

You're the Flight Surgeon

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You are the flight surgeon at a busy Air Force base that is home to a squadron of A-10 Thunderbolt II aircraft. You receive a call from a medical technician assigned to the fighter squadron notifying you that a pilot is being transported to the clinic for evaluation. The tech reports that the pilot was found sitting on the restroom floor with severe dizziness, nausea, and vomiting. In the clinic, the 32-yr-old male pilot is pale and diaphoretic while you take a history. He reports onset of the dizziness as 1 h ago while sitting at his desk. This progressed to include nausea and ultimately vomiting multiple times. Prior to becoming ill, he had just returned from lunch 2 h ago. He and three of his coworkers had pizza. All members of the lunch party had eaten the same food and no one else is exhibiting any symptoms. The restaurant has been frequented by base personnel for many years and has never been known for food safety concerns.

The pilot's past medical history is significant only for chickenpox during childhood, which did not require hospitalization, and there were no sequelae. He has no medication allergies and has never had any surgeries. He does not use tobacco or illicit drugs, but does admit to consuming six to eight alcoholic beverages weekly and drinks one to two cups of coffee a day. He is not married, but is involved in a monogamous relationship. He denies any history of sexually transmitted infections.

The pilot denies any previous similar episodes. Furthermore, he denies any recent ill contacts or foreign travel. He has not had any recent illnesses or injuries. He has never had any head injuries, including concussions, loss of consciousness, or problems with headaches. His only medication is loratadine (Claritin®) 10 mg daily for seasonal allergies. He does complain that his allergy symptoms have been worse recently, as he complains of recent onset of symptoms of rhinorrhea, nasal congestion, and left ear pressure. The symptoms have not responded to the loratadine.

Chart review reveals no serious past illnesses. With exception of the visit related to allergies, his last visit to the flight medicine clinic was roughly 4 mo prior for a routine annual exam. The history and physical exam at that time revealed no abnormalities. On his personal health questionnaire completed on the day of his physical, he did note occasional tinnitus in his left ear. Upon further questioning, he explains that he still has occasional problems with tinnitus, but he states that he can easily "drown out" the ringing with competing noise such as music or a running fan. He denies the tinnitus being a problem

in completing his daily job. He admits that he did not want to make a big deal about the tinnitus because he was afraid of being removed from active flight status, but states that it currently is worse than usual.

Physical exam reveals a well-developed/well-nourished man. Vital signs are within normal limits. Eye exam reveals a horizontal nystagmus to the right, which suppressed with fixation. Nose and throat are normal. On otoscopic exam, both tympanic membranes are normal appearing and freely mobile. There is no fluid or air noted behind the tympanic membranes. The Dix-Hallpike maneuver is negative, but Romberg is positive to the left.

1. Which is the MOST likely diagnosis?

- A. Vestibular neuronitis.
- B. Benign paroxysmal positional vertigo.
- C. Ménière's disease.
- D. Acute gastroenteritis.

ANSWER/DISCUSSION

1. C. The classic triad of symptoms for Ménière's disease or idiopathic endolymphatic hydrops includes vertigo, dizziness, a roaring tinnitus, and a fluctuating low-frequency sensorineural hearing loss.⁷ According to the American Academy of Otolaryngology-Head and Neck Surgery criteria for diagnosis of Ménière's, a "definite" diagnosis can only be made on the basis of: 1) at least two spontaneous episodes of rotational vertigo lasting at least 20 min; 2) audiometric confirmation of a sensorineural hearing loss; and 3) tinnitus and/or a perception of aural fullness.⁵

Patients may also complain of aural fullness, pain, or pressure. With Ménière's, the symptoms are usually transient and unpredictable. The symptoms of vertigo, nausea, and vomiting usually last minutes to hours. During this time, the severity can be incapacitating, preventing the person from performing normal activities, including flight duties. The hearing loss is usually unilateral and transient, but may persist late in the disease. Benign paroxysmal positional vertigo (BPPV) is the most common cause of vertigo and typically lasts seconds to minutes.³ The vertigo caused by BPPV is usually related to movement of the head or bending over. The vertigo symptoms with BPPV can usually be

