

Small Pox-Induced **Myocarditis**

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J.T. is a thirty year old male who presented to the Emergency Department with a seven day history of fever, chills and myalgias. In addition, he began having drenching night sweats and chest discomfort the past two days. The patient stated that he was recently treated for a UTI by his PCP the week prior; however, despite an oral course of antibiotics, his fevers and urinary symptoms persisted. He had a CT scan of the abdomen done at this time which showed no abnormalities.

The patient described his chest pain as worse with movement and minimally relieved by ibuprofen. He denied cough, abdominal pain, nausea, vomiting or diarrhea. He denied sick contacts or recent travel. He had no history of similar chest discomfort in the past. He stated he had been in his normal state of health except for the above mentioned UTI.

His past medical history consisted of hypertension and hyperlipidemia. He had no surgeries in the past and denied any known drug allergies. His outpatient medications included ibuprofen 400 mg as needed and a multivitamin daily. He was currently trying to control his hypertension and hyperlipidemia with lifestyle modifications. He denied any premature cardiac death,

hypertension or diabetes in either parent or his siblings. He is married without children, works in pharmaceutical sales and is active in U.S Armed Forces. He denies recent travel or risky sexual behavior.

A review of systems was positive for fever, chills, myalgias and chest discomfort but negative for headache, shortness of breath, cough, sputum, nausea, vomiting, dysuria or diarrhea.

On physical exam his vital signs were a temperature of 97.6 orally, blood pressure 120/80, heart rate 80, respirations 14 and oxygen saturation of 98% on room air. The patient is awake, alert, and in no acute distress. His height and weight are of a typical nourished individual. Pupils were without scleral icterus and mucous membranes were moist. There was no cervical or axillary lymphadenopathy. He had S1 and S2 heart sounds auscultated without any murmurs, rubs, or gallops. His lungs were relatively clear to auscultation, but the patient was really not able to take deep breaths due to discomfort. His abdomen was soft, nontender, nondistended, with positive bowel sounds. He had no suprapubic tenderness. His lower extremities were without clubbing, cyanosis, or edema. The patient is able to move all four extremities and is oriented to person, place and time. He had an appropriate mood and affect.

Troponin: **29.1** CK **576**, MB **71.9**, Index **12.5**

Labs on presentation to ED:

Na **135** K **3.9** Cl **98** Bicarb **30.7**
Ca **9** Glucose **185**

BUN **99** Cr **1.1** Alk phos **53**, AST **206**, ALT **61**

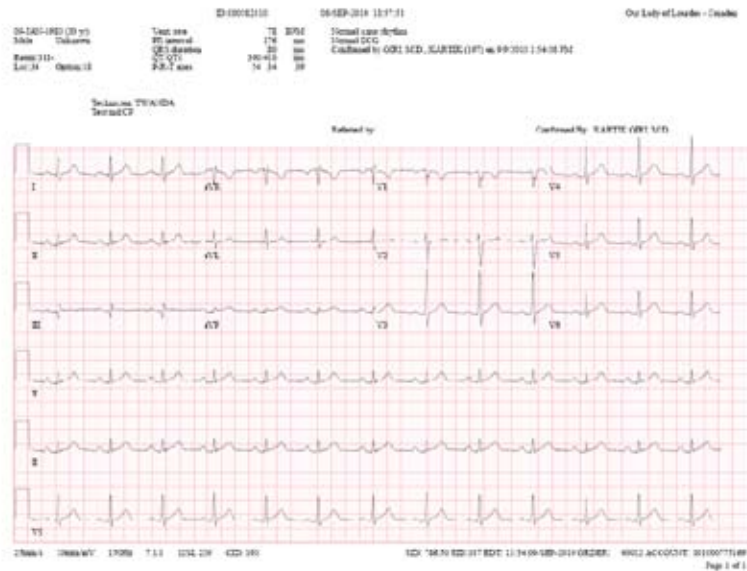
WBC **15.6**, bands **12**. Hb **13.7** Hct **39.1** Platelets **166**

UA- trace leukocyte esterase, 10- 20 WBCs and moderate bacteria. No RBCs, casts or eosinophils were seen.

CXR: no active disease (see image 1)



EKG: ST elevation in II, III , aVF
(see image 2)



As a result of the acute findings on the above EKG, Cardiology was consulted. A STAT bedside Echocardiogram was performed which showed good diastolic and systolic function, no wall abnormalities, mild mitral regurgitation and an estimated ejection fraction of 60-65%

The patient was diagnosed with an ST Elevation Myocardial Infarction (STEMI). He was started on IV Heparin, Aspirin 325 mg, Nitroglycerin paste, IV Lopressor and Zocor 80mg. In addition, he received thrombolytics in the form of weight based tenecteplase. He was then transferred to a nearby facility for an emergent diagnostic cardiac catheterization.

Hospital Course

The patient was admitted to the General Medical Floor with the diagnosis of a Urinary Tract Infection with a possible pyelonephritis. He was started on IV antibiotics since he had failed outpatient oral therapy. On the second day of admission, he complained of worsening chest discomfort. An EKG and cardiac enzymes were obtained and are shown below.

The cardiac catheterization showed mild left mid luminal irregularity, normal left anterior descending, left circumflex and right coronary arteries and left ventricular function of 55-65%.

