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Commentary

Cutaneous manifestations of the ebola virus

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Abstract

The current Ebola outbreak has drawn attention to the virus in the medical community. *Zaire ebolavirus*, more commonly known as 'the Ebola virus,' is a level 4-security agent in the Filoviridae family. The main cutaneous finding of Ebola is a nonspecific maculopapular rash that appears between day four and six of disease. Patients have "ghost-like" features, and the rash initially presents on the upper arms, flexor forearms, and upper legs, sometimes in a centripetal fashion. Skin biopsy, immunohistochemistry, ELISA, and electron microscopy can help provide early diagnosis and conceivably prevent spread if proper precautionary measures are in place.

Introduction

The current Ebola outbreak in West Africa has drawn attention to the virus in the medical community, although there is currently limited dermatologic literature on the Ebola virus. Twenty-four outbreaks of Ebola have been described since its discovery near the Ebola River in 1976, but the first laboratory confirmed case of Ebola occurred in the United States during the 2014 outbreak [1]. The following editorial addresses a knowledge practice gap by discussing what a dermatologist should know about the Ebola virus to ensure the safety of providers, patients, and the community.

- The main cutaneous finding of Ebola is a nonspecific maculopapular rash that appears between day four and six of disease
- A dusky, cutaneous erythema erupts over the entire body around day 8

- Skin biopsy, immunohistochemistry, ELISA, and electron microscopy may provide early diagnosis and prevent spread if precautions are in place

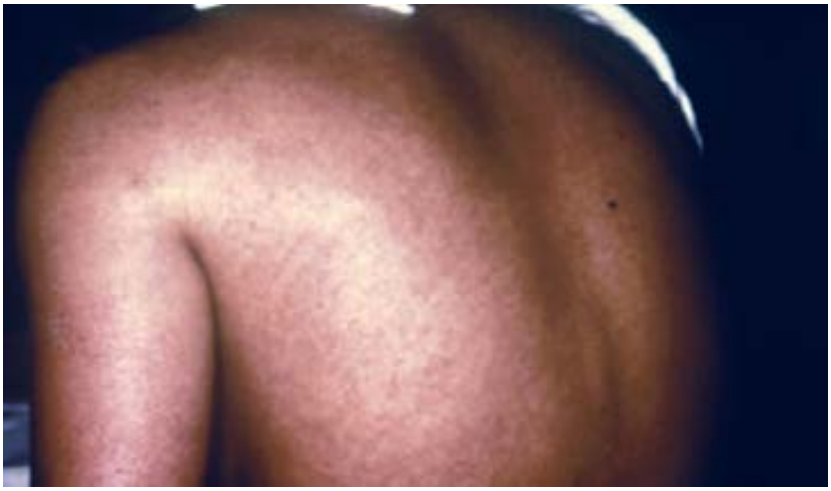
Commentary

Zaire ebolavirus, more commonly known as 'the Ebola virus,' is a level 4-security agent in the Filoviridae family [2]. Ebola is considered to be among the most virulent human pathogens, with the case fatality rate in some outbreaks reportedly almost 90% [3]. Fruit bats are considered the most likely reservoir of disease, but no one has successfully isolated infectious Ebola virus from bats [4]. Human infection can occur through contact with bats, primates, infected large-animal carcasses, and by person-to-person contact [5].

The Ebola virus displays no gender predilection, but the majority of patients are 15-44 years old [6]. The pathogenicity of the virus lies in its ability to infect a wide variety of tissues in the body that activate innate immune cells and trigger a destructive cytokine storm [5]. The virus also attacks the liver, lungs, spleen and kidneys, which causes organ failure, inability to regulate fluid, chemical imbalance, and halts the production of blood clotting proteins [5].

The Ebola virus strikes in three successive phases after a variable incubation period of two to twenty-one days [6]. Sharp chest pain, fever, headache, diarrhea, vomiting, stomach pain, myalgia, and unexplained bleeding or bruising can occur in the first stage of disease. Fever worsens as the virus progresses to the second phase, and a non-pruritic exanthematous rash with fine scaling appears [2]. Other symptoms of stage two include nervous system involvement, bleeding, erythema, petechiae, melena, hematemesis, hematuria, epistaxis, hemoptysis, and hemorrhage at puncture sites [2]. The final stage of disease results in death if the patient's condition continues to deteriorate as septic shock ensues from complications of hemorrhage. Recovery is seen in about 25% of cases, which coincides with the 26% of cases that have resolved in the 2014 Sierra Leone outbreak [7,8]. If pregnant, uterine bleeding, spontaneous abortion, and death frequently occur [9].

