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A viral rash: the impact of COVID-19 infection on the skin

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The phrase, a viral exanthem, often conceals a tenuous causative association. Yet linking a rash to a specific viral infection is potentially key to diagnosis and prognosis. Published in this issue of the *BJD* is a comprehensive analysis by Spanish dermatologists[1] that classifies the different skin changes seen in 375 patients with COVID-19 infections into five types: pseudochilblain, other vesicular, urticarial, maculopapular, and livedo or necrosis. Such studies are fraught with difficulties in terms of case definition and diagnostic transparency. Yet the investigators have addressed this by using consensus clinical definitions and molecular diagnosis, while identifying methodological limitations. The study adds to important information coming from other dermatologists in the face of the tragic spread of this infection in their communities.[2,3]

Beta-coronaviruses of the family Coronaviridae include SARS-CoV and MERS-CoV, both associated before 2019 with human outbreaks, as well as the new epidemic strain, SARS-CoV-2, which causes COVID-19 infection.[4] Other coronaviruses cause a variety of different diseases including mild upper respiratory tract illness. Studying the clinical expression of these earlier severe human beta-coronavirus infections highlights similarities such as acute respiratory syndrome. However, skin manifestations were not prominent features of these other two related infections,[5,6] which makes documenting these in the current outbreak so important. At present there is much about COVID-19 that is unknown, particularly the determinants of mild vs. severe and life-threating infection.

The vesicular and perniosis-like types, seen in a subset of patients, are very distinctive and require further study, particularly as they appear to be associated with milder disease. Conversely the livedoid and necrotic types are potentially important indicators of more severe disease. The latter suggest blood or vascular abnormalities. Changes in clotting and vessel damage in patients with COVID-19 range from thrombocytopenia, elevated D-dimers, prolonged prothrombin time and disseminated intravascular coagulation, to episodes of infarction in the lungs, kidneys and large arteries.[7] The involvement of angiotensin-converting enzyme (ACE)2 binding has been implicated, and, in renal biopsies, coronavirus particles have been detected adhering to arteriolar walls.[8] The mechanism underlying these cutaneous reactions is not known, but previous studies of severe coronavirus infections have shown a high level of expression of ACE2 receptors in the skin vessels, as well as in the basal layer of the skin,[9] which provide potential binding sites for the virus. Are these implicated in any of the COVID-19 skin types documented?

It will be important to build on the diagnostic and prognostic aspects of COVID-19 in skin and to refine the descriptive foundations laid down by this study and others that will emerge over the next few months. Unfortunately, further collateral dermatological damage will also emerge. This will include the adverse effects of personal protective equipment such as contact dermatitis or aggravation of pre-existing skin conditions in health workers,[10] reported in the SARS outbreak of 2003.[11] Another key dermatological side-effect of this epidemic is the damage that has been caused by the interruption of normal dermatology services. While the experience may provide some basis for re-examining, and possibly modifying, our traditional working practices, it is likely to have had a deleterious impact on patients with skin conditions waiting to be seen.

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