The patient's wife presented to hospital. Upon questioning, she informed us that the patient had received the small pox vaccine seven days prior while training at Fort Dix military base. She had with her the patient's medical records, which included a handout given to the patient discussing the possible side effects post vaccination, one of them being myopericarditis within 30 days of vaccination.

Based on his EKG changes, positive cardiac enzymes but a normal catheterization, J.T was diagnosed with myocarditis, possibly due to his recent vaccination. An Infectious Disease consult was placed and serology was sent for echovirus, adenovirus and Coxsackie B antibodies, all of which were negative.

On repeat routine labs, was found to have a transaminitis. A right upper quadrant ultrasound was performed which showed mild fatty infiltration of the liver, mild splenomegaly, measuring 12.5 cm, but no acute pathology. Anti-smooth muscle antibody was also sent to rule out autoimmune hepatitis, which was also negative.

J.T was discharged home on day 5. He was instructed to continue Naproxen with restricted physical activity for 4 to 6 weeks. He would continue lifestyle modifications for his hypertension and hyperlipidemia. The patient agreed to follow up with his

primary care physician as needed. This case was reported to the Military Vaccine Agency.

Reason for Presentation

Smallpox is contagious and sometimes fatal infectious disease caused by Variola virus.

It was one of the most devastating diseases known to humankind and killed nearly 500 million people in the twentieth century

alone. Smallpox spreads by direct contact

but can also be spread through infected body fluids or contaminated bedding and clothing.

Rarely, smallpox has spread by airborne droplets in enclosed settings such as

buildings, buses, and trains. Humans are the

only natural hosts and transmission by

insects or animals has not been reported.

The first symptoms of smallpox include

fever, malaise, headache, body aches, and

vomiting. Long term complications are

encephalitis, extensive scarring and

blindness.

Vaccinations and post-exposure

interventions are the mainstays of treatment.

New [antiviral](#) medications are in progress, but it will be some time before they produce results. The vaccinia vaccine and [vaccinia immune globulin](#) (VIG) are available only through the CDC and state health agencies and the only licensed smallpox vaccine is Dryvax.

There are few contraindications to vaccination. The vaccine contains live viral particles of vaccinia, a virus similar to smallpox. The virus contained in the vaccine usually does not cause disease in humans, however; can be deadly in an immune-compromised individual. It is therefore recommended that no one with a weakened [immune system](#), [eczema](#) or [atopic dermatitis](#) receive the vaccination.

The [World Health Organization](#) (WHO) officially declared smallpox eradicated in 1980 and routine vaccination of the general population in the United States stopped. Vaccination of military personnel was later discontinued in 1989.

In 2002, the Soviet Union presented the threat of using smallpox as a biological weapon. Since that time, all U.S military have been vaccinated. In the face of biological warfare, civilians would also require vaccination. Researchers estimate that vaccinated people retain [immunity](#) for about 10 years, therefore, the current U.S population is considered vulnerable to smallpox, with 42% of the US population being younger than 30 years old and never vaccinated.

An association between smallpox vaccination and development of pericarditis has been reported. Over 450,000 soldiers were vaccinated in 2002, and over 50 probable cases of myopericarditis were reported to the Department of Defense. One particular study reported in JAMA in 2003 showed 18 cases of probable myopericarditis in white men aged 21 years to 33 years, who presented with acute myopericarditis 7 to 19 days following

vaccination. The diagnosis was made based on elevated CK-MB, positive troponin, ST-segment elevation on EKG plus/minus wall motion abnormalities on 2D Echo.

In the United States, the annual incidence of myocarditis is estimated at 10 per 100,000.

In addition, five percent of patients with acute viral infections have myocardial involvement. Many viruses have been reported to cause myopericarditis, making it hard to pinpoint the vaccine as the cause.

However, it has been a reported event after vaccination with the currently used strain of vaccinia virus (New York City Board of Health).

In the face of bioterrorism, civilian vaccination would also be required. Based on multiple documented adverse cardiac events, it would have to be decided if those with cardiovascular disease be excluded.

As opposed to the 20th century outbreak, if reinstated, the civilian smallpox vaccination

program will include vaccination of older patients, including those with underlying heart disease and cardiac risk factors. The frequency of coronary heart disease in the general population will make it difficult to determine if a serious coronary event following vaccination is coincidental or associated with vaccination. In addition, because current diagnostic tests such as cardiac enzymes and echocardiography are more sensitive for diagnosing myocardial infarction than in the past, it is expected that more adverse events will be detected.

Conclusion:

Myopericarditis should be considered an expected adverse event associated with smallpox vaccination. Clinicians should consider myopericarditis in the differential diagnosis of patients presenting with chest pain 4 to 30 days following smallpox vaccination.

In the face of bioterrorism, I believe the benefit of vaccination would outweigh the risk of developing myocarditis. Because a causal relation between smallpox vaccination and serious cardiac events cannot be excluded, the CDC recommends as a precautionary measure that persons with known cardiac disease with or without symptoms be excluded from vaccination. As more information becomes available, this recommendation might be revised.

Persons receiving smallpox vaccine should be informed of the risk of myocarditis. They should also be instructed to seek medical attention if they develop chest pain or shortness of breath. For suspected adverse cardiac events among smallpox vaccine recipients, providers should consult with a cardiologist to ensure appropriate diagnostic studies are conducted to facilitate diagnosis and treatment.

Sources:

CDC. Smallpox vaccine adverse events among civilians. United States, March 4-10, 2003. MMWR 2003;52:201-203.

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