

You're the Flight Surgeon

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You're the flight surgeon at a military aviation medical clinic. A 26-yr-old male service member presents to the military clinic for an acute visit. He is a rotary wing student pilot with 6 yr of prior infantry service and no prior aviation experience. His primary complaints are dizziness, postnasal drainage, and headache. In addition, the service member reports two recent episodes where he felt "dizzy" and "blacked out" simultaneously. The first episode was 4 d prior and the second episode was 1 d prior to this visit.

Alarming, both episodes occurred while driving his personal vehicle, where he denied losing control or being involved in an accident. The service member states that the symptoms occurred briefly, perhaps "less than a second," and were not associated with head movement or position. He reported that the episodes were followed by a headache that lasted several hours. Although fleeting, these events were concerning enough to the service member to have him seek medical attention.

Upon physical exam, the service member exhibited moderate postnasal drainage. He denied any urinary or fecal incontinence, vision changes, hearing changes, emesis, headaches that awakened him from sleep, loss of concentration, sleep deprivation, or recent illnesses. He denied any use of prescription or over-the-counter medications or dietary supplements. Past medical history was unremarkable, with a report of an uncomplicated extraction of his wisdom teeth 4 yr prior. He does not use tobacco regularly, but does have occasions where he will smoke up to five cigarettes in a day. His alcohol intake is limited to one to two drinks, two to four times per month, and he denies engaging in binge drinking behavior. His family history is limited because he was adopted. Head, eyes, ears, nose, throat, neck, cardiovascular, pulmonary, neurological, psychiatric, and musculoskeletal exams were within normal limits. All vital signs were within normal limits, with the exception of a slightly elevated blood pressure of 132/68.

1. Which of the following diagnoses should be considered given the history and exam?

- A. Absence seizure.
- B. Wolff-Parkinson-White (WPW) syndrome.
- C. Migraine.
- D. Transient global amnesia (TGA).
- E. All of the above.

ANSWER/DISCUSSION

1. E. An absence seizure, WPW syndrome, migraine, and TGA are possible etiologies for his symptoms. An absence seizure presents with a sudden altered level of consciousness accompanied by staring, arrest of activity, or repetitive eye movements.² The episodes are quite brief, lasting approximately 10 s. Absence seizure is the most common childhood idiopathic generalized seizure.⁴ Most patients present between the ages of 4 to 12, putting this service member outside the usual age range for a first episode of this pathology.² Also, if he had an absence seizure, it would have been unlikely that he could maintain control of the vehicle. Although unlikely, seizure activity could not be ruled out from the history and physical.

WPW is possible given his symptom of dizziness with the episode. Patients with dysrhythmias may manifest symptoms such as dizziness/lightheadedness, syncope/presyncope, or palpitations.⁶ WPW pattern is defined as the patient having a "shortened PR interval and a widened QRS complex due to a delta wave" without having symptomatic dysrhythmias.⁶ Meanwhile, WPW syndrome is diagnosed when the patient has the electrocardiogram findings listed above and a symptomatic dysrhythmia due to the accessory pathway. Both WPW pattern and WPW syndrome are seen in about 1% of the population, with WPW syndrome being less common than WPW pattern.⁶

Migraine should be considered owing to the presence of recurrent headaches after a possible prodrome. Migraines typically include a recurrent severe headache, with nausea, photosensitivity, and/or phonosensitivity.⁵ Migraines usually affect individuals between 30–39 yr old. An overwhelming majority of cases (approximately 75%) of migraines are classified as migraine without aura. Migraines may last as short as a few hours to as long as a few days and may be triggered by a variety of different stimuli. According to the third edition of the International Classification of Headache Disorders, migraine with aura cannot be ruled out at this point because the patient had visual fully reversible aura symptoms accompanied by a headache.⁵

According to Kremmen, TGA is a benign anterograde amnesia that occurs in middle-aged and elderly individuals. Inability to form new memories is a prominent feature of TGA.⁸ The incidence is approximately 5.2 to 10 per 100,000 per year in the general population, but increases to 23.5 to 32 per 100,000 per year in those 50+ yr old.

