affecting the flying performance that he reports to his authorized medical attendant (AMA). Seeking medical advice from civil doctors is also not very uncommon. If at all an aircrew reports to AMA it is incumbent on the part of the latter to apply all his skill and knowledge to diagnose and treat the malady so that the pilot can be restored to his flying fitness at the earliest.

This case report highlighted one such case of a young fighter pilot who quietly suffered headaches

for many months, then consulted a civil neurophysician and finally came under care of service specialists. He was thoroughly worked up and labeled as a case of vascular headache.

Case Report

In July 2005 a young fighter pilot, aged 29 years, reported with history of headache of 18 months duration. The headache was usually right sided but occasionally was felt on left side as well. It occurred twice or thrice a month and lasted two to three days. Headache used to appear late in the afternoons and appeared to be precipitated by work related stress including flying. Headache was severe enough to preclude him from his next sortie. At times he would forcefully ignore his headache and undertake night flying but used to pay a high price for the same in the form of very severe headache the next day. There was a history of aura in the form of "sense of lousiness" just before his headaches. His wife reported a peculiar symptom: he used to become euphoric before an attack and became more talkative and cracked jokes. There was no history of nausea, vomiting or visual disturbances. No history of chronic sinusitis or association with any food item or beverage. Rather

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than ameliorating, headaches used to adversely affect his sleep. There was no significant past medical history. He hailed from an upper middle class civilian background. He had been married for three years and headaches had started within about a year or so of his marriage. There was no evidence of any domestic strife or financial burden. His entire family was supportive of his flying career. There was no relevant family history. The civilian neurophysician prescribed Tab Divalproex 500 mg HS. At this stage, an apprehension about having to use this drug over long periods, prompted him to report to his AMA. At unit level he was evaluated in detail by the squadron Aviation Medicine specialist. Essentially his physical and systemic examination was normal. He was evaluated by an Ophthalmologist, Otorhinolaryngologist and a Physician at the local service hospital, but no underlying cause could be elicited. Detailed investigations including blood, biochemistry, lipid profile, audiometry, X-ray para nasal sinus (PNS) and contrast enhanced computed tomography (CECT) head were carried out but nothing abnormal was detected. X-ray PNS was suggestive of mild frontal sinusitis which was however dispelled by the CT scan. He was labeled as a case of migraine and grounded for a period of 12 weeks with an advice to continue Tabs Divalproex 500mg ms.

He was subsequently reviewed at Institute of Aerospace Medicine in Oct 2005. The officer reported that he had not had any headache since about a month. Again a detailed evaluation was carried out but everything was found to be normal. All laboratory investigations were within normal limits except for mild dyslipidemia with hepatosteatosis. Nasal endoscopy was normal except a mild deviated nasal septum (DNS) to right with a spur which was considered insignificant. Decompression chamber run was uneventful. The neurophysician reaffirmed the diagnosis of vascular

headache. Divalproex was stopped instead he was advised to take Sumatriptan 25 mg at the onset of pain followed by Dispirin during the attacks. He was awarded restricted flying category and three monthly reviews in the neurology Out Patient Department (OPD).

He was next reviewed at Air Force Central Medical Establishment (AFCME) in Feb 2006. He had been asymptomatic for almost 4 months without drugs and had a complementary executive report on flying. A decision had to be arrived at to finalize his flying category. Review of his personal history revealed few anomalies which did not sound quite right especially in the light of the diagnosis of migraine:- (a) Absence of classical aura but an associated feeling of lousiness which preceded the headaches; (b) Wife reporting an unusual, gleeful, euphoric and talkative behavior before frank manifestation of headaches; (c) Association of headache with long hours of flying, extending to more than three sorties in a day; (d) No relief with sleep; (e) Absence of classical symptoms like photophobia, phonophobia or crescendo type of headache associated with nausea and vomiting. To pry into these strange symptoms which did not match the specific criteria of migraine a detailed history was taken again. The sessions lasted 3 days with 30 to 45 minutes spent each day to recount the history in detail and review all the symptoms afresh.

Salient facts of the case that emerged are discussed hereafter:

(a) History Related. The individual started suffering from headaches almost two years ago while he was posted to a MiG fighter base. The headaches were periodic, recurrent and related to long hours of working and stress. On days, after having flown more than 3 sorties, the headache used to start gradually in the afternoons and progressively peak in the next 24 hours. There was

