

What Is Causing This Pruritic Rash on an Adolescent Boy?

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A healthy 11-year-old boy had developed a pruritic rash that started on his abdomen and back. Over the next week, the rash had become more pronounced on his trunk and then extended to his arms and legs. It eventually reached the dorsum of his hands and feet.

The boy had a stuffy nose 1 week before the rash appeared and an episode of diarrhea 4 days before the rash had developed. He never had a fever, cough, emesis, loss of taste or smell, chest pain, dyspnea, or fatigue. He never acted ill. He had not traveled. His vaccinations were up to date.

The rash was a diffuse, erythematous maculopapular rash on his abdomen, back, and extremities (Figure). He presented to the clinic 3 days after the rash had appeared. After a week, the rash began resolving in the areas where it had started and lasted for 2 weeks. After 3 to 4 weeks, the affected skin began peeling.

Because there was a family member in the home who had tested positive for COVID-19, the boy was tested for COVID-19 three days after the rash had begun; a nasal polymerase chain reaction test returned positive results the next day.



Figure. Pruritic rash on the abdomen of an 11-year-old boy with a diagnosis of COVID-19.

What is the most likely diagnosis?

- A. Erythema infectiosum
- B. Atopic dermatitis
- C. Pityriasis rosea
- D. Viral exanthem
- E. Gianotti-Crosti

Correct answer: D. Viral exanthem

Rashes are common among pediatric patients, and the differential diagnosis includes many common etiologies (Table 1).¹ Based on the associated symptoms and positive test results for COVID-19, the etiology of his rash was most likely COVID-19 exanthem.

Discussion

Cases of unexplained pneumonia were reported in Wuhan, China, in December 2019. It was determined that these cases were due to a novel coronavirus named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) or COVID-19. COVID-19 infection spread rapidly, and on March 11, 2020, it was declared a pandemic by the World Health Organization.^{2,3}

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Table 1. Common Pediatric Rashes

CONDITION	DESCRIPTION	ETIOLOGY
Pityriasis rosea	Herald patch on trunk, then papules with scale form a tree pattern Slightly pruritic	Unknown, possibly viral
Measles	Blotchy, erythematous, blanching, maculopapular rash starts at hairline and spreads cephalocaudally to palms/soles Associated with conjunctivitis, coryza, Koplik spots	Morbillivirus
Rubella/German measles	Fine erythematous maculopapular eruption starts at hairline and spreads cephalocaudally Associated with lymphadenopathy and mild fever	Rubella virus
Adenovirus	Discrete erythematous blanching, maculopapular rash, generalized onset Associated with conjunctivitis, rhinitis, and pharyngitis	Adenoviruses
Erythema infectiosum/ Fifth disease	Erythematous patches on cheeks and macular, erythematous, lacy rash on extensor surfaces of extremities	Parvovirus B19
Roseola infantum	Erythematous maculopapular exanthem after high fever resolves Occurs among those aged 6 to 36 months	Herpesvirus 6
Infectious mononucleosis	Diverse erythematous exanthems associated with fever, exudative pharyngitis, and adenopathy	Epstein-Barr virus
Rocky Mountain spotted fever	Erythematous maculopapular rash that starts on the extremities including palms/soles and spreads centripetally Associated with fever	Rickettsia rickettsii
Chickenpox	Pruritic crops of lesions at different stages Erythematous papules eventually become fluid-filled vesicles Prodromes include fever, respiratory symptoms, and malaise	Varicella
Gianotti-Crosti syndrome/papular acrodermatitis	Lichenoid papules that appear in crops over the extremities and face Prodromes include fever and malaise	Various viral etiologies, including hepatitis B, Epstein-Barr, and coxsackie
Hand-foot-and-mouth disease	Erythematous macules starting on the palms and soles that become thick-walled vesicles, which can be generalized Associated with painful oral ulcers Prodromes include fever and malaise	Coxsackievirus and enteroviruses