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Other cognitive functions are intact and patients are able to perform complex activities such as driving or cooking.⁸ Self-awareness during an episode will exclude the diagnosis of TGA. The episodes usually occur from 1 to 10 h. When they regain self-awareness, they have no recall of events during the episode.⁸ Although arterial ischemia, venous congestion, epileptic phenomenon, psychiatric disorder, and migraine phenomenon have been suggested etiologies, older age has been the only consistent risk correlation. Given his younger age, the case patient has a lower chance of having a TGA episode. However, his amnesic gap while not losing control of his vehicle suggests TGA as a possible differential diagnosis.

2. What is your next step in the evaluation of this patient?

- A. Magnetic resonance imaging (MRI) of the brain without gadolinium.
- B. Electroencephalogram (EEG).
- C. Holter monitor.
- D. All of the above.

ANSWER/DISCUSSION

2. D. The MRI of the brain may demonstrate lesions in the hippocampus in a patient with TGA.⁹ The EEG may show slow wave discharges in some seizure patients.² The Holter monitor will help to identify dysrhythmias that may account for this patient's symptoms, but may not be evident on the electrocardiogram.

The patient was restricted from flight duty on the date of his initial visit. He was referred to Neurology as well as a 48-h Holter monitor, EEG, and MRI without gadolinium. An MRI of the brain without gadolinium was unremarkable. The 48-h Holter monitor showed predominantly sinus rhythm, sinus dysrhythmias with rare premature atrial contractions noted, and no sustained conduction abnormalities. The EEG was performed while the patient was asleep. It was negative for any epileptiform discharge or findings of encephalopathy. The patient was cleared by the civilian neurologist to return to nonflight duty and operate an automobile.

3. What is your next step?

- A. Permanently ground.
- B. Temporarily ground until migraine medication was tried.
- C. Information only and return to flight duties.
- D. Refer to an aeromedically trained neurologist.

ANSWER/DISCUSSION

3. D. With the current level of information given, some aeromedically trained providers may suggest permanently removing the patient from flight duties is warranted. However, the etiology and possible resolution for his concerns still remain unclear; care must be taken to properly mitigate in-flight risk at the possible expense of removing a healthy aviator from service. Referring the patient to a neurologist who has training in aerospace medicine is beneficial in helping to investigate possible neurological causes for his condition with an eye on ruling out concerns

for sudden or subtle incapacitation. Starting a patient on a medication without a clear diagnosis that warrants the medication is not good medical practice. The patient's condition demands further workup.

With direction from the appropriate military aviation authority, a service-specific, aeromedically trained neurologist was consulted for an administrative review of the case. The consultant felt the case was likely a migraine and should be worked up for potential waiver. However, an additional courtesy review by a neurologist from a sister military branch generated a recommendation against pursuing a waiver. This opinion was based on cognitive symptoms thought to be part of a migraine aura that could impair the safe operation of aircraft. Based on conflicting opinion, further workup was initiated.

The patient was referred to an additional aeromedical neurologist and was examined in person. The second aeromedical neurologist obtained additional, significant history from the patient. The patient reported that before the first episode, he had just finished a long flight across the United States as a passenger. He then smoked a cigarette and drank an energy drink, neither of which he did on a regular basis, in preparation for a multihour drive home. Once he began driving, the service member turned his head rapidly to check for traffic and felt a spinning sensation lasting 1–2 s, followed by a mild holoccephalic headache. He reported that the second episode was a similar brief spinning sensation, but was unclear if it was associated with a head turn. The service member reported being symptom-free for 1 mo prior to seeing the second aeromedical neurologist. The second aeromedical neurologist felt the headache was nonmigrainous in nature and not related to the vertiginous symptoms. This neurologist was reassured by the absence of other symptoms, absence of recurrence in 1 mo, normal physical exam, and normal Holter, EEG, and MRI. However, the patient still did not have a clear diagnosis for his symptoms. Therefore, the aeromedical neurologist recommended the patient cease flight training.

The flight surgeon submitted the recommendation to the aeromedical authority for medical suspension. The aeromedical authority concurred with the recommendation for medical suspension.

