



Onychomadesis in a COVID-19 patient

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Summary We report the case of a 67-year-old woman who developed onychomadesis on 9 of her fingers 2 months after recovering from COVID-19, with subsequent full nail regrowth after 4 months. The development of onychomadesis in COVID-19 is probably related to inhibition of nail proliferation due to fever, direct viral damage, or an inflammatory process associated with endothelial damage and obliterative microangiopathy in the nail matrix area. Clinicians should be aware of nail changes and actively seek them out in patients with COVID-19.

Keywords Nail changes · Onychomadesis · COVID-19

Introduction

Coronavirus disease 2019 (COVID-19) is a pandemic systemic disease caused by a novel human pathogenic virus of the *Coronaviridae* family called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Various nail changes have been observed during and after recovery from COVID-19 and have been sporadically reported in the literature:

- **Red half-moon sign.** This represents the appearance of a convex erythematous line over the distal end of the lunula. It was observed in all fingers from 2 days

to 3 weeks after the onset of symptoms of COVID-19. The changes were asymptomatic and gradually disappeared over 2–3 months. It is assumed that they are related to the damage to the capillary network of the nail bed from the infectious inflammatory process [1–3]. This is supported by the changes observed by means of videocapillaroscopy of the periungual area. In 64% of the 82 patients with COVID 19 studied, Natalello G. et al. [4] found non-specific capillary changes manifested with pericapillary edema, reduced number of capillaries, enlarged and folded capillaries, slowed blood flow, microhemorrhages, and microthromboses.

- **Beau's lines.** These represent the appearance of transverse depressions of the nail plate, located at a distance from the proximal nail fold. They were observed in all fingernails and toenails, 2 and 3.5 months after diagnosis of COVID-19, respectively [5, 6].
- **Mees' lines (transverse leukonychia).** These represent the appearance of transverse, non-disappearing on pressure white lines on all fingernails that migrate forward with their growth. They were observed during illness from COVID-19. They are thought to be caused by abnormal keratinization of the nail plate due to COVID-19 [7].
- **Transverse orange chromonychia.** This represents the appearance of an orange discoloration of the distal parts of the fingernails. It was observed 4 months after recovering from COVID-19. It is assumed that the change in the color of the nails is related to microvascular damage or to closely located and merging hemorrhages (so-called splinter hemorrhages) of the nail bed [8].
- **Retronychia.** This is a condition in which the nail plate grows in the direction of and embeds into the proximal nail fold, leading to the development of chronic perionyxis and paronychia. It was observed

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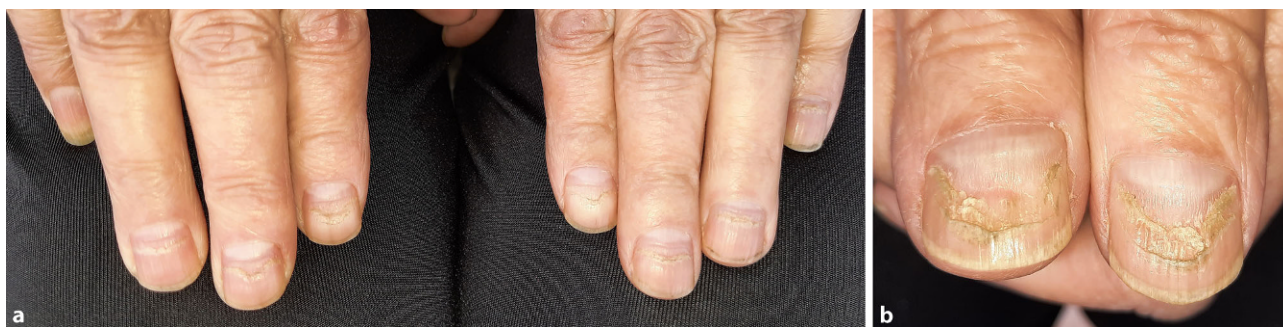


Fig. 1 a Fingernails with onychomadesis; b Nails of both finger thumbs with onychomadesis

on the fingers, and the condition started 12 weeks after the onset of infection [9].

