

Case Report

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Staphylococcal Scalded Skin Syndrome Superinfection in a Child with COVID-19: A Brief Case Report

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Abstract

Background: While the exact prevalence of bacterial co-infection and superinfection in children with coronavirus disease 2019 (COVID-19) remains unclear, numerous scattered reports of it are on the rise.

Case Presentation: Our case was a 14-month-old infant with fever, truncal erythema, and scalded skin in flexor folds and also in perianal and perioral regions. A positive Nikolsky's sign was observed. The oropharyngeal mucosa was intact. The patient was diagnosed with staphylococcal scalded skin syndrome (SSSS) according to clinical features and a skin culture report. Due to the general impact of COVID-19 these days, the patient was evaluated for coronavirus via a polymerase chain reaction (PCR) test, and the result was positive. The patient successfully responded to the treatment which included hydration, wet compress, topical emollient, topical mupirocin for periorificial regions, and intravenous clindamycin. He was discharged after nine days without any complications.

Conclusion: This case highlights a clear bacterial infection superimposed on COVID-19. Nevertheless, inconspicuous cases of co-infections remain obscure and require a more diagnostic suspicion.

Keywords: Coronavirus disease 2019, COVID-19, Staphylococcal scalded skin syndrome, Bacterial co-infections, Bacterial superinfection, Nikolsky's sign

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Introduction

Most children affected with severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection develop none or mild symptoms and need more supportive therapeutic strategies (1). More severe cases of multi-system inflammatory syndrome (MIS-C) and organ system involvement are increasing (2,3).

Evidence for the presence of superinfection and co-infection among COVID-19 adult patients is rapidly evolving in several reports. Nevertheless, little data exist regarding the bacterial infections occurring in the course of SARS-CoV-2 infection in children (4,5). There is a wide variation in antibiotic prescriptions among pediatric institutions, highlighting the lack of practical guidelines for the use of antibiotics in COVID-19 patients. However, in a Latin American multicentric analysis of 921 children with COVID-19 and 69 children with MIS-C, the prevalence of antibiotic prescribing was 24.5% (6). Limited clinical data suggest a bacterial superinfection prevalence of approximately 16% among critically ill

patients (4). Garcia-Vidal et al revealed that 3% of adults with COVID-19 presented with community-acquired co-infection, mainly *Staphylococcus aureus* or *Streptococcus pneumoniae*. In addition, they showed that SARS-CoV-2 infected patients with superinfection had worse outcomes in mortality and length of hospital stay, while those with co-infection had a higher frequency of intensive care unit (ICU) admission (7). Here, we reported a 14-month-old boy who presented with staphylococcal scalded skin syndrome (SSSS) and COVID-19 simultaneously.

Case Report

We reported a 14-month-old boy who presented with a fever from two days ago, truncal erythema, scalded skin in periorificial regions and flexor folds from the last day, irritability, and loss of appetite. Physical examination indicated that exfoliation affected nearly 20% of the body surface, and Nikolsky's sign was present. The mucosal membranes including buccal, nasal, and conjunctival membranes were intact (Figure 1). He was



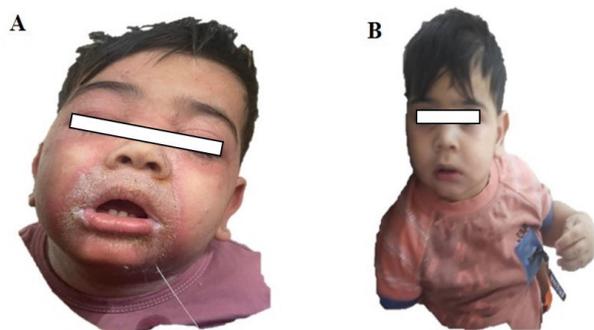


Figure 1. A- The erythematous scaling skin compatible with SSSS diagnosis at the time of admission. B- The repaired skin lesions of the same patient

