engage in regular exercise and maintain a healthy weight to reduce his risk of developing type 2 diabetes or hypertension, since these conditions jeopardize renal function.

Per the Air Force Waiver Guide, congenital UPJ obstruction with hydronephrosis is disqualifying for all flying classes, but is a waiverable condition; Aeromedical Consult Service review is at the major command's discretion and is not mandatory.[1] The Aeromedical Consult Service reviewed this pilot's case and recommended a waiver. The pilot was subsequently granted an initial 3-yr waiver, pending no change in renal function status. You counsel the pilot of his personal responsibility to self-ground and report to you for immediate reassessment if he experiences any of the signs or symptoms discussed above.

The U.S. Navy's Manual of the Medical Department states that current or history of hydronephrosis is disqualifying.[3] Per the U.S. Navy Aeromedical Reference and Waiver Guide, this pilot's condition is disqualifying, but may be waived; it includes a section on congenital abnormalities of the kidneys, but does not specifically address hydronephrosis. However, the Guide does state that "waivers for conditions not specifically listed will be considered on case-by-case basis."[8]

U.S. Army Regulation 40-501 states that current or history of hydronephrosis is disqualifying.[9] The U.S. Army's Flight Surgeon's Checklists has a section on cystic and congenital abnormalities of the kidney, but does not specifically mention hydronephrosis. However, it does state that a waiver is possible in most cases if the flyer is asymptomatic and has adequate renal function.[10]

The Federal Aviation Administration (FAA) Guide for Aviation Medical Examiners addresses hydronephrosis, but only in the context of impaired renal function, which requires FAA decision. Since this pilot's renal function is within normal limits, he does not require a waiver, and the local aviation medical examiner can issue the medical certificate.[6] Regarding his testicular torsion, he underwent definitive treatment (orchiopexy), is fully healed, and has remained asymptomatic, so this condition does not require an aeromedical waiver for any of the military services nor for the FAA.

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You're the flight surgeon working your clinic when a 40-yr-old pilot you know well comes in for his annual flight physical. Throughout the appointment, you identify nothing concerning on his questionnaire or physical examination. Before you clear him for another year, you ask if there is anything else that he would like to discuss. He hesitantly responds that he had an incident that scared him a few nights before.

He was driving home with his wife after dinner when he experienced visual difficulties. He states that he lost visual acuity while driving and was seeing flashes of light in his visual fields. His symptoms were significant enough that he had to pull over and have his wife

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drive the rest of the way home. These symptoms persisted for about 40–50 min. He also admits that this is the second time that he has had such symptoms. The first time was about 2 wk ago.

1. From your initial impression, which of the following should be lowest on your differential for this problem?

A. Retinal detachment.
B. Migraine aura without headache.
C. Occipital stroke/transient ischemic attack (TIA).
D. Partial seizures.
E. Acute angle-closure glaucoma.

ANSWER/DISCUSSION

1. E. Acute angle-closure glaucoma presents with decreasing visual acuity or colorful halos around lights, due to corneal edema, over a few hours and is accompanied by acute eye pain, headache, nausea, and/or vomiting.[17,18] Additionally, it presents with vascular congestion, conjunctival hyperemia, and ciliary flush.[17,18] This is usually a monocular phenomenon; however, there is an increased risk of glaucoma in the contralateral eye. Prompt evaluation of this phenomenon would reveal increased intraocular pressures (>30 mmHg), mid-dilated and sluggish pupil (4–6 mm), and a shallow anterior chamber when measured.[17,18] This is a medical emergency and needs prompt evaluation and treatment.[17,18] The pilot in question exhibited none of these symptoms. His history of relatively rapid onset of painless decrease in visual acuity with bright flashes of lights and symptoms lasting only 40–50 min is not consistent with acute ocular hypertension.