The main cutaneous finding of Ebola is a nonspecific maculopapular rash that appears between day four and six of disease (Figure 1 and 2) [10,11,12]. Patients have "ghost-like" features, and the rash initially presents on the upper arms, flexor forearms, and upper legs, sometimes in a centripetal fashion [10,11]. Dark-red pinpoint papules arise on the face, arms, legs, buttocks, and around the hair roots with subsequent spread to the rest of the body. Desquamation begins approximately five days after the initial rash and is most prominent on the palms and soles [2]. Around day eight, a dusky, cutaneous erythema erupts over the entire body [1,2,11]. The rash subsides within two weeks of onset.



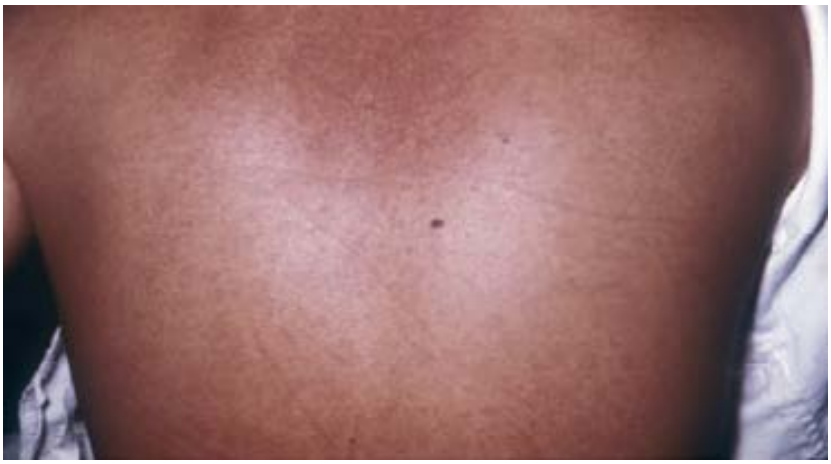


Figure 1 and Figure 2. Maculopapular rash on the chest, back and abdomen that usually appears between day four and six of disease

Other cutaneous manifestations of Ebola are purpura, petechiae, and mucosal lesions that affect the eyes, mouth, and pharynx [2]. Half of those infected will display bilateral conjunctival inflammation with photophobia, which may signal onset of hemorrhage. Hemorrhage can occur from any site in the body, but it is most common from the gastrointestinal tract and lungs [11].

Skin biopsy, immunohistochemistry, ELISA, and electron microscopy can help provide early diagnosis and conceivably prevent spread if proper precautionary measures are in place. Formalin-fixed specimens are not infective, and histopathology demonstrates nonspecific changes restricted to endothelial cells and fibroblasts of the dermis and epidermis [2,5]. Lesions demonstrate varying degrees of swelling and necrosis. Treatment is symptomatic with replacement of blood and fluids being essential. No vaccine has shown efficacy against Ebola, but a number of promising medical, immunologic, and nucleic acid therapies are under investigation [13].

Ebola can be spread through direct contact with broken skin, mucous membranes, contaminated needles or syringes, and with blood or body fluids from an infected individual [2]. The virus has been reported to survive for days on hard surfaces, but it is important to note test samples were kept in the dark and at low temperatures (4 degrees Celsius), which helped the virus survive [14]. The Ebola virus is sensitive to light, heat and humidity, so it is less likely to survive for extended periods in brightly lit environments or hospital waiting rooms that are routinely disinfected [15,16,17]. Ebola is susceptible to 3% acetic acid, 1% glutaraldehyde, alcohol-based products, and dilutions of 5.25% household bleach (sodium hypochlorite) and bleach powder (calcium hypochlorite) [15,16,17].

For workers treating Ebola patients, personal protective equipment (PPE) with full body coverage is recommended to reduce risk of infection. Healthcare facilities should provide onsite management and oversight on the safe use of PPE and implement environmental controls with continuous safety checks.

In conclusion, dermatologists should recognize the early signs of Ebola and use proper precautions if they suspect a patient may be infected. Because preventive measures and protocols continue to evolve all providers should be aware of current Center for Disease Control recommendations. These actions may aid in disease prevention through early identification, isolation, and quarantine of suspected Ebola patients.

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