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Acute Myopericarditis Following Smallpox Vaccination

By Akbar Khan, MD, Cardiology Fellow,
Emory University School of Medicine

After a concentrated worldwide campaign launched in 1967, the World Health Organization (WHO) declared the global eradication of endemic smallpox in 1979. Routine vaccination of civilians in the United States officially ceased the following year and, beginning in 1989, military personnel no longer were immunized.

After 9/11/2001, threats of the possibility of bioterrorism compelled reinstitution of vaccination for military and essential medical personnel (emergency care providers, some public health personnel and first responders). Although there are only two WHO-approved sites for storing the variola virus, the Centers for Disease Control and Prevention (CDC) and Vector Laboratories in Russia, the existence of clandestine stockpiles cannot be discounted. Should such a bioterroristic attack occur, those who were vaccinated before 1980 are vulnerable because immunity begins to wane 5-10 years after vaccination and by 20 years there are virtually no antibodies against the virus.

Reaction to the smallpox vaccine usually is mild. Typically, it is limited to a mild pustular eruption at the site, occasionally accompanied by low-grade fever, mild myalgias and malaise that generally clear within a few days. However, cases of cardiac complications associated with the smallpox vaccine have been documented in recent years.

A 28-year-old man presented with a four-day history of chest pain that was not associated with exertion or position. He had received a smallpox immunization about six days before symptoms first appeared. The patient had no shortness of breath, orthopnea or peripheral edema, although he complained of typical constitutional symptoms. His history was negative for prior health problems and high-risk social behaviors, and he was taking no medications.

The patient's vital signs included blood pressure of 134/86 mmHg, pulse of 94/min and oral temperature of 102.6 F. Scattered pustules were noted on his scalp and upper back. Jugular venous pressure was 8 cm. Heart and chest sounds were normal, with no murmurs or rubs. A chest X-ray also was normal.

Laboratory evaluation revealed elevated cardiac biomarkers and an elevated C reactive protein level. An electrocardiogram (ECG) showed diffuse ST elevation (Figure 1).

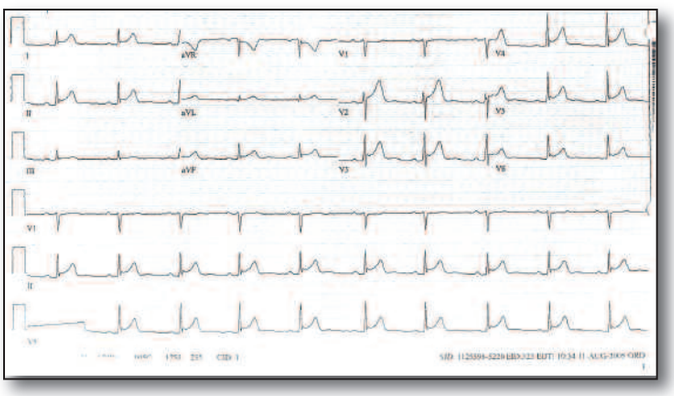

Figure 1

The patient was admitted to Emory University Hospital (EUH) for evaluation and management of myopericarditis. A transthoracic echocardiogram was done, and the results were normal. Nonsteroidal anti-inflammatory drugs (NSAIDs) were started.

The following day, the patient was discharged from EUH feeling much better. At follow up a week later, his symptoms had resolved completely and ECG demonstrated resolution of the ST elevation (Figure 2).

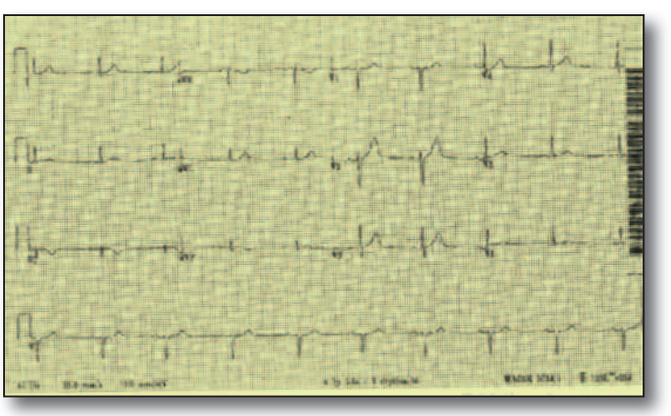

Figure 2

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A review of the literature documents several recent instances of myopericarditis associated with smallpox vaccination. The CDC reported 21 probable or confirmed cases among 37,901 civilian vaccinees during 2003-2004. Median time to onset of symptoms was 12 days (range 2-42 days), and median age was 48 (25-70 years old); 14 were women; 10 were hospitalized; none had more than two risk factors; all survived.

In the same time period, 67 cases were reported among 540,824 military personnel. Symptoms appeared 10.4 ± 3.6 days after immunization. All experienced chest pain. ST elevation was present in 57%, cardiac enzymes were elevated in 98% (mean troponin of 11.3), and abnormalities on echocardiogram (depressed ejection fraction, effusion) were found in 35%. Mean age of the cases was 26.6; 99% were men and 90% were white.

Histopathologic examination of myocardial tissue from four samples of military cases demonstrated no viral invasion, suggesting that post-vaccine myopericarditis is an immune-mediated phenomenon. This finding is consistent with murine studies of vaccine-related myopericarditis.

As of July 2006, the military continues to enforce immunization of selected troops. Vaccination is contraindicated in those with a history of cardiac disease or more than two risk factors for coronary artery disease.

Variola virus has a well-deserved reputation as the most dangerous member of the Poxviridae family. Outbreaks have occurred from time to time over thousands of years and have, on occasion, nearly decimated entire communities. It is spread by aerosol and is environmentally stable, with a long period of infectivity. Mortality rate is 30% among unvaccinated populations.

The usual mode of transmission is prolonged face-to-face contact with an infected person or direct contact with infected body fluids on bedding or clothing. It also may be spread via aerosol release in enclosed spaces such as buildings and public transportation. The CDC determined through laboratory experiments that 90% of the aerosolized virus dies within 24 hours.

During the time of routine immunization against smallpox in the United States (1950-80), very few cases of vaccine-associated myopericarditis were reported. Now, however, physicians are likely to see more cases as more people are immunized. Awareness of prompt diagnosis and following today's recommended diagnosis and treatment protocol will lead to satisfactory outcome of this unusual complication.

Current Recommendations to Physicians

- Consider a diagnosis of vaccine-related myopericarditis in individuals recently immunized against smallpox who present with chest pain and ECG changes.
- Treat with NSAIDs.
- Restrict activity for 4-6 weeks.
- Follow up to prevent further complications even though complete resolution of symptoms and clinical findings is to be expected.

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