

**ANSWER/DISCUSSION**

5. E. You reassure him that they both were exposed near the same time and she hasn't shown any symptoms to date, which is a good sign. It is unlikely that both of them are nonconvertors to the MMR vaccine, but it is a good idea to check her immunity status (serum immunoglobulin G level) and offer her the MMR vaccination after she delivers their baby if her immunity is waning. The MMR vaccination is not recommended during pregnancy, as it is a live virus vaccine, but it is recommended for all women of child-bearing years at least 1 mo prior to getting pregnant.<sup>4</sup>

You follow up with the patient 7 d after hospital discharge. On exam, his vital signs have all normalized and he is off all medications. He reports his right ear is no longer painful and, other than a slight cough and a resolving rash, he has no other symptoms. On exam he is able to Valsalva, although the right TM is still a little sluggish.

**6. He asks whether or not he can return to flying duties. What do you do?**

- Return him to flying status today.
- Continue him on duties not including flying status but reexamine him in 2–3 d to verify he can clear his ears before returning him to flying status.

**ANSWER/DISCUSSION**

6. B. You inform him that although he is very close to returning to flying status, you want to make sure that his ears can clear easily on the ground prior to putting him back into the cockpit. You have him follow up with you in 3 d, at which point his serous otitis had resolved and he was able to clear his ears. He was swiftly returned to flying status and told to follow up with you as needed.

Measles is a ribonucleic acid virus that is preventable through routine vaccination. As a society we rely on herd immunity, but as reported above, 3% of people vaccinated are still at risk of contracting the disease.<sup>1,2</sup> Although there is no specific guidance for aviators related to the measles infection, the grounding period is determined by the duration of the illness and full recovery from symptoms. No

waiver or special issuance is necessary following full recovery from the measles infection.<sup>3,5,7,8</sup>

**Leary DB. *You're the flight surgeon: measles.* *Aerosp Med Hum Perform.* 2019; 90(10):908–910.**

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You're the flight surgeon covering a routinely busy morning of sick call, precepting independent duty medical technicians (IDMTs) in between your patients. One of these aviators had come in for a simple refill of loratadine for his mild seasonal allergies and, as the IDMT was sending the patient to the pharmacy, the patient said, "Oh by the way... can I get this cyst removed?" Eager for any opportunity to do clinical procedures, the question is brought to you with enthusiasm and you proceed to the exam room with your IDMT. The 24-yr-old male patient, a tanker

pilot new to the squadron, reports he noticed the painless lump on the right side of his neck 2 yr ago. He presented to the clinic at that time and was told that it was likely a small cyst, to just watch it and follow up if it got worse. He has no specific complaint about the lump now, aside from its persistent existence. cursory review of systems is negative. Upon examination, you can see the lump located on the right side of

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his neck, approximately one-third of the way up from the clavicle, just anterior to the sternocleidomastoid muscle. There is no discoloration; the overlying skin is intact. Palpation reveals a nontender, mobile, soft, round mass roughly 1 cm in diameter.

**1. Your initial differential diagnosis of this neck mass may include which of the following?**

- A. Sebaceous cyst.
- B. Infectious mononucleosis.
- C. *Staphylococcus aureus* abscess.
- D. Malignancy.
- E. All of the above.

**ANSWER/DISCUSSION**

**1. E.** All of the answers may be considered. The American Academy of Otolaryngology–Head and Neck Surgery clinical practice guidelines recommend the differential of the adult neck mass be divided into three categories: infectious, malignant, and nonmalignant.<sup>8</sup> Infection is the most common etiology of a neck mass in children. Without any overt signs or symptoms of bacterial infection or viral illness, and given the chronicity of this mass, infectious causes can quickly be ruled out. Sebaceous cyst, or epidermal inclusion cyst, is typically a firm, mobile, subcutaneous nodule with central punctum, and only tender when inflamed. In this case, the lack of central punctum or history of episodic inflammation steers away from this diagnosis.<sup>3,4</sup> Of utmost importance to remember, the most common cause of a neck mass in adults is a malignant neoplasm, and an asymptomatic neck mass may be the first or only indicator of head and neck cancer.

You proceed with a targeted history and physical exam. When asked about constitutional symptoms including fatigue and night sweats, your patient admits that over the past year he has been more exhausted by the end of the day, but thought it was due to his increased mental and physical job demands and his rigorous exercise routine. He has had occasional night sweats over the past several months, but thought it was normal given the summer weather. There are no other masses felt in his neck or axillae, his thyroid feels normal, and a thorough examination of his oropharynx, including the base of the tongue, reveals no abnormalities.

**2. What would you like to do next? Choose all that apply.**

- A. Send the patient home, with instructions to follow up in 4 wk.
- B. Schedule the patient an appointment to have the mass removed in your procedure clinic.
- C. Refer the patient for a fine needle aspiration biopsy (FNAB) of the mass.
- D. Order a contrast-enhanced computed tomography (CT) of the neck.
- E. Order an ultrasound of the mass.