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reproduced with the Dix-Hallpike maneuver and treated with canal repositioning maneuvers such as the Epley maneuver.³ BPPV normally does not cause severe nausea. Vestibular neuronitis is known to last much longer, possibly days to weeks. Hearing involvement in vestibular neuritis is rare.³ It is usually a one-time episode, frequently after an upper respiratory infection. Acute gastroenteritis is very likely to cause the acute nausea and vomiting, but the vestibular symptoms are not common to gastroenteritis.

The pilot is given 4 mg sublingual ondansetron (Zofran®) and removed from flying status. Prior to being released from clinic, he undergoes audiometry testing. As the hearing loss associated with Ménière's disease is fluctuating, the opportunity for testing during an active episode should be pursued. Audiometry results reveal normal hearing in the right ear, but hearing loss among the lower frequencies in the left ear (500, 1000 Hz).

2. With the pilot appearing to meet the criteria for Ménière's disease, what is the most appropriate next step in the aeromedical treatment of this pilot?

- A. Ears, nose, and throat (ENT) referral.
- B. Mild diuretic.
- C. Low salt diet.
- D. Symptomatic relief, including antinausea medications.

ANSWER/DISCUSSION

2. A. Given the likelihood of the lifelong prognosis associated with Ménière's disease and the fact that Ménière's is a diagnosis of exclusion, the best initial option is to refer to ENT or a neurotologist, if available. Ménière's disease is thought to be caused by either overproduction or retention of endolymphatic fluid in the ear. This creates a "cochlear hypertension." With this fluid imbalance theory for the etiology, treatment for Ménière's has in the past been directed at salt restriction ($1\text{--}2\text{ g} \cdot \text{d}^{-1}$) and diuretics.⁶ In this pilot's case, and pending aeromedical disposition, an ENT consult will be required.

The differential diagnosis of vertigo can be quite complex, with both central and peripheral causes. A variety of conditions must be excluded, including perilymph fistulas, which also can occur in aviators. There are additional clinical tests such as electrocochleography and vestibular evoked myogenic potentials (VEMP) that can assist in the diagnosis of Ménière's. Electrocochleography measures electric responses by the auditory nerve (action potential) and the cochlea (summating potential) after an auditory stimulus is introduced. In Ménière's, the summating to action potential waveform ratio is typically higher than in a normal ear.¹ The VEMP test measures the vestibulocollic reflex. This normal reflex occurs when a brief tone burst in one ear will produce an inhibitory response in the contralateral tonically contracted sternocleidomastoid muscle. The VEMP is effective at measuring dysfunction in the saccule, which is distended in Ménière's and exhibits an abnormal vestibulocollic reflex.¹ Treatments alone with antinausea medication can alleviate the symptoms of nausea and vomiting, but will not address the cause of the incapacitating vertigo.

The pilot returns to your office 3 wk later and reports three other instances of the vertigo, nausea, and vomiting. He denies identifying

any pattern to the attacks, which he states concerns him the most. He is afraid to go too far from home. He was evaluated by the neurotologist, who agreed with the diagnosis of Ménière's. He is currently being treated with hydrochlorothiazide and was advised to go on a low salt diet and avoid alcohol and caffeine.

3. What is the most likely aeromedical disposition of this pilot?

- A. Return to flight status after an observational period, given no recurrences.
- B. Recommend permanent disqualification.
- C. Return to flight status following surgical intervention.
- D. Grant a Class II C waiver restricting him to dual-piloted aircraft.

