Endocarditis Attributable to Group A β-Hemolytic Streptococcus After Uncomplicated Varicella in a Vaccinated Child

Antoinette L. Laskey, MD*; Tiffanie R. Johnson, MD*; Maria I. Dagartzikas, MD*; and Joseph D. Tobias, MD‡

ABSTRACT. Varicella is generally a benign, self-limited childhood illness; however, severe, life-threatening complications do occur. A live, attenuated vaccine exists to prevent this illness, but controversy remains concerning the need to vaccinate children for what is generally a benign, self-limited disease, although more states are currently recommending this vaccine. We report a previously healthy 3-year-old who developed varicella 6 months after vaccination with no apparent skin superinfections, who subsequently developed group A β-hemolytic streptococcus (GABHS) bacteremia resulting in endocarditis of a normal heart valve. We are unaware of previous reports of endocarditis related to GABHS after varicella.

After developing a harsh, diastolic murmur that led to an echocardiogram, aortic valve endocarditis was diagnosed. A 6-week course of intravenous penicillin G was administered. Two weeks after the initiation of therapy, the diastolic murmur was harsher, and echocardiography revealed a large vegetation on the posterior leaflet of the aortic valve, with severe aortic insufficiency and a dilated left ventricle. The patient subsequently developed congestive heart failure requiring readmission and aggressive management. One month after the initial echocardiogram, a repeat examination revealed worsening aortic regurgitation and mitral regurgitation. The patient received an additional 4 weeks of intravenous penicillin and gentamicin followed by aortic valve replacement using the Ross procedure.

Our patient, the first reported case of bacteremia and endocarditis from GABHS after varicella, illustrates the need for the health care practitioner to consider both common and life-threatening complications in patients with varicella. While cellulitis, encephalitis, and septic arthritis may be readily apparent on physical examination and commonly recognized complications of varicella, the possibility of bacteremia without an obvious skin superinfection should also be entertained. The case we report is unique in that the patient had normal immune function, had been previously vaccinated, and developed a rare complication of varicella–endocarditis–in a structurally normal heart with a previously unreported pathogen. Although a child may have been vaccinated against varicella, the chance of contracting the virus still exists and parents should be informed of this risk. *Pediatrics* **2000;106(3). URL: http://www.pediatrics.org/cgi/content/full/106/3/e40;** ***group A β-hemolytic streptococcus, endocarditis, varicella, Varivax, complications of varicella.***

ABBREVIATION. GABHS, group A β-hemolytic streptococcus.

The clinical spectrum of varicella ranges from a benign, self-limited disease to potentially life-threatening complications from both varicella and bacterial superinfections, such as cellulitis, pneumonitis, necrotizing fasciitis, encephalitis, epiglottitis, myocarditis, and endocarditis. Superinfection of varicella skin lesions with group A β-hemolytic streptococcus (GABHS) is the most common complication of primary varicella infection. This focus of infection may serve as a portal of infection for bacteremia and more serious complications. We report a child who developed varicella 6 months after vaccination with no apparent skin superinfections, who subsequently developed GABHS bacteremia resulting in endocarditis of a normal heart valve.

CASE REPORT

A previously healthy 3-year-old male, vaccinated for varicella (Varivax, Merck, West Point, PA) at 2.5 years old, developed typical varicella skin lesions 10 days before admission. Three days earlier, he had developed nausea, vomiting, and fever to 103°F, along with increased irritability, decreased urine output, and right foot pain with difficulty walking. After hospital admission, blood cultures were drawn and therapy was started with intravenous acyclovir and ceftriaxone. The admission physical examination revealed an irritable child with stable vital signs. There were crusted skin lesions 5 to 10 mm in diameter without erythema. He had an I/VI systolic ejection murmur attributed to fever and anemia. Musculo-skeletal examination was normal; however, the patient's gait was broad-based and he refused to bear weight on his right side. Magnetic resonance imaging of the brain and examination of cerebrospinal fluid were negative. The patient had progressively worsening joint pain without evidence of arthritis. Intravenous clindamycin was added for persistent temperatures to 103°F and concern over possible GABHS infection. On hospital day 2, the blood cultures were positive for GABHS. Antibiotic therapy was changed to penicillin and clindamycin. The hospital course was further complicated by bilateral pulmonary infiltrates, hypoalbuminemia, and elevated liver function tests (albumin, 1.9 g/dL; aspartate aminotransferase, 153 U/L; alanine aminotransferase, 118 U/L). On hospital day 8, the patient developed a diastolic murmur consistent with aortic regurgitation. Subungual hemorrhages also were noted. Echocardiography revealed thickening of the aortic valve with moderate aortic insufficiency. A 6-week course of intravenous penicillin G was administered for aortic valve endocarditis. Two weeks after the initiation of therapy, the diastolic murmur was harsher, and echocardiography revealed a large vegetation on the posterior leaflet of the aortic valve with severe aortic insufficiency and a dilated left ventricle. After readmission to the hospital, digoxin, furosemide, spirono-