Retinal detachments can manifest with flashes of light associated with noticeable loss of visual acuity in large detachments.[20,23] The flashes of light have a sudden onset and progress as the retinal detachment progresses. This is accompanied by floaters due to debris and vitreous blood.[20,23] The flashes of light resolve spontaneously, but the loss of vision generally does not resolve without prompt interventions.[21,23] A thorough retinal evaluation with direct fundoscopy and indirect ophthalmoscopy will be able to evaluate for this condition. Retinal detachments may progress if not treated.[20,23] Also, having a detachment in one eye is a risk factor for a subsequent ipsilateral detachment, but bilateral simultaneous detachments are exceedingly rare.[20,23]

Typical migraine aura without headache is a rare condition that presents itself in adults with classic migraine auras and occurs with or without cephalalgia.[9] The most common migraine auras are visual, sensory, and/or language symptoms. This is a diagnosis of exclusion, with diagnostic criteria established by the International Headache Society (IHS), including full reversibility of symptoms.[8]

A TIA can cause visual symptoms similar to those described. As the optic nerves transverse the length of the brain, there are numerous ways a vascular incident can affect vision. When a TIA occurs behind the optic chiasm, it produces visual symptoms that are homonymous. In addition, when the event affects the optic nerve anterior to the optic chiasm, symptoms are monocular. The symptoms that occur as a result of an occlusive vascular phenomenon in the occipital region are sudden onset and can include partial loss of vision, complete blindness, and visual hallucinations. TIA symptoms last less than 5 min and full stroke symptoms generally last days or can cause a permanent defect.

Partial seizures that affect the optic pathway can cause recurrent visual symptoms. Visual hallucinations from occipital seizures generally are characterized by a prototypical constellation of symptoms. These visual hallucinations are colored and circular, appearing over a few seconds and lasting a few minutes. The symptoms begin in the periphery of a hemifield of vision and often move across to the other side.[15,16] Partial seizures do not typically present in adults unless there is an accompanying brain lesion such as from a tumor, trauma, or vascular disease.[2,14]

On further evaluation, this pilot states that the visual disturbance began in the central vision and progressed to involve most of his visual field. From the onset of symptoms to maximum intensity, it progressed over about 10 min. He denies any persistent blind spots in his vision after the episode. A thorough review of systems is unrevealing for any further symptoms. He denies any recent headache and any history of migraines at a younger age and has no family history of migraines, vascular disease, or neurological conditions. He has no recent trauma. His risk for vascular disease is low as he has normal cholesterol and blood pressure, no diabetes, has never smoked, and has a benign family history. A thorough examination reveals a healthy 40-yr-old man who takes no medications. His vital signs are normal. A fundoscopic evaluation shows a normal retina and normal cup-to-disc ratio. The neurological examination is unrevealing for any cranial nerve pathology or other neurological signs. Cardiovascular examination reveals a regular heart rate and rhythm with normal S1 and S2 without murmurs or gallops; carotid examination is without bruits.

2. Which of the following can distinguish the visual aura of migraine from those of structural brain lesions?

A. Absence of headache (acephalalgia).
B. Increasing frequency of visual aura.
C. Persistent visual field defects.
D. No past history of migraines.
E. Duration of visual aura.

ANSWER /DISCUSSION

2. C. Persistent visual field defects. As migraine aura without headache is thought to follow the same pathophysiology as typical migraines, once the incident is resolved the patient should be completely symptom free and without any residual effects.[9,22] In contrast, any lesion along the visual pathway or occipital cortex has the potential to leave a permanent loss of visual fields.[22] Therefore, a fixed visual loss after an episode of visual symptoms should be concerning for a structural lesion.

In this patient, we see the absence of headache. While a headache is most commonly associated with migraine aura, about 1.2% of the population will experience migraine aura without headache.[4,7] Additionally, headache is not uncommon in patients with occipital seizures and occasionally occurs with TIAs/strokes.[15,19] The presence or absence of headache cannot be used to rule in or out a competing diagnosis;

therefore, in the presence of concerning visual symptoms, further evaluation of the patient is warranted to evaluate the possibility of cerebral vascular disease or seizure.

Progression in severity or frequency of headaches or aura symptoms is concerning for additional pathology and should prompt further investigation.[22] In the case of this pilot, he has no prior history of migraines. Therefore, the occurrence of these symptoms constitutes a progression in the frequency of his symptoms and warrants a more thorough workup. However, with the prevalence of migraines in the adult population of about 12%, using severity or frequency as a distinguishing criterion is inappropriate.[9,12]

The majority of patients who experience symptoms such as those described by this pilot have a history of migraines when they were younger.[9] Even if a patient has a prior or current history of migraines and then visual aura symptoms develop, this change in headache pattern and new aura should raise concerns regarding new pathology that is causing the new symptoms.[22] Imaging of the brain would be appropriate to ensure that no other concomitant pathology exists. This pilot has no history of migraines or trauma and has no risk factors for stroke, yet due to the new onset of symptoms, imaging was obtained to ensure no cortical lesions were present.