- *Distal onycholysis and red-white discoloration of the nail bed.* This was observed 4 months after recovering from COVID-19 [10].
- *Nail changes induced by medication used to treat COVID-19.* After treatment with favipiravir and under UV irradiation (Woods lamp), a yellow-white fluorescence on the fingernails and lunula was observed [11–13]. The cause of the fluorescence has not been determined with certainty. It is assumed that the drug itself, its metabolites, or additional ingredients of the medicinal tablets are involved.

The only systematic study on nail changes in COVID-19 was performed by Grover C. et al. in 2022 [14]. They studied nail changes in 43 patients with moderately severe disease including 25 men and 18 women with a mean age of 53 years. The study was performed on average 18 days (8–38 days) after disease onset. New nail changes were found in 32 (74%) of the patients. The most common changes observed on the fingernails were as follows: nail bed erythema in 15 (35%) patients; red half-moon sign-type nails in 14 (32%), most often on the thumbs; leukonychia in 11 (25%); distal brownish staining in 6 (14%); and splinter hemorrhages in 4 (9%). On the toes, distal brown staining in 22 (51%) and leukonychia in 20 (46%) were most often observed. According to the authors, although the pathogenesis of most nail changes remains unclear, a role of inflammation and predisposition to intravascular coagulation can be assumed on one hand, and on the other hand, the impact of disturbances in the

function of internal organs (liver, kidneys) in the disease can be suggested.

In addition to nail changes, other changes of the nail apparatus such as periungual desquamation, pernio-like periungual erythematous edema (COVID-toe or finger), and acral gangrene have been described in patients with COVID-19 [15].

We had the opportunity to observe and follow up on a case of onychomadesis of the fingernails after recovery from COVID-19.

Case report

A 67-year-old woman was hospitalized in a specialized department with severe general fatigue, muscle pain, shortness of breath, fever, and a positive rapid antigen test for COVID-19, where the diagnosis of COVID-19 was confirmed with a positive PCR test for SARS-Co-2 and observation of ground glass-type changes on CT examination of the lung. Laboratory tests including complete blood count, ferritin, Lactate dehydrogenase (LDH), Aspartat-Aminotransferase (ASAT, AST), Alanine Aminotransferase (ALAT, ALT), bilirubin, urea, creatinine, C-reactive protein, and D-dimer were within normal limits. After treatment with antibiotics, corticosteroids, antithrombotic, and symptomatic agents, the patient was discharged with an improved general condition. Two months later, she noticed the onset of changes in the nails of the fingers—separation of the nail plates from the base of the nail shaft—about which she turned to a dermatologist. On examination, changes were observed in the nails of all fingers except the fifth finger of the

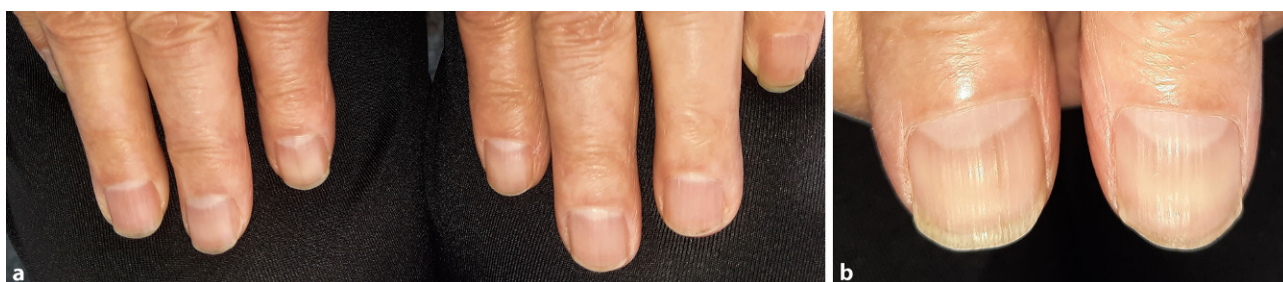


Fig. 2 a Healthy fingernails after 4 months; b Healthy nails of both finger thumbs after 4 months

