



UNRAVELLING BEAU'S LINES AS A POTENTIAL INDICATOR OF SEVERE IMMUNE RESPONSE IN COVID-19 AND REINFECTION

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ABSTRACT

Background: Beau's lines are transverse grooves in the nail plate that result from transient interruption of the growth of the proximal nail matrix. These rare nail disorders can be triggered mostly by infections or systemic diseases.

Case Description: We describe a 65-year-old man who presented with nail changes on all fingernails. The patient, a non-smoker with no medication history, had severe immune responses during two hospitalisations, 9 and 4 months ago, for COVID-19. Both hospitalisations were accompanied by markedly elevated interleukin-6 levels, and treatment with tocilizumab on top of dexamethasone was required. The present examination revealed Beau's lines which were associated with both prior COVID-19 infections.

Conclusions: Although nail changes look harmless, seeking Beau's lines during the physical examination might indicate past severe COVID-19 infection and a higher probability for reinfection and rehospitalisation.

KEYWORDS

Beau's lines, COVID-19, interleukin-6

LEARNING POINTS

- Beau's lines are grooves that traverse the nail plate horizontally.
- The appearance of Beau's lines may indicate past severe COVID-19 infection.
- Beau's lines can potentially indicate a higher probability of COVID-19 reinfection and rehospitalisation.



INTRODUCTION

Nail disorders encompass a wide range of conditions affecting the nails' appearance, texture, and growth. These disorders can result from various factors including genetics, trauma, infections and systemic diseases^[1]. Common nail disorders include fungal infections, psoriasis, and ingrown nails, while some less common nail abnormalities include leukonychia, onycholysis, onychomadesis, onychoschisis, and Beau's lines^[1,2]. These changes may signal an underlying health issue, prompting individuals to seek medical attention. Beau's lines are depressions or grooves that traverse the nail plate horizontally^[2]. These lines are a consequence of disruptions in the nail matrix, the tissue responsible for nail growth. The occurrence of Beau's lines is often associated with acute illnesses, malnutrition or exposure to certain medications^[2]. It should be noted that there is no specific therapy for Beau's lines, as they resolve concurrently with the underlying condition. In the context of coronavirus disease 2019 (COVID-19), little is known regarding their association. Here, we describe a case of Beau's lines following COVID-19 and reinfection.

CASE DESCRIPTION

A 65-year-old, white man presented with a horizontal groove over all his fingernails, proximal to the nail fold (Fig. 1 and 2). Nine months ago, he was diagnosed with COVID-19 and required hospitalisation in the intensive care unit (ICU); five months after the first discharge he required a second hospitalisation due to reinfection with COVID-19. However, the second time he did not require hospitalisation in the ICU. The sequelae of these hospitalisations was a myopathy with gradual improvement and a loss of 20 kg (baseline weight of 110 kg). Notably, an extreme immune response was evident since he had markedly elevated interleukin-6 (IL-6) levels in both hospitalisations (85.4 pg/ml and 39 pg/ml, respectively; normal values 0–6.4 pg/ml). He responded favourably to the administration of tocilizumab (on top of dexamethasone), an IL-6 Inhibitor, both times he was hospitalised.

Of note, he had noticed nail changes for the previous 2 months. His medical history was unremarkable; he reported receiving no routine medication, he was a non-smoker and did not consume alcohol. A physical examination revealed transverse grooves in the fingernails of both hands (Fig. 1 and 2) and laboratory tests revealed mild leukopenia (white blood cell count 2030 cells/mm³, 790 neutrophils, 710 lymphocytes); the white blood cell count was normal before the COVID-19 infection. The biochemical profile values were within normal limits.

DISCUSSION

Beau's lines have been associated with localised trauma, as well as systemic triggers such as febrile illness, severe malnutrition, pemphigus, Kawasaki's disease and chemotherapy^[3-5]. Few publications have reported the appearance of Beau's lines following COVID-19 infection^[6-10]. Alobaida and Lam were the first to describe Beau's lines



Figure 1. Transverse grooving (Beau's line) of the second fingernail



Figure 2. Transverse grooving (Beau's lines) of the fourth and fifth fingernails

appearance 3.5 months after COVID-19 infection in a 45-year-old male patient^[6]. Several case reports followed, describing Beau's lines in adults and children appearing 1–4 months after COVID-19 diagnosis^[7-10], while their appearance parallels the length of time needed for the nail to grow past the proximal nail fold. Notably, the appearance of Beau's lines has also been reported following vaccination for COVID-19^[11,12].

Interestingly, a multicentre case control study conducted in Turkey in 2023 examined 2,171 post-COVID-19 patients who developed nail disorders^[13]. Of them, 165 patients developed nail disorders such as leukonychia (27%), onycholysis (16%), onychomadesis (10%), onychoschisis (7%), bruising on fingers (5%), onychorrhexis (5%) and Beau's lines (16%). The authors suggested that the development of nail disorders after COVID-19 may be related to a history of severe COVID-19^[13].

Likewise, in the described patient, Beau's lines appeared after severe COVID-19, which required ICU hospitalisation and severe reinfection. Elevated IL-6 levels in both hospitalisations indicated an extreme immune response.

Regarding pathophysiological mechanisms linking Beau's lines and COVID-19, little is known. Research and clinical observations have suggested a correlation between Beau's lines and COVID-19^[13]. Beau's lines are believed to develop during periods of systemic stress, and the severe

physiological impact of COVID-19 on the body could trigger their formation. The exact mechanisms linking the coronavirus to these nail abnormalities are not fully understood, but it is hypothesised that the immune response and vascular changes associated with COVID-19 may contribute to nail matrix disruptions.

While the precise mechanisms are still being explored, clinicians should be aware that the recognition of Beau's lines may potentially indicate a previous severe COVID-19 infection. Continued research and collaboration between internists, infectious disease specialists and dermatologists will deepen our understanding of these relationships and contribute to more comprehensive diagnostic approaches in the ever-evolving landscape of healthcare.

CONCLUSIONS

Although nail changes look harmless, seeking Beau's lines during the physical examination might prove to be important, as its appearance may indicate not only prior severe COVID-19 infection but also a higher probability for reinfection and rehospitalisation.

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