The IHS states that visual aura symptoms with migraines have an onset of between 5 and 20 min and a duration of less than 60 min.[8] However, a study and review of the literature by Shams and Plant showed that the duration of visual symptoms of cerebral lesions was between 20 and 30 min.[22] Additionally, the visual symptoms of seizure disorders usually last less than 5 min, but no more than 15 min without being considered status epilepticus.[2,15] Due to the significant overlap in the duration of symptoms, these cannot be reliably differentiated from migraines using symptom timing.[22]

In this pilot, magnetic resonance imaging studies of the brain and carotid arteries were obtained with and without contrast. These showed normal anatomy without concern for stroke or vascular disease. It was decided that his risk for developing de novo partial seizures at the age of 40 was exceedingly low. Additionally, the length and timing of his symptoms with a crescendo over 10 min and resolution in 40–50 min were not consistent with partial seizures, so an electroencephalogram was not pursued unless his symptoms continued to worsen.

3. What is your final diagnosis for this patient?

A. Occipital TIA.
B. Adult onset partial seizures.
C. Migraine aura without headache.
D. Bilateral branch retinal artery occlusions.

ANSWER/DISCUSSION

3. C. Migraine aura without headache. During the workup of this pilot, he was found to have no risk factors for vascular disease and neuroimaging was unremarkable. As discussed above, there is little concern of adult onset partial seizures without a history of recent head trauma or cortical lesion (scar, tumor, etc.). If there was a concern for seizures, then an electroencephalogram could be considered in conjunction with the neurology consult. Retinal detachments were ruled out by retinal evaluation.

The final diagnosis in this case is one of exclusion. The diagnostic criteria put forth by the IHS take into account that other disease processes can cause the same visual symptoms and therefore express the importance of making sure that there is no other pathology present. The two most likely competing diagnoses with migraine aura without headache are stroke/TIA and partial seizures.[9] Each of these has unique diagnostic criteria, but the presenting symptoms can be overlapping.

According to the IHS, migraine aura "consists of visual and/or sensory and/or speech/language symptoms, but no motor weakness, and is characterized by gradual development [≥5 min], duration of each symptom no longer than 1 hour … and complete reversibility."[8] Additionally, there needs to have been at least two attacks, the symptoms cannot be accounted for by other diagnoses, and TIA has been excluded.[8]

Migraine aura can present with a variety of neurological manifestations. The most common aura manifestations are visual symptoms and include flashes of light (photopsia), partial loss of vision (scotoma), hemianopsia, diplopia, blindness, and visual illusions/distortions of perception (metamorphopsia).[4,7,9] Less common neurological manifestations of migraine aura are symptoms of paresthesias, vertigo, amnesia, confusion, hemiparesis, hearing loss, or mood alterations.[4,7–9]

With 12% of the population reporting migraines, those experiencing aura symptoms at least occasionally with their migraines range from 15–32%.[1,4,7] The reported prevalence of migraine aura without headache has ranged from 37–58% of those with a history of migraine with aura.[4,9,11,26] Migraine aura without headache is most common in adults over the age of 50, but has been reported at all ages.[4,9] A study looking at aura patients by age found no difference in gender distribution (3:1 female to male), type of aura, or history of migraines, but did find that auras were associated with headaches less with older age of onset.[10]

AEROMEDICAL DISPOSITION

According to the U.S. Air Force Medical Standards Directory* and the Air Force Waiver Guide,[24] all headaches, except for occasional tension headaches, are disqualifying for flying duties. Waivers are considered on a case-by-case basis. Headaches that impair social, vocational, or academic performance, require the use of abortive medications other than over-the-counter or require a prescription prophylactic medication, or have any associated neurological symptoms are not considered waiverable. A waiver may be considered if there are less than three headaches per year and they do not have any of the above listed characteristics. Any headaches not meeting these requirements need to be reviewed by the Aeromedical Consult Service (ACS).[24] For the pilot in this case, he would be disqualified and would need to be reviewed by the ACS.