no associated nausea, vomiting, photo or phonophobia. Sleep did not ameliorate his headaches, which persisted after sleep. Since the officer was familiar with the aircraft type he managed to meet his flying commitments including night flying, which however left him with more severe headaches to deal with. While his headaches continued he was posted to a Mirage Squadron. The aircraft being technologically far superior to MiG 21 not only demanded more flying skills but required a lot of studies as well on the part of the individual. It was at this stage that his headaches started interfering with his flying performance. When sleep did not provide respite to his headache he found it more and more difficult to cope with his flying commitments and studies. He consulted a civil neurophysician who diagnosed it to be migraine and prescribed him 'Divalproex'. Being apprehensive of starting a strong medicine which, perhaps he would have to take for years to come, the officer finally decided to report to squadron doctor. While probing the association of his headache with number of sorties it came to light that the officer used to initially fly with the two-piece Russian helmet which was very comfortable and he never got headache even after long hours of flying but when he started using the new indigenous Light Weight Integrated Helmet that the headaches started. At that point in time he did not correlate his headaches with the use of tight helmet. He somehow carried on flying as he was conversant with MiG 21 but when he moved to a high performance aircraft his woes became intolerable. Since he was now flying Mirages his personal flying clothing had to change. Till he got his new outfit his headaches became worse and it was after he received the full complement of his new personal flying clothing along with a proper size helmet that his headaches stopped. Again at that point the officer did not connect the cessation of headaches with the use of the new helmet. It was only during the detailed history taking sessions at AFCME that he

correlated these facts.

(b) Headache Related. While analyzing the symptoms of headache the subject recollected that the 'feeling of lousiness' used to appear after the headaches had started rather than preceding it, therefore they were not a form of aura as felt earlier. The unusual, eccentric symptoms described by his wife were also analyzed. The pilot confessed that he had just been married for a year or so and his long bouts of headache used to cause undue anxiety and worry to his wife, therefore, whenever his headaches used to start he used to distract her from his symptoms by joking and appearing to be very happy and euphoric. Therefore, it was found that labeling these symptoms as aura had been incorrect all through and that the diagnostic criteria for migraine was far from being met. Similarly there was no history of classical auditory or visual aura. Time to peak was 4 to 24 hrs and not related to sleep or dark room. Nausea or vomiting never accompanied his headaches. All routine investigations as well as CT Scan was found to be normal.

Reviewing the case in its entirety, the diagnosis of migraine or vascular headache was found to be incorrect; instead the individual was suffering from external compression headache due to an ill fitting helmet. Use of a new, well fitting, proper sized helmet removed all his headaches.

After having labeled him as compression headache in Feb 2006, it remained to be seen over the succeeding months whether the diagnosis of compression headache withstood the test of time or not. The officer was closely followed up. He was asked to maintain a headache diary, his squadron doctor was advised to closely monitor him and his unit commander was asked to furnish an executive report at the end of three months. The individual was reviewed as late as July 2006. The diagnosis of compression headache stood; there had

been no recurrence whatsoever of his headaches since Jul 2005.

Discussion

Migraine or vascular headaches have often been a cause of disqualification for flying. In the United States (US) almost 43% to 59% cases of migraine have been denied flying because of migraine [1]. In a study in the United States Air Force (USAF) the cases of waiver were reviewed to quantify the number of aircrew permanently disqualified from flying duties from 1995-1999. Out of 157 cases one of the common diagnoses was migraine [2]. The estimated prevalence of this disorder in the general adult population is approximately 6% for men and 18% for women. Prevalence is highest between 25-55 years of age. This condition most frequently begins in adolescence. There is a general tendency to casually label any periodic, unilateral, headache as migraine more so if it gets associated with some kind of aura and lasts from few hours to a day or so. There is no clinical, laboratory or other special investigative finding which helps in clinching the diagnosis of migraine. Therefore it invariably remains an empirical diagnosis. The predicament commences when this diagnosis starts affecting a career as well as flight safety.

The diagnostic criteria [3] for different types of headaches was first published in 1988 by the International Headache Society (IHS). As per IHS-II [4] migraine can be broadly of two types that is with or without aura (Table I). To confirm a diagnosis of 'migraine without aura' it is essential to have phonophobia / photophobia or nausea and/ or vomiting whereas for 'migraine with aura' at least one of the classical auras like homonymous visual disturbance, unilateral paresthesias and/or numbness, unilateral weakness, or aphasia or unclassifiable speech difficulty should be present.

In this subject there were no symptoms which fulfilled the laid down criteria of migraine.

External compression headache is a scantily described type of headache which sometime in the past was also known as "swim-goggle headache". This headache results from continuous pressure on the forehead or scalp, such as from a tight hat, helmet, head-band or even swim goggles [5, 6, 7]. The pain is generally constant and hurts the worst where the object is pressing on the head. It is often described as dull, severe pain or feeling of constant pressure and hurts most where the object presses the head. Longer the use of the headgear worse is the bout of ensuing headache and if the item is left long enough it can turn into a migraine.