**ANSWER/DISCUSSION**

**2. C & D.** A contrast-enhanced CT is the initial diagnostic test of choice for a persistent neck mass in an adult, providing important information about the size, location, extent, and consistency of the

mass. Once imaging has ruled out or characterized involvement of underlying vital structures, FNAB can provide definitive diagnostic information via cytology, Gram stain, or cultures. FNAB can detect malignancy with quite high sensitivity (77–97%) and specificity (93–100%).<sup>3</sup> With a suspicion of malignancy, these two diagnostic tests are essential. FNAB is preferable over open biopsy because the latter increases the risk of tumor seeding and local or regional tumor recurrence.<sup>8</sup> Ultrasound may be used instead of CT if there is reason to avoid radiation exposure (such as in a younger patient) or contrast exposure (renal disease) and can be useful in guiding the FNAB of small or nonpalpable lesions.<sup>3</sup> Answers A and B are absolutely incorrect in this case. Any adult neck mass should only be watched for 2 wk before further diagnostics are accomplished. Delayed diagnosis of metastatic cancer can be associated with significant progression of disease, increased mortality, and poor outcomes.<sup>8</sup> Any excisional procedures should be withheld until malignancy is ruled out.

The patient's CT imaging shows the right lateral neck mass of concern is a complex solid cystic mass measuring 1.2 cm in diameter. There are also several smaller masses, ranging from 0.3 cm to 0.8 cm, with the same characteristic appearance in the region, as well as a 0.4-cm mass in the right lobe of his thyroid and several microcalcifications. The otolaryngologist calls you with the FNAB cytopathology results of the neck mass—they are consistent with papillary thyroid cancer. Papillary thyroid cancer is the most common of the differentiated thyroid cancers, constituting about 85% of cases, followed by follicular cancer (12%) and anaplastic or undifferentiated thyroid cancer (< 3%). Cervical lymph node metastases are present in 20–50% of differentiated thyroid cancer cases.<sup>2</sup> With a confirmed diagnosis of papillary thyroid cancer, the patient must now be placed on duties not including flying status.

Although cystic neck masses are often thought to be benign, as in a brachial cleft cyst anomaly, it is important to remember that several malignancies often mimic this cystic lateral neck mass, particularly papillary thyroid carcinoma, lymphoma, oropharyngeal carcinoma, and salivary gland neoplasms. If the diagnosis remains unclear after initial imaging and FNAB, consider repeat FNAB with image guidance to a solid component of the mass. If these results are inadequate or benign, yet you still suspect malignancy due to history or CT imaging results, an expedient open excisional biopsy is recommended.<sup>8</sup>

**3. What treatment do you anticipate for the patient's papillary thyroid cancer?**

- A. Right thyroid lobectomy and right neck lymph node dissection.
- B. Total thyroidectomy and radioiodine ablation.
- C. Right thyroid lobectomy and radioiodine ablation.
- D. Total thyroidectomy, right lateral neck compartmental lymph node dissection, and consider radioiodine ablation.

**ANSWER/DISCUSSION**

**3. D.** Current guidelines from the American Thyroid Association on management of differentiated thyroid cancer strongly recommend a near-total or total thyroidectomy with lateral neck compartmental lymph node dissection and consideration of remnant ablative therapy

for this patient.<sup>2,6</sup> Management recommendations are based on risk stratification and, in this case, due to the metastasis into the cervical lymph nodes, he falls into the American Thyroid Association intermediate-risk category. Total thyroidectomy is indicated due to the suspicion of regional metastases, whereas a lobectomy would be indicated only for low-risk differentiated carcinoma when there are no suspicious lymph nodes seen on the preoperative imaging (no local or distant metastases).<sup>2</sup> Lateral neck compartmental lymph node dissection is strongly recommended for patients with biopsy-confirmed metastatic lateral cervical lymphadenopathy. Postsurgical radioiodine therapy should be considered in intermediate-risk patients, with the greatest potential benefit for those with adverse or aggressive histologies, greater number of lymph nodes involved, lymph node disease outside of the central neck, and advancing patient age.<sup>2</sup>

Your patient underwent successful total thyroidectomy, lateral compartment lymph node dissection, and radioiodine ablation therapy. He had an excellent response to treatment, defined as negative imaging and either suppressed thyroglobulin (Tg)  $< 0.2 \text{ ng} \cdot \text{mL}^{-1}$  or thyroid stimulating hormone (TSH)-stimulated Tg  $< 1 \text{ ng} \cdot \text{mL}^{-1}$ , which is associated with a very low risk of disease recurrence (1–4%) and  $< 1\%$  risk of disease-specific death, as well as decreased frequency of follow-up. Less favorable biochemical or structural incomplete responses are associated with increased need for additional therapy, persistent or progressive disease, and increased risk of death (as high as 11% with loco-regional metastases and 50% with structural distant metastases).<sup>2</sup> Thyroid hormone therapy with levothyroxine is initiated immediately after surgery at a slightly higher dose than would be anticipated for replacement to suppress TSH and suppress the potential growth stimulus of TSH on tumor cells. During follow-up, TSH was maintained at an undetectable level ( $< 0.1 \text{ mU} \cdot \text{L}^{-1}$ ) and, when free of disease, his levothyroxine dose was shifted from a suppressive dose to replacement. General guidance for follow-up includes thyroid function tests at 2–3 mo, then physical exam, neck ultrasound, and Tg measurements at 6 to 12 mo, then annually when free of disease.<sup>6</sup>