* U.S. Air Force. Section L: neurologic USAF medical standards, L21. In: Medical standards directory; 2016:43. [Accessed 1 Dec. 2016]. Available from https://kx2.afms.mil/kj/kx4/FlightMedicine/Documents/Forms/ShowFolders.aspx?RootFolder=%2Fkj%2Fkx4%2FFlightMedicine%2FDocuments%2FMedical%20Standards%20Directory%20%28MSD%29&FolderCTID=0x0120004DEB19A0C597EF4794DF99094B5AD8FC&View=%7BF2BF56F2%2D1249%2D4387%2DBBD9%2DFF9D369D4FC0%7D to those with access.

In the U.S. Army, migraines are considered disqualifying for flying duties.[25] The Army does not usually grant exceptions to policy in initial pilot training applicants for migraine headaches unless they have been symptom free for greater than 12 mo and are on no medications. For currently rated aviators, waivers are considered on a case-by-case basis and are usually not recommended if there are neurological or visual symptoms that accompany the headache. Final determination for waiver is based on general performance, special senses affected, and the risk of recurrence. The required workup includes a neurology evaluation, detailed migraine history, brain imaging with computed tomography or magnetic resonance imaging, and an ophthalmology evaluation if the patient's symptoms include visual disturbances.[25] For the pilot in question, he would be disqualified from flying and would require a waiver or exception to policy to fly. While he is pain free, the disturbance of special symptoms in his vision is of particular concern.

In the U.S. Navy, any headache syndrome that interferes with normal function in the past 3 yr is disqualifying.[3] According to the U.S. Navy Aeromedical Reference and Waiver Guide, headaches are evaluated on the basis of their impact on general performance, the effects on special senses, and their risk of recurrence. Specifically listed as disqualifying are migraine headaches with aura and scotoma, headaches that prohibit the performance of activities, and those that have required treatment in an emergency department, hospital, or acute care clinic. Also disqualifying are neurological dysfunction other than nausea/vomiting or photophobia. Treatments other than simple analgesics or nonpharmacological methods are also disqualifying. Waivers may be considered after an evaluation by the Naval Aerospace Medical Institute Neurology Division and a review of the following factors: frequency of headaches (no more than three a year), occurrence during flight, predictability, severity, history of incapacitation, and treatment required (note that daily verapamil is the only acceptable prophylactic medication). Also considered is type of aircraft and duties, experience and status (new applicant vs. trained asset), and the underlying diagnosis and presentation.[13] As in the other services, the pilot in this case would be disqualified due to particular concern about the visual symptoms.

According to the Federal Aviation Administration (FAA) Guide for Aviation Medical Examiners, pilots with common migraines without neurological symptoms may be issued a certificate by the Aviation Medical Examiner (AME) if the condition meets the limited criteria according to the Conditions AMEs Can Issue (CACI) worksheet.[6] The criteria are that symptoms are considered mild and are controlled on approved medications (over-the-counter, noninjectable triptans, metoclopramide, or promethazine) with no more than one episode per month. The applicant cannot be taking any prophylactic agents for migraines or have had any in-patient treatments and no more than two out-patient clinical or urgent care visits to treat exacerbations during the previous year. Meeting these criteria, the AME can issue a certificate.[5] A pilot with migraines that present beyond these criteria will not be issued a certificate and must submit the examination to the FAA for a decision.[6] This pilot would not qualify for an FAA certificate to be issued from an AME at this point because he has visual symptoms that classify his migraines as ocular as listed on the CACI worksheet.

The pilot who presented to your office was disqualified from flying and his case was reviewed by the Air Force ACS. After performing nonflying duties for 18 mo, he had one additional recurrence 3 mo after the first two. During this nonflying time, he received 1 mo of acupuncture for these symptoms, but other than this he had no other treatments. He reapplied for a waiver following this 18-mo period. After review of his case, he received a restricted pilot waiver where he was granted privileges to fly in multicrew aircraft. This waiver was granted based on the rarity of symptoms and the slow development of the visual auras when symptoms were present.

Overall, the diagnosis of migraine aura without headache should be considered disqualifying due to the symptoms, presentation, and special senses affected. These migraines may be considered for a waiver on an individual basis in all the flying communities in the United States. The diagnosis of migraine aura without headache is one of exclusion and every effort should be undertaken to investigate other competing diagnoses that could explain the presenting symptoms.

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