

You're the Flight Surgeon

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It is a hectic Monday morning, and you are the flight surgeon at a small, but busy clinic. The morning's medical group leadership meeting has just adjourned and you are hastily making your exit while stewing about your heavy clinic load for the day. As you walk down the hall, you encounter one of your fellow flight surgeons with a red, unilateral facial rash. She is in noticeable discomfort. Upon questioning, she discloses onset of facial pain overnight, described as a "fiery, hot poker" pain on her right cheek when rolling over on her pillowcase in bed. When she got up to come to work, she noticed a painful, red rash with some raised areas extending from the right bridge of her nose onto her right cheek. In typical flight surgeon fashion, she had washed the area, applied a little triple antibiotic ointment, taken 800 mg of ibuprofen, and come in to work. She reports no other symptoms.

1. Given this presentation, and based on possible outcome implications, what is the most concerning possible diagnosis?

- A. Cellulitis.
- B. Contact dermatitis.
- C. Systemic lupus erythematosus (SLE).
- D. Herpes zoster (HZ).
- E. Acne.

ANSWER/DISCUSSION

1. D. At this juncture, the most worrisome diagnosis would be a facial presentation of herpes zoster (also known as shingles or simply HZ), especially in regard to postherpetic neuralgias and ophthalmic complications. Cellulitis and contact dermatitis would be important to rule out, although they both would be less likely to present with a unilateral rash. SLE can present with a "butterfly" facial rash, but it is usually not overtly painful and is usually accompanied by other symptoms. While acne can present both unilaterally and painfully, overnight presentation and excruciating pain and skin sensitivity are not expected characteristics.

You walk the patient into the clinic for a more thorough history and exam than could be performed in the hallway. She is an otherwise healthy 29-yr-old female flight surgeon. You know that she has

been under a high amount of stress in the clinic for the past 3 mo due to short staffing. Aside from the burning, painful rash on her right nose and cheek, she reports no other symptoms or unusual exposures (no novel foods or medications, no changes in soaps or detergents) in the past week. She reports the pain as a 7/10 and feels slightly lightheaded and nauseated, which she attributes to the pain and the Motrin she took on an empty stomach this morning. She had "a good case" of chickenpox in the second grade. She has never had a rash like this before. She is mildly distressed and markedly concerned about the diagnosis and prognosis of this rash, as her wedding is in 4 mo and she is afraid of the effect on her wedding photographs.

On physical exam, the patient is afebrile (wholly expected after the 800 mg of ibuprofen), but her pulse and blood pressure are slightly elevated, presumably as a result of her facial pain. The rash extending from the bridge of her nose across the malar prominence onto her right cheek is rough and red and has raised areas that look like forming vesicles. There is no apparent involvement of the right eye, despite the proximity of the rash to the lower lid. The area is very tender to even fingertip palpation. The rest of your physical exam, including gross visual acuity and intraocular movement, is completely unremarkable.

2. At this juncture, considering the high likelihood of a case of HZ, what would be your primary course of treatment?

- A. Oral antiviral therapy alone.
- B. Oral antiviral therapy and pain management.
- C. Pain management and systemic corticosteroid therapy.
- D. Pain management alone.
- E. Suspend all treatment until ophthalmology consultation downtown.

ANSWER/DISCUSSION

2. B. The most important factor in the treatment of HZ is early recognition of symptoms and treatment with oral antiviral therapy within 72 h of symptom onset.^{1,9} That being said, for a patient in legitimate 7/10 pain, as a healthcare provider, your goal is to provide relief of pain as well. In this case, as a nonsteroidal analgesic was

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clearly not sufficient, stronger analgesics required consideration. Corticosteroid therapy has been studied and shown to reduce acute pain and provide for faster and better recovery and healing in the long run.¹ Corticosteroid use does pose some concern in the immunocompromised patient, so it is considered more of an adjuvant therapy than a mainstay in HZ treatment. The bottom line is that while other treatments and consultations may be in order, nothing should delay immediate treatment with oral antiviral therapy for the treatment of HZ.

