Aerospace Medicine Clinic

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You are an aviation medicine provider assigned to a military flight base. Happy to have the opportunity to do flight training this morning, you grab your flight gear and make your way to the flight line. In the operations section, you dig into the reading file to get up to speed on the unit's latest policies, procedures, and advisories when a pilot walks up to you with a medical question. "Hey doc! Do you think this is ringworm? I have had it for over 2 weeks now." As you turn, you prepare yourself for just about anything, knowing that this unit's pilots are known for their practical jokes. Thankfully, you see a 35-yr-old rotary wing pilot of Hispanic heritage lifting his uniform shirt to show his right flank. He doesn't appear to be in any distress. You know this patient well and he has no significant prior medical history except for a fully resolved bout of COVID-19 2 yr ago and a likely viral upper respiratory infection that kept him out of the cockpit for a week last month.

1. Looking at the lesion, what would you expect to see if the patient had "ringworm" (i.e., dermatophytosis) for the last 2 wk?
   A. Discrete pink macules or pink papules with a fine scale distributed over the trunk.
   B. A closely distributed vesicular and crusting rash.
   C. A closely distributed erythematous plaque with central hypopigmentation and scaling on the leading edge of the lesion.
   D. An area of erythema underlying silver scales.

ANSWER/DISCUSSION

1. C. The classic presentation of dermatophytosis is an annular plaque with a well-demarcated erythematous border, scaling at the leading edge, and a central hypopigmented area.[1] These plaques are caused by several species of fungal pathogens and are spread by contact with contaminated surfaces and infected individuals, especially in warm, wet environments such as locker rooms. The distribution of scaling can assist in the differential diagnosis of papulosquamous lesions. Scale at the leading edge occurs in tinea, scale in a confluence from edge to edge occurs in psoriasis, and scale in a peripheral rim (collarette) occurs in pityriasis rosea (PR).[2] A discrete maculopapular rash with a fine scale distributed over the trunk is a signature of secondary syphilis. It can be distinguished via sexual history, palm or sole involvement, history of a chancre, and lymphadenopathy.[3] Vesicular rashes are a signature of varicella zoster infections. Distribution along a dermatome is indicative of shingles or latent herpes zoster reactivation. These rashes often accompany significant neuropathic pain. Erythematous skin with silvery scales, often on the extensor surfaces of limbs, is a hallmark of plaque psoriasis.[4] A lack of central clearing helps differentiate this disease from dermatophytosis.

You ask the pilot to follow you to an unoccupied office for privacy and to get some better lighting. As you look at the lesion, the pilot says that he has seen civilian providers twice in the last 2 wk. First, his primary care manager gave him a topical azole antifungal to apply to the first and biggest patch to appear. However, the pilot stated that after a week of applying the cream a few times daily, the "rash" failed to improve. Having lost faith in this treatment, he went to an urgent care clinic where he was given oral terbinafine to supplement the topical medication. He states that with no resolution of the problem, he has also been washing his body with selenium sulfide shampoo on the advice of one of his colleagues.

Unfortunately, the pilot laments that the lesion is "even worse" now despite using his medications as directed. You perform a review of systems, where he endorses no other symptoms but the itchiness of the lesions. Furthermore, you ask him what he means by the lesions getting worse. He explains that the big patch is not resolving and that similar, but smaller, lesions have now spread all over his torso, especially on his back. He removes his shirt fully and you note how the lesions look. The first lesion is raised, café brown in color, and scaley around the edges. It is ruddy red to violaceous in

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color in the center and ovoid in shape. This lesion is by far the largest at approximately 8 cm in width. The remaining lesions vary in size, but all are smaller with a similar appearance to the original lesion. The lesions appear to follow the lines of the skin (Langer lines) across the whole of his torso, making a roughly triangular shape down his back. Considering the lack of effectiveness of the antifungal medications and the striking appearance of the lesions, you are reasonably sure this is not a fungal infection.

2. Based on the visual description above, what is the most likely diagnosis of the skin lesions?
   A. Psoriasis.
   B. Kaposi sarcoma.
   C. Secondary syphilis.
   D. PR, or pityriasis rosea.

