DOI: 10.20514/2226-6704-2020-10-3-223-229

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Cutaneous Manifestations in Patients with Covid-19 in the Practice of Emergency Medical Care

Abstract

Currently, information about the epidemiology, clinical features, prevention and treatment of coronavirus infection affected by SARS-CoV-2 (COVID-19) is constantly updated and updated. The most common clinical manifestations of COVID-19 are fever, symptoms of intoxication, cough, shortness of breath, fatigue, chest congestion, decreased sense of smell and taste, less often — abdominal pain, vomiting, diarrhea, and others. For the current period, there are data from clinical observations describing skin lesions in the new COVID-19 coronavirus infection. One of the first descriptions of skin manifestations in COVID-19 was published by the Italian dermatologist Recalcati S. (2020), who provided data on possible types of skin lesions as a variant of the manifestation of a new COVID-19 coronavirus infection.

This paper presents the confirmed cases COVID-19 infection with skin lesions, from the practice of specialists of mobile teams of emergency medical care state budgetary institution «Station of emergency medical care to them. A.S. Puchkov» in Moscow, at survey of the patients at disease onset. In the initial period of the disease, when examining patients, various morphological elements were observed: papulo-vesicular, papulo-squamous, erythematous, urticary, and others, their localization was also different. Whether the described changes on the skin are associated with direct exposure to the pathogen COVID-19 or are a manifestation of secondary pathogenetic factors (infectious-allergic, allergic, toxic, etc.) is not currently known. Further accumulation of clinical observations of skin manifestations in this disease is necessary in order to analyze and evaluate their diagnostic and prognostic value.

Key words: *Coronavirus disease — COVID-19, cutaneous reactions, emergency medical services*

Conflict of interests

The authors declare no conflict of interests

Sources of funding

The authors declare no funding for this study

Article received on 22.05.2020

Accepted for publication on 26.05.2020

For citation: Plavunov N.F., Kadyshev V.A., Sidorov A.M. et al. Cutaneous Manifestations in Patients with Covid-19 in the Practice of Emergency Medical Care. 2020; 10(3): 223-229. DOI: 10.20514/2226-6704-2020-10-3-223-229

Introduction

The skin is an indicator of the general state of health. It reflects many physiological and pathological processes in different organs and systems of the human body. Skin lesions are a common clinical symptom of various diseases; they can either be inevitable, in the case of measles, rubella, and chickenpox, or a concomitant component [1, 2].

The first cases of novel coronavirus disease (COVID-19), caused by a new virus from the group of coronaviruses — SARS-CoV-2, were reported

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in December 2019. In the following months, this infection spread throughout the globe and became a pandemic [3].

The clinical presentation was initially described as an acute febrile disease with a primary lesion of the lower parts of lungs, cough, chest tightness and shortness of breath, severe weakness, and an impaired sense of smell and taste. Myalgia, nausea, vomiting, diarrhea, headaches, confusion, hemoptysis, and palpitations were registered somewhat less frequently. Double polysegmental pneumonia with characteristic changes in pulmonary CT is currently considered to be the most typical clinical manifestation of COVID-19. Acute respiratory distress syndrome develops in 3–4% of patients [3, 4].

Information on the epidemiological and clinical features of COVID-19 is constantly updated and analyzed. As the infection spreads and the volume of clinical observations increases, there have been increasingly more reports of new symptoms in the clinical picture of this disease, including skin manifestations and changes in mucous membranes in COVID-19 patients [5]. According to different authors, their incidence varies from 0.2% (China) to 20.4% (Italy) of all cases [6].

Skin rash can appear at different stages of the disease: from the first hours to the middle of the second week. The cause and pathogenesis of skin manifestations in cases of COVID-19 infection have not been established yet. However, skin manifestations are most likely caused by infectious-allergic vascular damage, as well as by a high level of pro-inflammatory cytokines. In addition, the risk of drug allergy increases in connection with combined drug treatment.

Based on conventional concepts of the pathogenesis of exanthema and enanthema, rash is a focal reaction of the skin to the action of the pathogen or its toxins or metabolites, that occurs under the influence of histamine-like substances and occurs through several mechanisms, including:

- dilation of capillaries;
- blood stasis and increased vascular permeability with edema and hemorrhages;
- necrosis of epidermis and the deeper layers of the skin;
- dystrophic changes in cells (ballooning degeneration);
- inflammation (serous, purulent, serous-hemorrhagic) [7].

At the moment, there are data from clinical studies that describe skin lesions related to COVID-19. According to Spanish researchers, seven types of skin lesions can be distinguished in cases of COVID-19 [8].