stable hemodynamically, with normal blood pressure values. His pulse rate was 100 per minute and his body temperature was 38.3°C. He had no history of medication, medical problems, and allergies relatable to this condition. Laboratory studies revealed a leukocyte count of $12.1 \times 10^9/L$ ($4.8-10 \times 10^9$) consisting of 34% neutrophil and 50% lymphocyte, C-reactive protein of 0.8 mg/dL (<5 mg/dL), and erythrocyte sediment count (ESR) of 15 mm/h. Because of superficial scaling, presence of Nikolsky's sign, and the absence of mucosal involvement, SSSS was considered a working diagnosis, in the lack of skin biopsy. However, the skin culture result was positive for *Staphylococcus aureus*, which was compatible with the clinical diagnosis. The results of other cultures, including blood, urine, and nasopharyngeal secretions, were negative. He was evaluated for SARS-CoV-2 infection via a nasopharyngeal polymerase chain reaction (PCR) test and the result was positive. Finally, a combination of hydration, wet compress, topical emollient, topical mupirocin for periorificial regions, and intravenous clindamycin (40 mg/kg/d, divided q6h) was initiated. After eight days of treatment, the erythematous patches completely resolved and the exfoliations disappeared, and the patient was discharged after nine days without any complications.

Discussion

Although COVID-19 is mostly a respiratory disease in adults and generally a less severe disease in pediatrics, MIS-C and some other presentations are increasingly reported, resulting in more hospitalization and consequent implications. Community-acquired bacterial infections, co-infections in hospitalized patients, and super-infections result in worse outcomes for COVID-19 patients (4,7). Viral infections can facilitate bacterial super-infection by damaging the airway, decreasing mucociliary clearance, promoting bacterial adherence, and impairing the immune system. The interplay between virus and immune response, which results in both generation and release of pro-inflammatory cytokines such as interferon alfa, may predispose the patient to acquire

super-infection (8). In the lack of a specific biomarker for severity and super-infection, serial procalcitonin measurement plays an important role (9). The various bacterial agents that have been linked with COVID-19-related superinfection include multi-drug resistant *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Serratia marcescens*, *Acinetobacter baumannii*, *Enterobacter cloacae*, *Escherichia coli*, *Staphylococcus aureus*, and *Bacillus cereus* (10). The co-infection of the influenza virus with *Staphylococcus aureus* has been reported previously in both adult and pediatric populations (11,12). Spoto et al reported a 55-year-old woman with breast cancer admitted for respiratory distress, which resulted in the diagnosis of staphylococcus aureus co-infection with COVID-19 pneumonia, who died five days after hospitalization (13). To date, there is no comprehensive data regarding the super-infections and co-infections, as also antibiotic administration in children with COVID-19 and MIS-C patients. In a systematic review by Wang et al, between 19.4% and 100% of children with COVID-19 used antibiotics. Nevertheless, none of them mentioned any etiological findings. In adult patient's population, 13.2% to 100% received antibiotics while 1.0% to 27.3% of the cases had bacterial co-infections (14). Cutaneous manifestations of six hospitalized COVID-19 patients were reported by Bitar and colleagues in Michigan, USA. They presented two patients with a COVID-19-associated exfoliative shock syndrome with overlapping features of toxic shock syndrome and SSSS (15). Similar reports of cutaneous and histopathological manifestations of COVID-19 patients were recently reviewed by Khalili and colleagues (16).

It is unclear whether this presentation is linked to the hyperinflammatory state of COVID-19 or the defensive defects impacted in the context of infection. In this study we reported a typical clinical feature of SSSS and COVID-19 without other presentations of hypotension and multi-organ involvement, highlighting the possibility of bacterial superinfection.

Conclusion

While the exact prevalence of bacterial co-infection and superinfection in children with COVID-19 remains unclear, it's numerous scattered reports are on the rise. This case report points up a clear bacterial infection superimposed on COVID-19. Nevertheless, inconspicuous cases of co-infections remain obscure, requiring a more diagnostic suspicion.

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Author Contributions

Conception and design: AH, RS, MJ, and PA; Acquisition of data: AH and RS; Analysis and interpretation of data: AH, RS, MJ, and PA; Drafting of the manuscript: RS; Critical revision of the manuscript

for important intellectual content: AH, RS, MJ, and PA; Statistical analysis: RS; Administrative, technical, or material support: AH, RS, MJ, and PA; Supervision: AH, RS, MJ and PA.

Conflict of Interests

The authors declare that they have no conflicts of interest.

Ethical Approval

This study was approved by the ethics committee of the Kerman University of Medical Sciences (Code: IR.KMU.AH.REC.1399.064).

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