ANSWER/DISCUSSION

2. D. PR classically presents with a "herald patch" or large central lesion later accompanied by others along Langer lines, forming a roughly Christmas-tree-shaped distribution when they occur on the back. The lesions are generally annular and scaling at the periphery similar to secondary syphilis and dermatophytosis.[5,6] The distribution of PR lesions and a negative test for fungal pathogens help rule out dermatophytosis. Psoriasis, as stated above, generally has a scaly, erythematous presentation on the extensor surfaces of the limbs. Guttate psoriasis may occur on the trunk, but PR usually occurs after an upper respiratory infection, begins with a herald patch, and develops along Langer lines. Furthermore, psoriasis is less likely to occur at our pilot's age, being more likely in younger and older populations.[4] Kaposi sarcoma is a vascular tumor occurring largely in immunosuppressed populations due to human herpesvirus 8 infection. They generally present as violaceous lesions that can occur around the body, and the vascular coloration can help differentiate these lesions from that of PR. However, in patients of African descent, PR presents as violaceous lesions that are more likely to involve the face and scalp, complicating differentiation from Kaposi sarcoma.[5] In this case, taking a closer look at patient history for immunological conditions and testing for human immunodeficiency virus may be warranted. As stated in the previous question, secondary syphilis can present with a maculopapular rash on the trunk that is nearly identical to PR. Unlike secondary syphilis, however, this patient did not exhibit palm or sole involvement, history of a chancre, or lymphadenopathy. Secondary syphilis can also be ruled out with the rapid plasma reagin test. This can be remembered with the phrase, "if thinking PR, consider an RPR."

You discuss with the patient that the lesions are most likely PR. PR is a common exanthem without a definitive cause. However, some evidence suggests PR is caused by an initial infection or reinfection of human herpesvirus 6 or 7.[7] The disease does not have a strong gender preference but occurs most commonly in patients in their 20 s.[6] The prevalence of the disease is generally accepted to be under 5%, although establishing prevalence is difficult due to lack of knowledge on etiology and difficulty of diagnosis due to similarities to other disease presentations.[5] Because this disease has been associated with viral infection and community transmission, it is considered communicable, although the routes of transmission cannot be definitively determined due to ongoing uncertainty regarding its etiology.[5] Typically, the lesions will spontaneously resolve within 3 mo, with patches potentially appearing and disappearing during this time and the possibility of some hypopigmentation remaining in the lesion area long-term.[5]

The pilot is skeptical about your diagnosis because he states that he "goes to jiu-jitsu a lot and gets a lot of jock itch and athlete's foot" from rolling on dirty floor mats. To help confirm the diagnosis and address the service member's doubts, you call a dermatologist friend. Fortunately, she has an open appointment this morning because of a last-minute patient cancellation. She can see the pilot if he can get to her clinic across base in the next hour.

As the service member heads to the dermatology clinic, you educate yourself on some possible medications that can be used to treat PR. You find that currently there is nothing to make the lesions resolve significantly faster. Treatment is usually aimed at addressing pruritis, if it is present.

3. Which of the following can be acceptable treatment options for PR for the general public?
   A. Topical anti-inflammatory steroids.
   B. Ultraviolet-B (UV-B) light treatments.
   C. Oral antihistamines.
   D. Oral acyclovir.
   E. Erythromycin.
   F. Watchful waiting.
   G. All of the above.

ANSWER/DISCUSSION

3. G. All of the above. These options are all acceptable treatments. The course of PR is self-limited (usually 4–10 wk) and treatment consists of watchful waiting with the option to actively treat pruritis.[6] Topical steroids are advised based on the low potential for harm and expert consensus.[6] UV-B light treatment has demonstrated improvement in both disease severity and symptoms when administered multiple times per week for 4 wk. Some experts recommend against UV-B light treatment due to the possibility of postinflammatory hyperpigmentation.[6] Therefore, consideration can be made for using UV-B light treatment if PR does not resolve in the expected timeframe. Dermatological conditions are a common cause of pruritis and histamine is the primary mediator. Pruritis can be empirically treated with second-generation antihistamines [e.g., cetirizine (Zyrtec), loratadine (Claritin), fexofenadine (Allegra)].[8] Several randomized, controlled trials demonstrate increased itch resolution and/or rash improvement with acyclovir, and a

position statement by the European Academy of Dermatology and Venereology recommends 400 mg acyclovir for three times per day for 7 d for patients with moderate to severe quality of life affected by PR.[9] Historically, erythromycin was a treatment of choice for PR. However, an open-label study of 184 patients followed for 8 wk was not able to replicate earlier studies that showed a majority of cases of PR resolved with erythromycin.[6] Most cases of PR self-resolve; therefore, watchful waiting is appropriate if symptoms are mild and do not impact quality of life.[6]

Making sure that the pilot's skin condition is addressed appropriately is your main concern. However, before meeting with the pilot in the afternoon, you should also review the U.S. military's aeromedical policies and procedures with respect to PR, as well as be informed of those of the Federal Aviation Administration (FAA) and International Civil Aviation Organization (ICAO).