ANSWER/DISCUSSION

3. B. Unfortunately, given the unpredictable nature and the high likelihood of recurrence of Ménière's disease, the airman cannot continue in military aviation. The nature of the symptoms, especially the vertigo, can completely incapacitate the pilot. These patients may achieve good control on low salt diets and diuretics. Some may require transtympanic gentamicin therapy and others may require surgical intervention in the form of an endolymphatic shunt, vestibular nerve section, or labyrinthectomy.⁸ Endolymphatic shunt surgery was once considered the gold standard surgical procedure due to the preservation of the cochlear nerve.⁹ However, meta-analysis by Greenberg and Nedzelski demonstrated that outpatient use of transtympanic gentamicin injection provided 67% effective control of vertigo in one study and 75% in another.⁶

It is possible that the pilot will have no further episodes, but according to the Air Force Medical Standards Directory* and the Air Force Waiver Guide, Ménière's disease is a disqualifying condition.¹¹ The condition is also disqualifying for flight duties in the U.S. Navy and Army.^{4,10} The Federal Aviation Administration will consider a special issuance if the symptoms are controlled and not progressive on effective therapy and the airman has been asymptomatic for at least 1 yr.¹² The pilot in this case was disqualified from flying duties and was undergoing treatment by ENT to control his symptoms. He was to be evaluated within 1 yr for fitness for duty and possible Medical Evaluation Board for continued military service.

4. What famous astronaut who participated in the Apollo program had a history of Ménière's disease?

- A. Alan Shepard.
- B. Ken Mattingly.
- C. Gus Grissom.
- D. Stuart Roosa.

* U.S. Air Force. Medical standards directory; 2013:14. Retrieved 17 December 2013 from https://kx2.afms.mil/_layouts/login/Privacy.htm?ReturnUrl=%2Fkx2%2FflightMedicine%2F_layouts%2FAuthenticate.aspx%3FSource%3D%252Fkx2%252FflightMedicine%252FDocuments%252FMedical%2520Standards%2520Directory%2520%2528MSD%2529%252FMSD%25202013%252DDec%252D2%252DEpdf&Source=%2Fkx2%2Fkx4%2FflightMedicine%2FDocuments%2FMedical%20Standards%20Directory%20%28MSD%29%2FMSD%202013%2DDec%2D2%2DEpdf. Available to those with access.

ANSWER/DISCUSSION

4. A. After becoming the first American in space with the Mercury program, Astronaut Alan Shepard continued to work with the National Aeronautics and Space Administration with the Gemini program. He was scheduled to be command pilot for a Gemini mission, but had to be removed due to symptoms of Ménière's disease.² He later underwent surgery (endolymphatic shunt) and was returned to flight status. He was the oldest astronaut in the program to take part in the Apollo program. He gained notoriety for hitting two golf balls on the lunar surface.

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You're the flight surgeon on duty today with a full schedule. At 10 a.m., the nurse meets you in the hallway and tells you that a 32-yr-old African-American male loadmaster has asked to be seen for abdominal pain. The aviator is behind her and you notice that he appears mildly uncomfortable, but not acutely distressed. The nurse places the patient in the exam room and obtains the initial history and vital signs. She informs you that his vital signs are normal and his pain level was initially a 10 but was now 8. The patient did not eat breakfast as he had come to the base to work out. Because of the lower abdominal pain, though, he reported to the clinic. The patient reports a similar episode about 1 mo ago, but symptoms completely resolved after lying down for a few hours. Both episodes were first noticed upon awakening in the morning. He also described a dull pain in the left side of his scrotum earlier in the day that has resolved. His lower abdominal pain occasionally radiates to his back.

1. Which of the following diagnoses is the least likely to present in the above manner?

- A. Indirect hernia.
- B. Ureteral calculi.
- C. Cholelithiasis.
- D. Priapism.

ANSWER/DISCUSSION

1. C. Each of the answers can have a waxing and waning symptom pattern. However, the differentiating factor is the location. The patient describes pain in the lower abdomen with radiation to the

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