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Case Report

A Rapidly Progressive Case of Skin and Soft Tissues Necrosis in a COVID-19 Positive Patient

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Abstract

Sars-Cov2 infection can result in numerous and varied skin manifestations including vasculopathy, bullous lesions and rarely necrotic lesions. At present, the aetiopathogenetic mechanism is still unclear. We report a case of a 68-year-old patient with acute onset of bullous and necrotic lesions with rapid progression to osteomyelitis, suffering from mild Sars-Cov2 infection.

Keywords

Necrosis; Bullae; Sars-Cov2 Infections; Vasculopathy; Osteomyelitis; Advanced Dressings; Antibiotic Therapy

Severino P | Volume 3; Issue 2 (2022) | JCIM-3(2)-048 | Case Report

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Abbreviations

COVID: Corona Virus Disease of 2019; SARS-CoV-2: Severe Acute Respiratory Syndrome Corona Virus 2

Introduction

Coronavirus is a single-stranded RNA virus responsible for the pandemic that started in December 2019 in Wuhan (China), causing severe respiratory involvement in several patients. Since the start of the COVID crisis, more than 1,500 articles have been published showing a correlation between COVID-19 and dermatological objectivity. Camila Arai Seque, et al., found that the frequency of COVID patients with skin manifestations ranged from 0.2% to 45% [1,2]. The pathogenesis of skin diseases during COVID-19 infection is not yet fully understood, but two different mechanisms have been hypothesised:

1. Inflammatory, directed against viral antigens
2. Vascular, secondary to vasculitis and thrombotic occlusion phenomena [1]

Several dermatological manifestations have been described in COVID patients: maculopapular eruptions, urticarioid rash, erythema pernio-like lesions, vesiculobullous eruptions, livedo, purpura, necrosis, chilblain-like acral pattern, telogen effluvium [1-3]. In this article, we describe the case of a patient who developed a rapidly progressive necrosis of the lower limbs, without vasculitis, temperature, with negative blood cultures, and pervious arterial circulation during a COVID-19 infection. Cases of limb necrosis associated with COVID-19 have been described in the literature, but were caused by an underlying vasculitis and thrombotic occlusion [4-6].

Case Report

In January 2022 a 68-year-old man with a positive personal history of controlled insulin-dependent diabetes mellitus, and no other pathologies, came to the emergency department of the Sant'Andrea Hospital in Rome for the sudden appearance of tense bullous lesions on his lower limbs bilaterally after a short afternoon rest. The patient denied a history of chemical and physical trauma, and did not complain of any related systemic symptoms. On arrival at the emergency department, the patient's vital signs were: body temperature 36.4°C, saturation 97%, blood pressure 140/80 mmHg, HGT 91 mg/dl. On admission to the emergency department, a routine molecular swab for Sars Cov 2 was carried out, which tested positive. Given the presence of predominantly skin involvement, an urgent dermatological consultation was requested, and blood samples were taken for haematochemical tests. Blood test results,

Severino P | Volume 3; Issue 2 (2022) | JCIM-3(2)-048 | Case Report

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unexpectedly, showed no significant alterations, except for: PCR 18.92 mg/dl (range value: 0.00- 0.50), LDH 310 U/L (range value 125-220), PT 14.30 s (range value 10-13), D-dimer 739 ng/L (range value <243), Fibrinogen 744 mg/dl (range value 200-400). The objective skin examination revealed tense bullous lesions on the lower limbs, partly necrotic (Fig. 1-5). Smaller elements were also found on the abdomen and right hand. In order to rule out a bullous disease, a direct immunofluorescence biopsy was performed, which showed a negative result. Histological examination showed "Fragment of skin with dermal sclerosis associated with low-grade dysplasia". Further examinations were carried out: blood cultures were negative for aerobic and anaerobic bacteria, and the skin lesions were swabbed for *Streptococcus agalactiae* (Strep. group B), *Citrobacter koseri*, *Enterococcus faecalis*. It was decided, after infectiology consultation, to start broad-spectrum antibiotic therapy with Augmentin 2 g 3 times a day, Deltacortene 25 mg and Clexane once a day, pending a better diagnostic definition. As the patient was found to have COVID-19, it was decided to transfer him to the regular COVID ward. During the stay in the COVID ward, the patient performed Angio-CT of the peripheral districts which showed: "Abdominal aorta pervious and regular caliber, common iliac artery, external and internal bilaterally with regular course and caliber. AFC, AFP, AFS, popliteal artery, anterior tibial and posterior tibial with regular caliber, course and opacification." The patient also had a CT scan of the chest, finding "dysventilative signs in the basal subpleural site bilaterally." The patient continued Augmentin, Deltacortene and Clexane therapy for three weeks, and had advanced dressings at St. Andrew's Hospital Plastic Surgery. The lesions were treated with escharctomies and evacuation of the subfascial collections, but lower extremity injuries continued to worsen, and necrosis progressed to deep soft tissue. In February 2022, a new dermatological consultation was requested during which a stationary skin condition was observed but, in view of the immunofluorescence negativity and the absence of fever, leukocytosis and neutrophilia, it was recommended that investigations be carried out to assess the patient's immune status. In the meantime, systemic corticosteroid therapy was suspended. Analyses of the patient's immune status showed: normal blood count, reduction in the T4 subpopulation with subsequent reversal of the T4/T8 ratio, reduced B population, reduced NK population. Antibodies to HIV 1 and HIV 2 were negative. Patient started antibiotic therapy with Piperacillin and tazobactam and tigecycline. During his admission to the Department of Plastic Surgery, MRI of the right thigh, leg and foot was requested in anticipation of an escharectomy and for suspected osteomyelitis, which showed: "at the level of the right tibial diaphysis a diffuse alteration of the signal intensity of the bone spongiosa, extended for a longitudinal stretch of about 20 cm, with irregular margins and with associated hyperintensity in STIR. There is a focal inhomogeneity of about 4 mm of the bony cortical of the III tibial diaphysis, after contrast medium the ward shows significant enhancement, with predominantly peripheral distribution. The finding appears to be compatible with the clinical suspicion of osteomyelitis". Due to the severity of the clinical picture, the patient underwent amputation surgery on the leg affected by osteomyelitis. The patient is currently undergoing antibiotic therapy and advanced wound dressings in his left leg.