This article presents different types of skin lesions observed by medical staff at the State Budgetary Institution "A. S. Puchkov Emergency Medical Care Station", Moscow City Health Department (Station), in COVID-19 patients in the course of emergency treatment during the pandemic.

Case 1 (Acrodermatitis)

A 59-year-old patient who received treatment for confirmed COVID-19, including a drug of the quinolone group (hydroxychloroquine) per os, and interferon alpha-2b intranasally, on the 9th day of disease, developed a large bright pink spot in the region of the first toe of the left foot; the spot developed into an erythematous lesion and resembled a bedsore; painful on palpation (Fig. 1).

Case 2 (Papulovesicular Eruptions Resembling Chicken Pox)

A 64-year-old patient with confirmed COVID-19, with symptoms of the disease (cough, body temperature 37.4 °C) and receiving combined antibacterial

Figure 1. *Erythematous focus*

Figure 2. *Papular rash*

Figure 3. *Papulo-vesicular rash*

treatment (azithromycin, levofloxacin), developed rash on the 6th day of disease without any subjective sensations. On examination, significant papular rash was observed in the neck and chest area (Fig. 2). Later, as the disease progressed, the vesicles opened; small erosions and scabs formed; there was refractivity to antihistamine treatment.

Case 3 (Papulovesicular Eruptions)

A 35-year-old patient under observation, who had febrile fever with excessive sweating, intense myalgia of back muscles, severe weakness and received antiviral treatment (ingavirin per os and interferon alpha-2b intranasally), on the 5th day of disease noticed rash on the chest, abdomen, back, and limbs, accompanied by itching. Examination of the skin of the back revealed rash in the form of large papules and occasional opened vesicles with scabs and traces of scratching (Fig. 3).

Case 4 (Papulovesicular Eruptions)

A 43-year-old patient with confirmed COVID-19 and bilateral pneumonia and received paracetamol combined with ceftriaxone i/m, developed rash in the chest area, accompanied by itching two days before the first symptoms of the disease. Examination revealed few papulovesicular elements in the chest area (Fig. 4).

Figure 4. *Papulo-vesicular rash*

Case 5 (Papulosquamous Eruptions Resembling Pityriasis Rosea)

A 50-year-old patient with hypertension on the 10th day of coronavirus infection with febrile fever for a week and had taken drugs (hydroxychloroquine and azithromycin) and had repeatedly wiped the skin with an alcohol solution, noticed some itchy elements in the form of large red spots. The skin of the lateral surface of the chest and the back had erythematous plaques of different size, from 0.5 to 1.5 cm in diameter, with collarette scale eccentrically along the peripheral contour of the elements (Fig. 5).

Figure 5. *Papulo-squamous rash*

Case 6 (Measles-Like Rash)

An obese 44-year-old patient without asthenia, anosmia, myalgia, and fever for one week, on the 7th day of the disease, developed maculopapular rash on her torso, upper and lower extremities, without itching (measles-like). The patient took antiviral and antipyretic drugs per os for a week (Fig. 6).

Figure 6. *Maculo-papular rash*

Measles-like rash is in the form of relatively large maculopapular elements with a pronounced tendency to merging, with no itching, and is localized on the torso and limbs. Unlike measles, there is no phasing of rashes; the elements can also be located on the palms, soles and scalp [2].

Case 7 (Toxic Skin Eruption)

A 26-year-old patient with high febrile fever for a week experienced a headache, myalgia of gluteal and posterior thigh muscles. He took metamizole, paracetamol, hydroxychloroquine and oseltamivir in therapeutic doses. Examination revealed confluent maculopapular rash, sometimes ring-shaped, in the abdomen region — with the formation of a continuous erythematous area (Fig. 7).

Many confluent maculopapular eruptions; some of the elements are ring-shaped, resembling polymorphic exudative erythema, and occur in the cases of toxicoderma [2].

Case 8 (a Type of Toxic Skin Eruption)

A 68-year-old patient with confirmed COVID-19 infection and pneumonia with an underlying

Figure 7. *Polymorphic erythematous rash*

subfebrile condition, rare dry cough, severe asthenia and received azithromycin in combination with hydroxychloroquine, on the 12th day of the disease suddenly developed rash in the axillary regions, with pain and a burning sensation. Examination revealed rash in the form of extensive erythematous lesions with formation of follicular papules protruding above the skin surface and painful on palpation (Fig. 8).

A type of toxic skin eruption in the form of axillary purpuric rash was described in observations of skin manifestations of confirmed COVID-19 by other authors [4].