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lactone, and captopril were started for treatment of congestive heart failure. Quantitative immunoglobulin levels were normal, and varicella zoster titers were positive along with skin testing for mumps and *Candida*. One month after the initial echocardiogram, a repeat examination revealed worsening aortic regurgitation and mitral regurgitation. The patient received an additional 4 weeks of intravenous penicillin and gentamicin followed by aortic valve replacement using the Ross procedure. The latter involves use of the patient's native pulmonary valve in the aortic position and placement of a porcine valve in the pulmonary location. The valve at the time of surgery was described as thin-walled and trileaflet. The noncoronary cusp had avulsion of a portion of a leaflet that was flail. The remaining leaflet was retracted and scarred to the wall of the aorta and the right coronary leaflet had 2 holes from the endocarditis. He had an unremarkable postoperative course and was doing well on follow-up examination.

DISCUSSION

In March 1995, a varicella vaccine was licensed for use in the United States by the Food and Drug Administration. Now widely available, it is part of the recommended childhood immunization schedule at 12 to 18 months of age, as well as at other times for other susceptible patient populations. Unlike most vaccines on the schedule, in the majority of states it is not yet mandatory for school attendance. According to data for 1997 from the Centers for Disease Control and Prevention, only 25% of eligible children 19 to 35 months of age had been vaccinated.[1] The efficacy of the vaccine has been well-studied in Japan, where it was developed, and now in the United States. Data show 100% efficacy in preventing moderate to severe varicella and 86% efficacy for preventing mild varicella.[1] Without a mandatory requirement for varicella vaccination for school-aged children, vulnerable individuals will continue to acquire the disease, serve as vectors, and potentially experience life-threatening complications.

Although it is rare during childhood, endocarditis occurs most commonly in children with damaged/mechanical heart valves or in children with congenital heart disease. A review of the literature reveals that endocarditis as a complication of varicella is extremely uncommon. There have been 4 reports in the English literature of endocarditis after a varicella infection. The infecting organism was *Staphylococcus aureus* endocarditis in 3 cases and *Kingella kingae* in 1. Of these 4 cases, 2 required surgical intervention and 2 died of septic emboli before surgery could be performed.[1–3]

GABHS infections are a common comorbidity of varicella, because this pathogen is frequently the causal agent of skin superinfections. Although superficial cellulitis from GABHS is the most common infectious complication of varicella, more invasive infections and potentially more life-threatening infectious complications have been reported, including GABHS epiglottitis[4] and GABHS necrotizing fasciitis.[5] Our patient, the first reported case of bacteremia and endocarditis from GABHS after varicella, illustrates the need for the health care practitioner to consider both common and life-threatening complications in patients with varicella. Although cellulitis, encephalitis, and septic arthritis may be readily apparent on physical examination and commonly recognized complications of varicella, the possibility of bacteremia without an obvious skin superinfection should also be entertained. Previous reports in the literature support that serious complications may develop without obvious signs of cellulitis.[6] Our patient had GABHS bacteremia with mental status changes and refusal to walk and then a change in the cardiovascular examination with the development of a murmur, which led to the diagnosis of aortic valve endocarditis.

From 1988 to 1995, the Centers for Disease Control and Prevention reported up to 10 000 hospitalizations in children as a result of varicella or its complications. In the 5-year period from 1990 to 1994, an average of 43 reported deaths annually were attributed to varicella in children younger than 15 years old, 90% of whom were not considered to be at high risk.[1] Research in Canada regarding the cost to society in health care dollars spent and days of school/work lost as a result of complicated and uncomplicated varicella demonstrates the serious nature of this disease.[7] To accept varicella and its associated risk of death or serious complications as a routine childhood illness is unnecessary, considering the recent introduction of a vaccine.

The case we report is unique in that the patient had normal immune function, had been previously vaccinated, and developed a rare complication of varicella endocarditis in a structurally normal heart with a previously unreported pathogen. Although a child may have been vaccinated against varicella, the chance of contracting the virus still exists and parents should be informed of this risk. Recent studies in both Canada and the United States indicate that the incidence of varicella approximates the birth cohort, afflicting ~344 000 children a year in Canada and 3.1 million to 3.5 million children a year in the United States.[7,8] The death rate in nonimmunocompromised children between the ages of 1 and 14 years is 1.4 deaths per 100 000 cases of varicella. In adults, the death rate approaches 31 per 100 000 cases.[8] Although the vaccine is not 100% effective, failure to receive the vaccine is a virtual guarantee of acquiring chickenpox with the risks of serious complications and even death.

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