It is one of the infrequently reported forms of cranial neuralgia which is caused by the continued stimulation of cutaneous nerves due to external pressure over the forehead or scalp. The diagnostic criterion for external compression headache is summarized in Table-II. The pain is non-pulsating and felt over the area where the pressure has occurred, does not have any associated symptoms as seen in migraine. The pain gradually increases to peak levels and is not associated with any nausea, vomiting, photophobia or phonophobia. These pains often disappear after removing the causative stimulus. If the causative stimulus has been prolonged it can lead to a severe, migrainous type of headache as seen in this case. This is a primary-type headache and not associated with any organic cause hence does not require any investigation to prove it once the diagnostic criteria are fulfilled [8]. The problem in diagnosing this case was because there has been no such preceding case to fall back upon or refer to. Specific symptoms which clinch a diagnosis of migraine were missing, which prompted detailed history taking.

Review of literature did not bring forth any

Table I: Classification of Migraine as per IHS-II [5]

Migraine without aura (MO) diagnostic criteria

- A. At least five headache attacks lasting 4 - 72 hours (untreated or unsuccessfully treated), which has at least two of the four following characteristics:
 - 1. Unilateral location
 - 2. Pulsating quality
 - 3. Moderate or severe intensity (inhibits or prohibits daily activities)
 - 4. Aggravated by walking stairs or similar routine physical activity
- B. During headache at least one of the two following symptoms occur:
 - 1. Phonophobia and photophobia
 - 2. Nausea and/or vomiting

Migraine with aura (MA) diagnostic criteria

- A. At least two attacks fulfilling with at least three of the following:
 - 1. One or more fully reversible aura symptoms indicating focal cerebral cortical and/or brain stem functions
 - 2. At least one aura symptom develops gradually over more than four minutes, or two or more symptoms occur in succession
 - 3. No aura symptom lasts more than 60 minutes; if more than one aura symptom is present, accepted duration is proportionally increased
 - 4. Headache follows aura with free interval of at least 60 minutes (it may also simultaneously begin with the aura)
- B. At least one of the following aura features establishes a diagnosis of migraine with typical aura:
 - 1. Homonymous visual disturbance
 - 2. Unilateral paresthesias and/or numbness
 - 3. Unilateral weakness
 - 4. Aphasia or unclassifiable speech difficulty

Table II: Diagnostic criteria of External Compression Headache [5]

- A - Headache with all of the following characteristics and fulfilling criteria C and D:
 - Non-pulsating
 - Increasing over minutes
 - No accompanying symptoms
- B - Continuing application of external pressure to the forehead or scalp
- C - Headache develops during and is maximal at the site of pressure
- D - Headache resolves after pressure is relieved

studies or report on compression headache in any of the Air Forces of the world. There has been occasional reporting of migraine but none on compression headache. The author could find only one study carried out among 82 Rio de Janeiro Military Police personnel who had reported headaches after wearing a helmet. The aim of that study was to analyze the occurrence of this headache type among retrospectively studied 82 patients (79 men, 3 women), age 19-35 years (mean 26), who presented to an out patient neurology department in a military

police hospital with complaints of headache associated with wearing a helmet on at least 3 occasions. The headache subsided after removal of the helmet. During subsequent follow-up consultations, designed to reevaluate the patients and to renew the authorization releasing helmet use, no patients described recurrence of the head pain. The study concluded that the headache was caused by external compression and could be related to wearing a helmet. The headaches disappeared after the cops stopped wearing those helmets [9].

Sizing of helmets is an essential requirement like any other personal safety equipment. Apart from the physical discomfort of an ill-fitting or loose helmet which can cause discomfort and obstructed vision during high 'G' manoeuvres or lead to misalignment of the mask, a tight helmet can precipitate compression headache. The subject of this case study used to fly the MiG-21 in which ZSH-3 is the prescribed helmet, which is a two piece helmet with an external shell made of aluminum alloy and an inner surface lined with soft, shock absorbing layer of foam plastic. The inner helmet is made of leather and has 'built in' ear phones and sound insulating caps. It comes in two sizes based on the circumference of the head. However, an indigenous version of the helmet has been developed which is an integrated, one-piece, light-weight helmet. This helmet comes in three sizes and the sizing is based on the length and breadth of the head rather than the circumference. Conventionally in the IAF, sizing for flying clothing is done at the flying academy and this requirement of recording the length and breadth of the head has still not been incorporated in the evaluation protocol. However, the demand for the helmets is required to be submitted on the prescribed parameters. Since the sizing measurements are not recorded in the personal documents, there is a possibility of getting a wrong sized helmet for the aircrew. Therefore, there is need to incorporate these parameters in the evaluation protocol when the initial measurements are done.

Conclusion

This case has been presented for its uniqueness. A young pilot was labeled as a case of migraine and his flying had been stopped for a short period. Then his headaches stopped but the label of migraine would have continued, had not the diagnosis of compression headache been made. This

case report highlights the importance of detailed history taking as well as strict adherence to the IHS diagnostic criteria for labeling a case of headache. Aeromedical significance of proper sized flying clothing needs no greater emphasis.

Conflicts of interest: None identified.

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