Figure 8. *Purple rash*

Case 9 (Large Macular Rash of the Urticaria Type)

A 30-year-old patient with confirmed COVID-19 and normal body temperature, on the 3rd day of the disease, noticed a sudden itchy rash on her body; no drug treatment was performed. Objective examination of the face, torso, upper and lower extremities revealed multiple large-spotted rash merging in the forearms and lower legs with underlying general skin pallor (Fig. 9).

Figure 9. *Large spotted rash*

Case 10 (Papular Rash with Maceration)

A 56-year-old patient with no history of allergic diseases and no clinical symptoms of COVID-19 developed an itchy rash on the back of her hands. There was a history of known local use of antiseptics. Two days later, due to contact with a patient infected with coronavirus, the patient underwent laboratory tests, and COVID-19 was confirmed. On the 4th day of the disease, there were foci of maceration on the skin of the back of her hands, combined with the elements of papular rash with underlying dry skin (Fig. 10).

Observed changes in the skin are possible with atopic dermatitis, eczema, and rosacea as a result of frequent use of antiseptic agents to prevent infection transmission, as well as prolonged use of masks, gloves, and respirators. Exacerbation of chronic skin processes can occur due to a systemic inflammatory response caused by SARS-CoV-2.

Figure 10. *Papular rash with maceration*

Discussion

This paper describes clinical cases of confirmed COVID-19 encountered by emergency care teams. Novel coronavirus SARS-CoV-2 belongs to the family of RNA viruses. The site of entry of this pathogen is the epithelium of the upper respiratory tract and epithelial cells of the stomach and intestines. At the beginning of infection, SARS-CoV-2 damages cells with receptors of type II angiotensin converting enzyme (ACE2). These receptors are located on the cells of the respiratory tract, kidneys, esophagus, bladder, ileum, heart, and central nervous system. Damage to these organs causes clinical signs at the onset of the disease, such as dry cough or cough with a small amount of sputum, hemoptysis, dyspnea, chest tightness, diminished sense of smell, taste, fatigue, headaches, diarrhea, vomiting, palpitations. The pathogenesis of novel coronavirus disease has not been sufficiently studied; information on the epidemiology, clinical features, prevention, and treatment of COVID-19 is constantly being updated. As the volume of clinical observations increases, there have been more reports of skin rashes in COVID-19 patients [6, 11]. There are data from clinical studies describing skin lesions in COVID-19 cases. Italian dermatologist Recalcati S. (2020) was one of the first to publish clinical data on skin lesions as a form of manifestation of COVID-19 [6]. Eighteen (20.4%) of 88 patients hospitalized with confirmed COVID-19 had skin manifestations: 8 — at the onset of disease, 10 — after hospitalization. Erythematous rash was observed in 14 patients, generalized urticaria in 3 patients, variceliform vesicles in 1 patient. The torso was the most affected area; itching was absent or mild; rash disappeared within a few days; it did not correlate with disease severity. In Thailand, petechial rash was reported in one patient; it was initially considered as a manifestation of Dengue fever (widespread in this region); the patient subsequently had problems with breathing, and COVID-19 was finally confirmed [10]. Similar information concerning exanthema in COVID-19 patients was published by specialists from the USA, China, Holland and other countries [5, 9, 11, 12].

Typical skin rashes with viral exanthema are known to characterize measles, rubella, and Dengue fever. Without comprehensive studies, skin rashes cannot be ruled out as one of the first manifestations of COVID-19. On the other hand, the immunosuppressive state of the patient contributes to opportunistic bacterial and mycotic infections with skin lesions.

Conclusion

The described clinical cases of skin manifestations of COVID-19 in emergency care indicate the relevance of studying this disease at the present stage. In conclusion, it should be noted that although skin rash may be one of the first manifestations of COVID-19, it has a very diverse morphological and pathogenetic origin. Therefore, it cannot fully serve as the evidence base for clinical diagnosis. Further monitoring of changes in skin manifestations related to COVID-19, the accumulation of clinical cases, and experience in order to analyze their diagnostic and prognostic significance are essential.

Author Contribution:

All the authors contributed significantly to the study and the article, read and approved the final version of the article before publication.

Plavunov N.F. (ORCID ID: https://orcid.org/0000-0002-1296-1760): general organizational guidance for the structuring of literary material, drawings and the choice of direction of the concept and design of the article, editorial correction

Kadyshev V.A. (ORCID ID: https://orcid.org/0000-0002-1414-5337): literary processing of material, drawings describing the clinical cases of patients with COVID-19 infection. Preparation of bibliographic code for classification of articles for publication. Bibliographic work with a list of references (translation into English) and general preparation of material and drawings for publication

Goncharova N.A. (ORCID ID: https://orcid.org/0000-0001-8275-230X): literature data search: domestic and foreign sources for article preparation, general editing of material

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