For reassurance, you have the optometrist from the next clinic stop over to “eyeball” the patient and suggest any further inputs. He has no further suggestions but reiterates that should any changes occur or visual symptoms develop, the patient should call or return to clinic immediately. After issuing a 7-d DNIF, you send the young flight surgeon home on quarters for 24 h with a 7-d course of valacyclovir, lortab (hydrocodone bitartrate and acetaminophen), and topical analgesic ointment. She was additionally prescribed a 10-d course of dicloxacillin. She returned to clinic for work the following day with improved pain management, but with spreading of the rash up the bridge of her nose onto her forehead, across the left cheek, and in the left outer ear canal. After completion of all medical treatments, the condition fully resolved with no scarring or further sequelae, and she was returned to flight status.

The varicella-zoster virus (VZV) is responsible for both the clinical syndromes of chickenpox and HZ/shingles.¹ Following infection with VZV in the acute form of chickenpox, VZV retreats to the sensory ganglion tissues where it can later reactivate into shingles. The classic clinical manifestation of HZ/shingles is a unilateral vesicular rash, usually adhering to a single dermatome (avoiding midline crossing) and accompanied by a burning pain.⁹ The symptoms, especially the pain, can last from weeks to months. Shingles is considered largely to be a disease of older age; thus, most research is focused toward that subset of the population. Medical conditions associated with an increased risk of HZ infection include rheumatoid arthritis, SLE, inflammatory bowel diseases, chronic obstructive pulmonary diseases, asthma, chronic renal disease, type 1 diabetes, and depression (many of which can pose obstruction to Flying Class standards on their own).³ Unfortunately, many of these conditions are paradoxically contraindications for HZ vaccination due to resultant immunocompromised states. Immunocompromised states resulting from adjuvant diseases or from virus-induced immunosuppression paired with a disrupted skin surface can lead to secondary infections.⁵ These infections can vary in severity from cellulitis to fatal sepsis. In this case study, the proximity of the vesicular rash to the patient's eye raised concerns for ophthalmological sequelae, chiefly herpes zoster ophthalmicus (HZO).¹ As with general HZ, early oral antiviral therapy (within 72 h of onset) is critical; pain management and steroid treatment are tailored to each case.

3. What severe sight-threatening ophthalmological complications can result from HZO?

- A. Neurotrophic keratitis.
- B. Inflammatory glaucoma.
- C. Acute retinal necrosis.

- D. Smoldering disease.
- E. All of the above.

ANSWER/DISCUSSION

3. E. All of the conditions listed above can result from HZO. Careful monitoring and treatment with both medications and surgical procedures are often required over a long period to preserve sight and ensure good recoveries and, in the case of an airman, return to flying status.¹

There is increasing discussion in the literature as to whether the advent of the VZV vaccine in children is leading to a paradoxical increase in HZ cases.^{1,4,9} There is only a single HZ vaccine available, but it is licensed only for individuals over 50 yr of age. Given that most military aviators are younger than the appointed HZ vaccine cutoff and the growing number of young airmen with only the VZV vaccine exposure to the disease (as opposed to having had the chickenpox), aeromedical evaluators are left muddling through the gray zone of prevention possibilities.

AEROMEDICAL DISPOSITION

Per U.S. Air Force regulations found in the most current Medical Standards Directory, there are no specific recommendations regarding shingles or HZ. There is notation that disqualification may occur if residual pain or other neurological deficits that interfere with an airman's ability to perform his or her duties occur following resolution of any neurological condition.^{*} Since oral antiviral therapy for HZ sometimes produces side effects incompatible with flying duties, the approved aircrew medication guide suggests that for both acyclovir and valacyclovir the patient will remain DNIF until the condition treated no longer will interfere with flying duties and that there are no adverse side effects (minimum 72-h ground test).[†] The Air Force Waiver Guide offers no specific guidance regarding HZ infections,⁷ nor does the guidance for flight standards from the U.S. Army and Navy.^{6,8} The Federal Aviation Administration Guide for Aviation Medical Examiners has no specific comments regarding VZ/shingles.²

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^{*} U.S. Air Force. Medical standards directory. Section L: neurologic USAF medical standards, L43. 2014:51. [Accessed 3 Dec. 2014]. Available for those who have access from [https://kx.afms.mil/kj/kx4/FlightMedicine/Documents/Medical%20Standards%20Directory%20\(MSD\)/Approved%20MSD%206%20October%202014.pdf](https://kx.afms.mil/kj/kx4/FlightMedicine/Documents/Medical%20Standards%20Directory%20(MSD)/Approved%20MSD%206%20October%202014.pdf).