Regarding U.S. Army aeromedical standards, you reference the Aeromedical Policy Letters, but there is no policy for PR. To develop an aeromedical disposition, you start by referencing Table 11: Conditions That May Not be Granted Temporary Clearance, which states, "Any condition which obviously impairs personal safety, safe flight, or mission completion" may not be granted temporary clearance.[10] Pruritis is the aviator's only symptom currently, so you search for other conditions with pruritis. The atopic dermatitis/eczema subsection discusses pruritis as a distraction during flight, but temporary flight clearance can be granted following a favorable aeromedical summary. Furthermore, a waiver is not required for the condition "if mild or moderate, requires only topical treatments, and doesn't interfere with fit and wear of equipment." Finally, you take note that "intermittent use of topical steroids over a limited area is considered compatible with continued flight status."[10]

In the Naval Aerospace Medical Institute's Aeromedical Reference and Waiver Guide,[11] there is no subsection for PR. However, aeromedical concerns for dermatitis include distraction during flight caused by itching symptoms and interference with wearing of flight gear depending on the location of lesions. All flight classes are eligible for a waiver, with the following considerations:

> *Symptom severity and the requirement for therapy will determine the aeromedical disposition. Patients controlled on topical therapy over small areas and patients who are asymptomatic on stable doses of loratadine (Claritin) OR fexofenadine (Allegra) may be considered for waiver. An initial seven-day grounding period is required for loratadine and fexofenadine to document no adverse effects. A one-time separate waiver submission is required for loratadine or fexofenadine.*[11]

In reference to the U.S. Air Force Aerospace Medicine Waiver Guide,[12] there is no subsection for PR, so you similarly reference a section on eczematous dermatitis (eczema) and atopic dermatitis. All flight classes are eligible for a waiver based on "the severity of disease, evidence of active lesions, the risk associated with specific medication(s), the individual service member's tolerance of the medication(s) and adherence to therapy, and the presence of comorbid conditions (i.e., asthma, allergic rhinitis, and food allergies)."[12] The waiver guide states that members can be considered for a waiver "once the individual demonstrates tolerability of the current treatment regimen, reduction of any distracting symptoms, and the ability to wear operational equipment."[12]

The FAA Guide for Aviation Medical Examiners provides decision considerations for several skin conditions. Chronic urticaria is listed as a condition of aeromedical significance that requires an FAA decision.[13] However, the disease course of PR is significantly different than chronic urticaria. Therefore, it is appropriate to apply the FAA's guidance to Aviation Medical Examiners for any condition not listed in the guide. The Guide for Aviation Medical Examiner states that if a condition "may result in sudden or subtle incapacitation," it will require consultation with the Aerospace Medical Certification Division or the Regional Flight Surgeon prior to certification.[13]

The medical standards and recommended practices of the ICAO are found in Annex 1: Personnel Licensing of the ICAO Manual of Civil Aviation Medicine. There is no guidance for dermatological conditions, but general guidance in section 1.2.6.1 states that license holders should not be permitted to exercise license privileges when "they are aware of any decrease in their medical fitness which might render them unable to safely and properly exercise these privileges."[14]

The pilot arrives at your office and tells you that the dermatologist agrees with your assessment of his skin condition. He states that the dermatologist has written prescriptions for oral diphenhydramine and topical triamcinolone for the pruritis and suggested "light therapy" if the lesions do not clear up within a month or so. The dermatologist emphasized that it is possible that he could have a protracted course of skin discoloration even after treatment.

You have a supportive discussion about the nature of the illness, how it affects his flight status, and how you will work with him during his recovery period. However, you tell him that he cannot fly while using a sedating antihistamine like diphenhydramine and you suggest taking the nonsedating antihistamine fexofenadine that is flight-approved by his branch of service. You also haven't forgotten about his previous comments about his frequent fungal infections and his current use of oral terbinafine or that he never reported these issues to his flight medical team.

4. Is oral terbinafine a concern in aviation medicine?
   A. No. There are no statistically significant side-effects.
   B. No. There are a few, very mild side-effects that are easily managed by the patient buying over-the-counter medications.
   C. Yes. It is only a concern as an indication of the underlying condition disease, not of the medication itself.
   D. Yes. There are many distracting and even debilitating side-effects that have been reported with its use.

ANSWER/DISCUSSION

4. D. There are numerous potential problems flying on oral terbinafine. Common adverse reactions include headache, diarrhea, visual disturbances, and rash. Rarely, fulminant liver failure, Stevens-Johnson syndrome, and other debilitating adverse reactions can occur.[15] Seemingly innocuous adverse reactions such as headache could lead to subtle incapacitation in flight, and visual disturbances could lead to sudden incapacitation. There are several common side-effects that negatively impact performance of flight duties. Attempts to self-treat symptoms with over-the-counter medications could delay the identification, treatment, and resolution of a disease process. This can be harmful to the patient and may put other crewmembers at risk if an aviator is flying with an inadequately controlled condition that is incompatible with flight duties. Medical certification for flight duties can be revoked for an illness, the medications taken to treat the illness, or both.

Over the next few weeks, the pilot checks in with you to review the progress of the PR. His service's aeromedical policies have not kept him out of the cockpit, and he is asymptomatic with flight-approved treatments. Although the lesions are resolving, he is unhappy about the darkened patches that are left behind. However, he is relieved to report that he never developed lesions on his face, arms, or other highly visible areas. You reassure the patient that even those discolorations will fade with time, and you give him a friendly reminder that he is welcome, and indeed required, to return to the aviation medicine clinic for this or other concerns.

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