

Vaccine Era Measles in an Adult

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GOAL

To discuss the occurrence of measles since the advent of immunization

OBJECTIVES

Upon completion of this activity, dermatologists and general practitioners should be able to:

1. Describe the clinical appearance and diagnosis of measles and its recent reappearance in the United States.
2. Discuss atypical measles, its presentation, and the differential diagnosis.
3. Identify the reasons for primary and secondary vaccine failure.

CME Test on page 347.

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Measles should be included in the differential diagnosis of patients with fever and the characteristic viral exanthem, even if a history of adequate immunization is obtained. We present the case of a 23-year-old white female who developed high fever (103°F), brightly erythematous eruptions on

the face, sore throat, dry cough, and myalgia 5 days after her return to the United States following a trip to Calcutta, India. The patient had extensive facial erythema from the hairline to the neck, but some areas beneath the chin were spared. Fine erythematous papules extended down the anterior neck, and white papules were seen on the buccal mucosa. The erythematous macules spread to the trunk and extremities, eventually becoming confluent and desquamating over a period of 1 week. Defervescence occurred with desquamation. Measles serology revealed the IgM antibody as positive and the IgG antibody as negative despite 2 measles, mumps, and rubella (MMR) vaccinations at ages 15 months and 7 years. Skin biopsy was consistent with viral infection.

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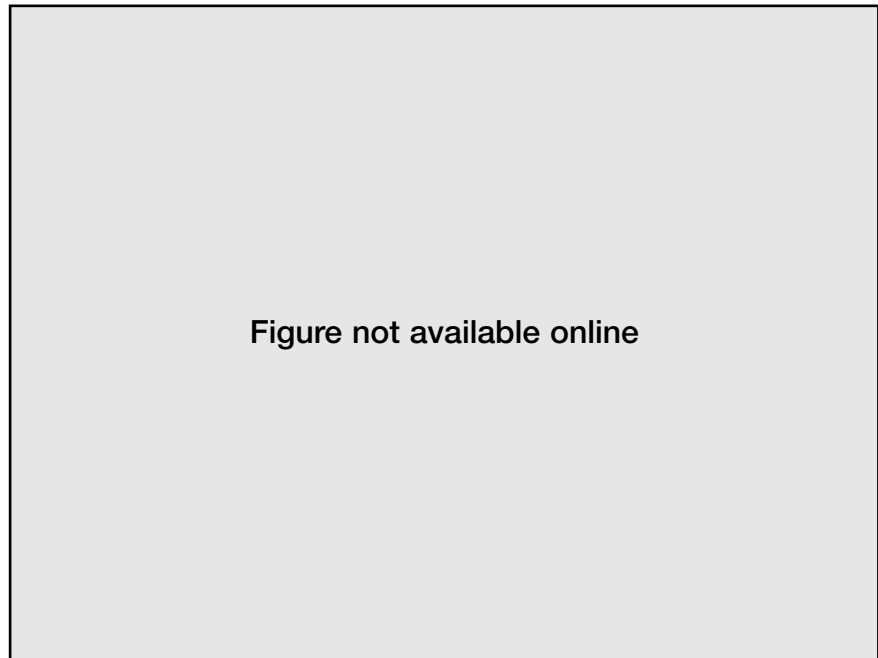


FIGURE 1. Erythematous eruption on the face and neck.



FIGURE 2. White papules on the buccal mucosa.

Measles, a highly contagious disease caused by the rubella virus and spread by direct contact with droplets from respiratory secretions, is one of the common childhood viral exanthems. With the advent of immunization, measles has nearly been eliminated in the developed world. We must still be aware, however, of primary and secondary vaccine failures and how this disease can present. After a 10- to 14-day incubation period, which may be longer in adults, a prodromal phase characterized by fever,

malaise, loss of appetite, conjunctivitis, coryza, and cough occurs and lasts for several days. Toward the end of this phase, pathognomonic Koplik's spots (tiny bluish white specks on a red base, likened to grains of sand) can be seen on the buccal mucosa, often opposite the second molars. Koplik's spots precede the onset of an erythematous, discrete, and maculopapular rash that starts on the face and spreads down the neck to the trunk and extremities. After becoming confluent, the rash resolves and desquamation, ac-

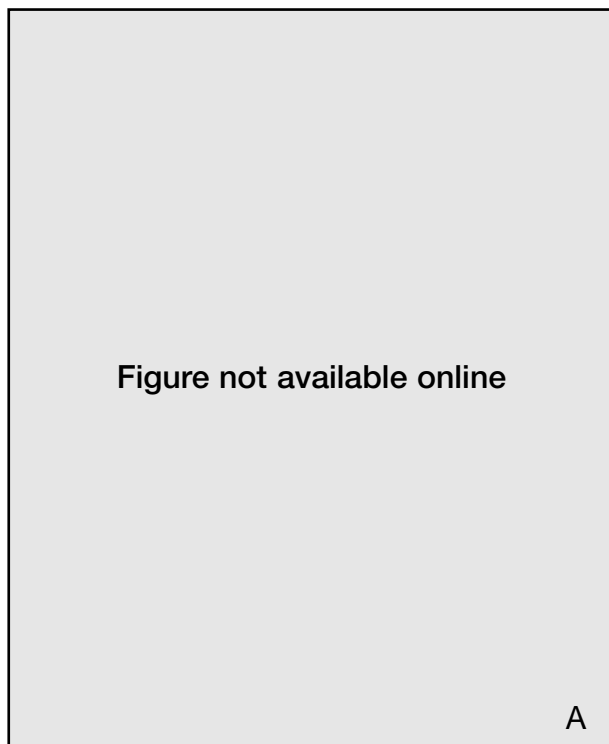


FIGURE 3. Erythematous macular eruptions on the anterior trunk (A) and on the back (B).