right hand (Fig. 1a and 2a). The nail plate consisted of two parts, with a different ratio between them on individual fingers. The proximal portion consisted of a normal newly growing nail, and the distal portion consisted of the old nail that had been proximally detached from the nail bed. There was an arcuate groove between the two parts. The changes were consistent with onychomadesis. The patient was followed for 6 months. Growth of healthy fingernails was observed (Fig. 1b and 2b).

Discussion

Onychomadesis is a complete separation of the nail plate from the nail matrix while preserving the attachment to the nail bed. It can affect single nails as a result of local factors such as trauma or inflammation of the periungual area (paronychia). When more than one or all nails are affected, a systemic condition should be sought, most associated with [16]:

- **Infections.** Onychomadesis is usually associated with infection by coxsackie viruses, the so-called hand-foot-mouth disease. Onychomadesis is most likely to develop in children younger than 7 years of age and after a latent period of 4 to 10 weeks after infection. It is associated with temporary suppression of the proliferation of the nail matrix because of its direct damage by viruses or as a result of a more severe effect on the general condition in young children. Affected nails fall off and new ones grow spontaneously.
- **Autoimmune diseases.** Onychomadesis is reported in about 7% of patients with pemphigus vulgaris. It is associated with the development of acantholysis and bullous lesions as part of the disease process in the area of the nail matrix, nail bed, and periungual area.
- **Medication intake.** Drug-induced onychomadesis affects several or all 20 nails. It occurs because of acute toxicity on the nail matrix, a few weeks after the start of taking the medication. The most reported medications are chemotherapeutic agents such as capecitabine, doxorubicin, cytosine arabinoside, and etoposide, as well as antiepileptics, especially carbamazepine and valproic acid.

In terms of prognosis, in all cases, the condition is described as a temporary event, with nail regrowth within 12 weeks.

There are isolated reports in the literature of development of onychomadesis in COVID-19. In 2020, Senturk N. and Ozdemir H. [17] were the first to report a 47-year-old woman who developed onychomadesis 3 months after recovering from COVID-19. On dermatologic examination, the nails of her fingers and toes were separated from the nail base and healthy nails were seen growing from the proximal matrix.

The next communication of onychomadesis was by Liu J. et al. in 2021 [18]. They observed a 59-year-old

man of African origin who had COVID-19 as an outpatient. About 4 months later, there was a sudden detachment of the nail plates of four of the fingers from the proximal nail fold. The toes were not affected. At the follow-up visit after 3 months, the patient reported a gradual loss of nails on all fingers. There was partial growth of new thin nail plates located on about half of the nail bed area.

Colonna C. et al. in 2022 [19] reported on an 11-year-old girl in whom illness from COVID-19 was accompanied by the development of pernio-like (chilblain-like) lesions on the fingers and hands. About 1 month later and 3 days after the resolution of these lesions, detachment of the fingernails from their base occurred. Dermatological examination revealed onychomadesis on four fingernails.

All authors consider that the observed onychomadesis is most likely related to inhibition of nail proliferation due to SARSCoV-2 infection due to fever, direct viral damage, or an inflammatory process associated with endothelial damage and obliterative microangiopathy in the nail matrix area.

Conclusion

Nail changes in COVID-19 reflect the systemic nature of the disease. They are associated with changes in the vascular apparatus of the nail bed and suppression of nail matrix growth. Like skin manifestations, nail manifestations can also be helpful in the diagnosis of COVID-19, and clinicians should be aware of these and actively seek them out in patients.

Conflict of interest Z.G. Ivanova, T.I. Aleksiev, and H.P. Dobrev declare that they have no competing interests.

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