Severino P | Volume 3; Issue 2 (2022) | JCIM-3(2)-048 | Case Report

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Figure 1: Bullous lesions with clear content and necrosis, on a purpuric background.

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Figure 2: Bullous lesions with clear content and necrosis, on a purpuric background of the left leg.



Figure 3: Necrotic lesion of the right leg.

Severino P | Volume 3; Issue 2 (2022) | JCIM-3(2)-048 | Case Report

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Figure 4: Necrotic lesion of the right leg.



Figure 5: Left leg injury after two weeks of advanced dressings and antibiotic therapy.

Severino P | Volume 3; Issue 2 (2022) | JCIM-3(2)-048 | Case Report

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Discussion

The mechanisms by which Sars-Cov2 causes skin lesions are largely unknown. The ACE2 receptor, to which the virus binds, is detectable in the basal layer of the epidermis, as well as in hair follicles. However, skin involvement is secondary to infection of endothelial cells of dermal vessels that express ACE 2 [1,7]. The pathophysiology of COVID-19 is multifactorial and involves the innate and adaptive immune systems, cytokines, the coagulation cascade, and the monocytic/macrophage system. Pathogenesis proposed to explain the skin manifestations are:

1. Inflammatory, as an immune response to the virus
2. Vascular, secondary to vasculitis and thrombosis

The first mechanism has been suspected as the cause of urticaria and exanthems in the course of COVID. The second mechanism explains the appearance of purpura, livedo reticularis, and necrosis of the extremities [1,8]. The clinical case described here is peculiar. In the first hours after onset, skin manifestations were represented by tense bullae at the lower extremities and abdomen, associated with initial necrosis. Bullous eruptions, although rare, have been described in the course of COVID-19 infection. In most cases, the bullae are localized or disseminated and their onset occurs three days after the onset of general symptoms and undergo spontaneous improvement after a few weeks [1]. In the patient in this case report, the bullous lesions rapidly underwent necrosis within a few hours and showed no improvement in the following weeks. Mohammad Karimi Alavije et al. described the case of a diabetic woman who developed hemorrhagic lower extremity bullae, which evolved into necrotic ulcers, during COVID-19 infection. As in our clinical case, the patient had no constitutional symptoms and had negative blood cultures [9]. However, in our patient, the bullous lesions were not hemorrhagic but had clear contents and were associated with necrosis from the onset. Skin necrosis of the extremities during COVID-19 infection is associated in most cases with fixed livedo reticularis, livedo racemosa, purpura and acro-ischemia [1,6]. These are manifestations related to an underlying vasculitis. Çabuk FK, et al., described a case of skin necrosis during Sars-Cov2 infection, with skin lesions appearing 1 month after admission to the intensive care unit with severe symptoms of pneumonia. These skin lesions presented as ischemic-necrotic lesions, and histologic examination revealed evidence of vasculitis in medium-sized vessels [5]. Although the necrotic lesions were similar in our clinical case, the latter lacked histological findings of vasculitis, and the patient never presented clinical signs of vascular involvement, such as purpura. In addition, our patient did not have a severe clinical form of COVID, and he never required admission to the intensive care unit.

Conclusion

This case report highlights the possibility of superficial and deep necrotic lesions in the course of Sars-Cov2 infection. In addition, it is hypothesised that the primum movens of the clinical picture was the viral infection and that the bacterial agents, found on swabs, worsened the underlying necrotic and inflammatory manifestations. The mechanism underlying this correlation is not yet clear, but a vascular pathogenesis can be hypothesised.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Authorship

Federica Rega - Wrote the paper, conceived research idea

Severino Persechino - Conceived research idea, supervision

Giulia Maretti - Wrote the paper, conceived research idea

Flavia Persechino - Conceived research idea, supervision

Domenico Giordano - Translation and revision of the English text

Nazareno Gagliostro - Supervision, collected data

Alessandro Capalbo - Supervision, collected data

Data Availability Statement

All data reported in the present manuscript will be available on request from the authors.

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Severino P | Volume 3; Issue 2 (2022) | JCIM-3(2)-048 | Case Report

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