accompanied by improvement of symptoms, may be seen. The entire illness from prodrome to resolution of the rash and fever lasts from 7 to 10 days.¹

Case Report

A 23-year-old white female without significant past medical history presented with high fever (103°F), brightly erythematous eruption on the face, prostration, sore throat, dry cough, myalgia, loss of appetite, and occasional vomiting without diarrhea. The symptoms emerged 5 days after her return to the United States from Calcutta, India, where she worked for 2 weeks at an orphanage where children had measles. The patient had completed her immunizations as a child, including 2 doses of MMR vaccines at ages 15 months and 7 years, and she received the recommended prophylaxis before travelling.

Three days after the onset of fever, vomiting, and upper respiratory tract complaints, the patient was admitted with facial erythema. She was tachycardic and had a fever of 104°F, but her blood pressure was normal. Fine erythematous papules spread down the anterior neck and nape (Figure 1), and tiny white papules consistent with Koplik's spots were seen on the buccal mucosa (Figure 2). Pharyngeal congestion, nonpurulent conjunctivitis, and submandibular lymphadenopathy were also noted. The rest of the physical examination was unremarkable. After the patient started treatment with doxycycline and ceftriaxone, the erythematous macular eruption spread progres-

sively over the trunk and extremities, became confluent and pruritic, and subsequently desquamated (Figure 3, A and B). Fever and constitutional symptoms subsided with desquamation.

Initial laboratory studies showed a white blood cell count of 3500 cells per microliter (μL) with neutrophilic predominance. Hemoglobin counts, platelet counts, and a chemistry profile, including liver function tests and coagulation parameters, were normal. Urinalysis was unremarkable, and blood, urine, and sputum cultures were negative. Chest radiograph showed a small patchy left lower lobe infiltrate. Several malarial smears and connective tissue disease markers were negative, as were serology tests for dengue, typhus, *Brucella*, and *Salmonella*. A test for the measles IgM antibody was positive (2.2 index value), and one for IgG antibody was negative. Convalescent titers showed increased IgM (6.7 index value) and negative IgG levels. Skin biopsy showed epidermal destruction and giant multinucleated cells consistent with viral infection. After a 3-week period, the patient recovered completely without adverse sequelae.

Comments

A diagnosis of classic measles with typical manifestations should not be problematic; however, difficulties may arise because of an unfamiliarity with the symptoms that resulted from the decline of cases in the United States since the introduction of vaccination. In 1997² and 1998,³ the Centers for Disease Control

and Prevention (CDC) reported only 138 and 100 confirmed cases, respectively, of measles in the United States, which prompted it to state in 1998 that "measles is no longer an indigenous disease in the US."² Underdiagnosis may be obscured by atypical presentation and the tendency for measles to be a more severe illness in adults. In our case, the prodromal symptoms of erythematous eruption and Koplik's spots appeared almost simultaneously, and the appearance and pattern of the rash on the face and neck resembled that seen in photosensitivity disorders. The patient's vaccination history argued against a measles diagnosis; however, it is important to consider her travel history in light of the discovery that the majority of measles cases observed recently in the United States are imported or importation related.²

Atypical measles, a modified form of measles with variable and milder symptoms, has been reported in people with some degree of passive immunity, including infants with passive maternal antibodies to measles and susceptible persons who received gamma globulin after exposure. Atypical measles consists of a 1- to 2-day prodrome of fever and pain followed by a rash that may be urticarial, hemorrhagic, maculopapular, and/or vesicular. This form of the disease begins in the hands and feet and has been described in people with undetectable or very low antibody titers who received killed vaccine in the past and were exposed to the wild virus years later. These patients have high fever, prostration, and peripheral edema, and interstitial pulmonary infiltrates and hepatitis may present. Atypical measles may be misdiagnosed as varicella, Rocky Mountain spotted fever, toxic shock syndrome, or drug eruption.^{1,4} Our patient received MMR vaccinations at ages 15 months and 7 years, and although she had no immunity to measles (no IgG), she also did not show the severe manifestations of atypical measles syndrome. Measles serology, the most commonly used method of laboratory diagnosis, is particularly useful in atypical cases: a 4-fold or greater rise in antibody titers in acute and convalescent sera is diagnostic.

Despite 2 doses of the MMR vaccine, the patient had a negative rubella IgG titer. Several reasons for primary vaccine failure (failure of the initial vacci-

nation to elicit an immune response) have been postulated and include vaccine storage at more than 4°C, improper diluent, exposure to light or heat, and vaccination in the presence of low levels of passive antibody. Primary vaccine failure and secondary vaccine failure (waning immunity after successful vaccination) are each seen in less than 5% of recipients.^{5,7} Our patient's failure to mount an IgG response after primary measles remains unclear.

Measles should be included in the differential diagnosis for febrile illness with accompanying rash in the context of exposure and/or travel regardless of the patient's immunization history. A case of atypical measles can present with symptoms of prostration and rash occurring almost simultaneously, while a facial rash may be confluent and erythematous, which is suggestive of photosensitivity or a connective tissue disease. Serology can be particularly helpful for diagnosis in atypical cases.

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