[†] U.S. Air Force. Official Air Force aerospace medicine approved medications; 2014 Oct. 3. [Accessed 3 Dec. 2014]. Available for those who have access from <https://kx.afms.mil/kj/kx4/FlightMedicine/Documents/Med%20List%2003%20Oct%202014.doc>.

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You are the flight surgeon on call for the day at a joint undergraduate pilot training base and also a squadron medical element for one of the flying squadrons. During your quiet lunch time the airman at the front desk rushes in to inform you he has one of your pilot students with complaint of chest pain and shortness of breath. Upon initial examination, you find a pale and sweating 24-yr-old athletic-built man, alert and oriented, slightly out of breath but calm. He and his wife were practicing some P90× routines at the base gym minutes ago when he developed some palpitations and then chest tightness. Past medical history is significant only for flying waiver granted for premature ventricular contractions (PVCs) and rare atrial ectopy. An echocardiogram 2 yr ago showed normal ejection fraction (EF) and cardiac chamber sizes. He normally has asymptomatic bradycardia. The patient has taken no medications or supplements. He has no medication allergies or environmental allergies. The ensuing examination reveals heart rate of 235, blood pressure 149/100, temperature 97.8°F. Electrocardiogram (EKG) shows supra ventricular tachycardia. Thankfully, your staff had the foresight to call Emergency Medical Services when the patient first presented with complaint of chest pain, as your clinic is small and a good 45-min drive from a cardiac center. During his transfer to the nearest and trusted civilian cardiac center in town, the patient develops ventricular tachycardia (VT) and a lidocaine infusion is started during the ambulance transport. That same evening, when you call the cardiac center to follow up, you discover that upon arrival your patient degenerated into ventricular fibrillation and required immediate defibrillation. He is for the moment stable in the cardiac intensive care unit.

1. The evening of the incident, your squadron commander is concerned and wants information. What is your best next step?

- A. Ask the civilian cardiac center to fax updated information.
- B. Call the patient's wife to express concern and to find out more about what happened.

- C. Go to the hospital and visit the patient and meet his treating physicians.
- D. Assure your squadron commander that all will be fine as the patient is stable.

ANSWER/DISCUSSION

1. C. The best way to find information from a civilian hospital, in a case like this, is to go there and talk to the patient's treating physicians. The patient and his family would be highly appreciative of a visit from the squadron physician. In addition, you can introduce yourself as the primary care manager to the hospitalists/specialists, who would likely prefer to communicate with the primary care manager to ensure the patient will have seamless care and follow-up.

After three consecutive visits at the civilian hospital, you finally piece together the results of diagnostic tests: a cardiac lab work-up including creatine phosphokinase and troponin is normal, a coronary angiogram is normal, a transthoracic echocardiogram shows a dyskinetic right ventricle with overall EF of 35%, with enlarged (34-mm) parasternal long-axis (PLAX) view right ventricular (RV) outflow tract corrected for body size. Mid-RV diameter is in normal range. Cardiovascular magnetic resonance (CMR) imaging reveals dyssynchronous RV contraction, increased RV end-diastolic volume, and depressed RV EF of 34%. During electrophysiological (EP) testing when VT is induced, patient's EKG shows multiple QRS morphologies.

2. What is your diagnosis?

- A. Right ventricular outflow tract (RVOT) tachycardia.
- B. Dilated cardiomyopathy (DCM) with predominant RV dysfunction.
- C. Myocarditis.
- D. Arrhythmogenic right ventricular cardiomyopathy (ARVC) or arrhythmogenic right ventricular dysplasia.

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