Although the patient does not currently have a diagnosis of migraine, per Army Regulation 40-501, recurrent or incapacitating headaches are also disqualifying.¹⁰ Rated aviators with migraines are considered on a case-by-case basis, but waivers are not usually recommended if neurological symptoms accompany the headaches.¹¹ According to U.S. Navy aeromedical policy, migraine with aura is considered disqualifying and applicants cannot be considered for waivers. Any headache is considered disqualifying if the patient needed to be seen for an acute care visit or experienced neurological dysfunction in excess of nausea/emesis or light sensitivity. For most prior cases, migraine patients are usually asymptomatic for greater than 6 mo before being returned to full flying duties.⁷ In the Air Force guidelines, a headache associated with a neurological manifestation is disqualifying for flight duties.³ Per the Federal Aviation Administration guidelines, the patient would require a special issuance for the headache because it is associated with neurological symptoms.¹

Due diligence was given to an extensive workup with no definitive diagnosis generated. Since the aeromedical authority cannot clearly ensure these symptoms will not recur, the aeromedical activity rendered a final disposition that permanently suspended the patient from returning to flying duty.

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REFERENCES

1. Federal Aviation Administration. Item 46. Neurologic. In: Guide for aviation medical examiners. Washington (DC): Federal Aviation Administration; 2018:134–143. [Accessed 2 Jan. 2018]. Available from https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/.
2. Fisher RS, Cross JH, D'Souza C, French JA, Haut SR, et al. Instruction manual for the ILAE 2017 operational classification of seizure types. *Epilepsia.* 2017; 58(4):531–542.
3. Hesselbrock R, Van Syoc D. Headache (Oct. 17). In: Air Force waiver guide. Wright-Patterson AFB (OH): U.S. Air Force School of Aerospace Medicine; 2018:361–370. [Accessed 6 Jan. 2018]. Available from <http://www.wpafb.af.mil/afirl/711hpw/USAFSAM/>.
4. Kananura C, Haug K, Sander T, Runge U, Gu W, et al. A splice-site mutation in GABRG2 associated with childhood absence epilepsy and febrile convulsions. *Arch Neurol.* 2002; 59(7):1137–1141.
5. Lipton RB, Bigal ME, Diamond M, Freitag F, Reed ML, et al. Migraine prevalence, disease burden, and the need for preventive therapy. *Neurology.* 2007; 68(5):343–349.
6. Munger TM, Packer DL, Hammill SC, Feldman BJ, Bailey KR, et al. A population study of the natural history of Wolff-Parkinson-White syndrome in Olmsted County, Minnesota, 1953–1989. *Circulation.* 1993; 87(3):866–873.
7. Naval Aerospace Medical Institute. 10.5. Headaches and migraine (including headache algorithm). In: U.S. Navy aeromedical reference and waiver guide. Pensacola (FL): Naval Aerospace Medical Institute; 2017. [Accessed 2 Jan. 2018]. Available from <http://www.med.navy.mil/sites/nmotc/nami/arwg/Pages/AeromedicalReferenceandWaiverGuide.aspx>.
8. Pereanu M. Transient global amnesia. *Acta Medica Transilvanica.* 2016; 21(1):40–42.
9. Sander K, Sander D. New insights into transient global amnesia: recent imaging and clinical findings. *Lancet Neurol.* 2005; 4(7):437–444.
10. U.S. Army. 4-22. Neurological disorders. In: Standards of medical fitness. Washington (DC): Department of the Army; 2017:46. Army Regulation 40-501. [Accessed 6 Aug. 2017]. Available from http://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN3801_AR40-501_Web_FINAL.pdf.
11. U.S. Army Aeromedical Activity. Migraine (ICD9 346.9). In: Flight surgeon's aeromedical checklists, aeromedical policy letters. Ft. Rucker (AL): U.S. Army Aeromedical Activity; 2014. [Accessed 6 Apr. 2017]. Available from http://glwach.amedd.army.mil/victoryclinic/documents/Army_APLs_28may2014.pdf.