#### 4. Now that your patient is 8 mo postsurgery, stable on a replacement dose of levothyroxine, and symptom free, what does he require to return to flying status?

- Return to flying status, since he is stable on medication and has no sequelae from surgery.
- Flying waiver submission for hypothyroidism treated with levothyroxine.
- Initial review in lieu of a medical evaluation board (MEB) and flying waiver submission for malignant neoplasm.
- Flying waiver submission for malignant neoplasm.

#### ANSWER/DISCUSSION

4. C. According to the U.S. Air Force Medical Standards Directory, malignant neoplasms are disqualifying for retention and all flying classes (FCs). All malignant neoplasms require an initial review in lieu of an MEB, which is normally done as soon as a prognosis is established, and should not be delayed more than 90 d after treatment is initiated. Initial flying waiver requirements for thyroid cancer include history and physical, endocrinology and surgeon reports including

6-mo follow-up, thyroid function tests (TSH, serum thyroxine, Tg, and Tg antibodies), imaging reports, tumor board report if applicable, and MEB results. For FC I/IA and untrained members, a waiver may be considered after 2 yr of remission. For trained FC II and III aviators and remotely piloted aircraft pilots, waiver may be considered 6 mo after treatment is completed, provided the patient is in remission and asymptomatic. Although hypothyroidism treated with medication does require a waiver, his primary diagnosis and waiver for thyroid malignancy accounts for this, is more complete, and therefore is the most appropriate answer.\*

There is little aeromedical risk associated with differentiated thyroid cancer unless distant metastases are present. The main concerns are related to postoperative and treatment complications, including hypothyroidism, recurrent laryngeal nerve damage, and hypocalcemia related to parathyroid gland damage. Hypothyroidism is typically easily treated and waivable. Hypocalcemia must be managed closely; if severe enough, it can present as laryngospasms or seizures. Treatment can sometimes be complicated, requiring multiple doses of calcium and vitamin D divided during the day. Fortunately, hypocalcemia is usually transient, lasting less than 6 mo, and if controlled and stable, is waivable. Laryngeal nerve damage could result in vocal hoarseness or aphonia; waiver potential is based upon the ability to effectively communicate in a noisy aircraft environment.<sup>7</sup>

Your patient also holds a private pilot medical certificate. Thyroid cancer is not one of the 16 specifically disqualifying diagnoses, nor is it a condition that aeromedical examiners can issue, so he will need to be deferred to the Federal Aviation Administration for decision on an initial special issuance.<sup>1</sup>

Army standards of medical fitness only require a referral to an MEB if the malignant neoplasm is unresponsive to therapy or when residuals from treatment are unfitting, but otherwise thyroid cancer is not specifically disqualifying.<sup>9</sup> According to the Navy Aeromedical Reference and Waiver Guide, waiver will be considered for papillary or follicular thyroid cancer with the following: supporting MEB disposition, tumor board recommendations, histological confirmation of diagnosis by the Armed Forces Institute of Pathology, clinical and chemical euthyroidism, evidence of TSH suppression, and endocrinology consultation. The member must be returned to full duty by the MEB before a waiver for return to full flight status will be considered, which is generally 2 yr after completion of treatment.<sup>5</sup>

After a favorable return to duty without restriction disposition by the MEB, your patient's waiver was reviewed by the Aeromedical Consultation Service. They recommended a time-limited, unrestricted FC II waiver, which was granted by the major command, and your patient happily returned to flying status.

**McAviney HD. You're the flight surgeon: papillary thyroid carcinoma. *Aerosp Med Hum Perform.* 2019; 90(10):910–913.**

\* U.S. Air Force. Section O: tumors and malignancies. USAF medical standards, O1. In: Medical standards directory (MSD). 2018:53. [Accessed 9 Dec. 2018]. Available from <https://kx2.afms.mil/kj/kx4/FlightMedicine/Documents/Forms/ShowFolders.aspx?RootFolder=%2Fkx4%2FFlightMedicine%2FDocuments%2FMedical%20Standards%20Directory%20%28MSD%29&FolderCTID=0x0120004DEB19A0C597EF4794DF99094B5AD8FC&View=%7BE6B00DAE%2DE012%2D41B4%2DB351%2DDE160D7DA68D%7D> to those with access.

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