The first description of cutaneous manifestations of COVID-19 was based on rashes that developed in 18 of 88 patients in a hospital in Italy.⁴ Three variations were described: erythema, urticaria, and a vesicular rash. The trunk was the main site of involvement. Lesions healed in a few days; a correlation with disease severity was not made.⁴

In a series of 375 patients with suspected or confirmed COVID-19 in Spain, dermatologists identified 5 major patterns: areas of acral erythema with vesicles or pustules (pseudo-chilblain), other vesicular eruptions, urticarial lesions, maculopapular eruptions, and livedo.⁵ The maculopapular rash was the most common pattern; pruritus was associated

with urticarial and maculopapular lesions.⁵ The maculopapular lesions have been described as similar to pityriasis rosea, which is how our patient presented. The chilblain lesions were associated with the mildest COVID-19 symptoms, and livedo was associated with more-severe disease.⁵ In a comprehensive review of cutaneous manifestations associated with

Table 2. Most Common Presenting Symptoms of COVID-19

SYMPTOM	PREVALENCE
Fever	80%
Cough	84%
Chills	63%
Rhinorrhea	51%
Changes in taste or smell	22%
Shortness of breath	57%
Diarrhea	38%
Vomiting	13%
Fatigue	62%
Headache	59%
Myalgia	63%

Source: Burke RM, Killerby ME, Newton S, et al. Symptom profiles of a convenience sample of patients with COVID-19 — United States, January–April 2020. *MMWR Morb Mortal Wkly Rep.* 2020;69(28):904-908. <http://dx.doi.org/10.15585/mmwr.mm6928a2>

COVID-19, there were case reports and series of patients from all over the world, but most were from Spain and Italy.⁶ A total of 451 patients aged 2 months to 89 years were reported; most of these patients were adults. The review described 6 major groups: maculopapular rash, urticaria, chilblain, vesicular lesions, livedo reticularis, and petechiae. A pruritic maculopapular rash occurring on the trunk was the most common presentation (44% of patients).⁶ Skin lesions were usually seen in the symptomatic phase of infection (61% of cases).⁶ In a letter to the editor, researchers in Thailand speculated that dermatologic manifestations of COVID-19 could be divided into 2 groups: viral exanthems due to an immune response to the virus and cutaneous eruptions due to systemic consequences of the infection.⁷

While there have been some descriptions of dermatologic manifestations of COVID-19 in adults, little has been reported in children. Rashes have been described in cases of rare multisystem inflammatory syndrome in children

(MIS-C).⁸ To make a diagnosis of MIS-C, the patient must be younger than age 21 years and have a fever, laboratory evidence of inflammation, and evidence of severe illness requiring hospitalization with multisystem organ involvement, including skin.⁸ Our patient did not meet criteria for MIS-C, as he was not very ill. There is a case of an 8-year-old girl in Milan, Italy, who had a cough and developed erythematous papulovesicles on her trunk.⁹ The patient and her family tested positive for SARS-CoV-2, including her hospitalized grandmother.⁹ In this case, the girl had developed the rash 3 days after the cough; the exanthem resolved after 7 days.

Based on our patient and previously reported case series, dermatologic manifestations can be included in the long list of symptoms for COVID-19 (Table 2).¹⁰ Since children tend to have mild symptoms, this may be the only sign indicating they are infected, and early recognition may prevent further spreading. Recently, this idea was supported in a study in the United Kingdom that used a COVID-19 Symptom Study app.¹¹ The researchers found that in 17% of swab positive cases, a rash was the initial presentation; in 21% of those cases, rash was the only sign of illness.¹¹

Conclusion

Because rash is a common presenting symptom in pediatric patients, health care providers should consider COVID-19 testing in pediatric patients who present with a rash, especially when the rash is associated with any of the common COVID-19 symptoms.

Patient outcome

Our patient received no treatment and had complete resolution of the rash.

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