

Green nail syndrome caused by proteus mirabilis in an immunocompromised patient

Dina Evyana, Sandra Widaty

Department of Dermatology and Venereology Faculty of Medicine Universitas Indonesia/ Dr. Cipto Mangunkusumo National Central General Hospital, Indonesia.

Abstract Green nail syndrome (GNS) is distinguished by greenish discoloration of the nail plate, which *Pseudomonas aeruginosa* is known as the causative etiology. The occurrence of GNS with no *P. aeruginosa* evidence might be more frequent than has been reported. It can be effectively treated with the same approach used to manage *P. aeruginosa*-positive cases. We present a case of GNS due to *Proteus mirabilis* infection in an immunocompromised patient.

Key words

Paronychia; *Proteus mirabilis*; Green nail syndrome; Immunocompromised.

Introduction

Paronychia is one of the most prevalent infections in the hand. It may impair the lateral, proximal fingernails, or toenails folds as well as the tissue that outlines the nail's root and sides. Trauma or manipulation may trigger paronychia. This condition can also occur spontaneously.¹ GNS is a rare paronychia infection primarily caused by *Pseudomonas aeruginosa*.² This disease is also known as green nail or chloronychia.^{3,4} It is marked by green discoloration of the nail plate (greenish-black, greenish-brown, greenish-yellow), distolateral onycholysis, and chronic proximal non-tender paronychia.^{2,4} Its distinctive color change is pivotal for the diagnosis of GNS. If the bacterial culture result is inconsistent, the treatments can be challenging.²

Case report

A 32-year-old man presented with nail discoloration of his left thumb without any pain and a yellow-red crusts below his nail plate. His vital signs were normal. Physical examination revealed a distal onycholysis along with a green-yellowish discoloration of the left thumb and yellow-red crusts. Nail changes had occurred for three weeks without prior trauma. Dermoscopy of the thumbnail demonstrated trachyonychia, structureless green-yellowish pattern, and yellowish-hemorrhagic crusts (**Figure 1**; before treatment).

He had been diagnosed with HIV infection a year ago and treated with ARV. Other laboratory tests result was within normal limits. Direct light microscopy was performed on a sample collected from the clipped nail debridement, where neither fungal spores nor hyphae were found. Gram staining from his skin swab and debris under the nail plate showed numerous neutrophils, Gram-positive cocci, and Gram-negative bacilli. Bacterial culture was carried out on the sample collected from the nail, and *Proteus mirabilis* was identified. An antibiotic sensitivity test was also conducted, and the organism was sensitive to several antibiotics, including amoxicillin/ clavulanic acid.

Address for correspondence

Dr. Sandra Widaty
71 Diponegoro Street, Jakarta Pusat,
DKI Jakarta, Indonesia, 10430.
Ph: +6287878707048
Email: sandra.widaty@gmail.com

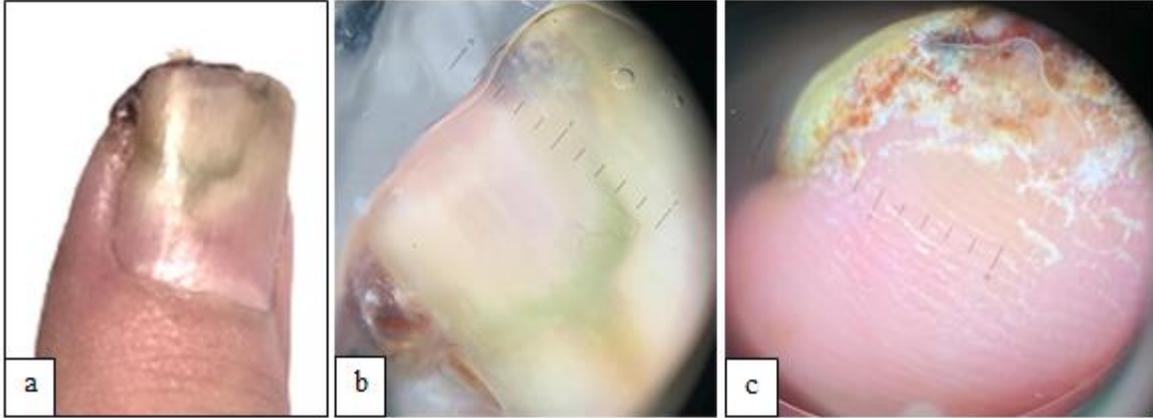


Figure 1 Green–yellowish discoloration of the thumbnail (a). Fine trachyonychia, a structureless green–yellowish patterns were seen from his nail (b), and yellowish-hemorrhagic crusts below his nail plate (c).

Hence, GNS was established as the diagnosis, and amoxicillin/clavulanic acid was prescribed. No mechanical preparation such as nail grinding nor resurfacing was used. A week later, the green pigmentation vanished, and only the onycholysis remained (**Figure 2**; photograph taken 1 week after treatment).

Discussion

This syndrome was commonly seen in men.^{2,5} Up to 87,5% of patients had GNS on a single digit.⁵ Infections of the toenails were slightly more common compared to fingernail infections. Mostly, it arose either on the thumbnail or big toe. Half of the individuals had more than half of their nails affected. Only 20% of them had reported preceding trauma. Onycholysis was observed in the majority of the patients.² *Pseudomonas aeruginosa* is the primary culprit

which releases pyocyanin and pyoverdine causing green colors.^{5,6} However, other pathogens, such as a gram-negative bacillus *Proteus mirabilis* can also be responsible in this condition. There was only 1 case of GNS reported *Proteus mirabilis* found in the bacterial culture result.²

For a wide range of nail problems, onychoscopy or nail dermoscopy is a helpful additional diagnostic method. There were only a few studies in the literature that had reported dermoscopic findings of GNS. The green color was seen in all patients through onychoscopy. The second most color was yellow.⁵

Predisposing factors of GNS are onychomycoses, nail diseases, working in wet conditions, diabetes mellitus, paronychia, and immunosuppression.⁷ The patient had been



Figure 2 Clinical improvement of the thumbnail compared to the opposite fingers after 1-week of systemic antibiotic treatment.

treated with antiretroviral therapy for HIV infection and had no history of other predisposing factors. There are no available recommendations for GNS therapy according to properly designed clinical trials. Treatment options include a single or combination therapeutic regimen of topical antiseptics, antibiotics (topical or, less frequently, systemic), and surgical removal.⁵

Conclusion

We brought out a rare case of GNS secondary to *Proteus mirabilis* infection in an HIV-infected patient. This case had a similar characteristic of GNS infected by *P. aeruginosa* and can be treated using the same management strategy as the typical case if the green discoloration is visible. Systemic antibiotics according to microbiological culture and sensitivity tests results showed a good response in this case.

References

1. Dulski A, Edwards CW, Hospital K. Paronychia. In: StatPearls. Treasure Island (FL): StatPearls Publishing. 2021;1–10.
2. Lee H, Mun JH, Cho S, Park H. Clinical analysis of *Pseudomonas aeruginosa*-positive and -negative green nail syndrome cases: A single center retrospective analysis. *J Dermatol*. 2021;**2020**:1073–6.
3. Hur K, Cho S. Chloronychia caused by *Pseudomonas oryzihabitans* infection. *JAAD Case Reports*. 2020;**6(9)**:918–20.
4. Chiriac A, Brzezinski P, Foia L, Marincu I. Chloronychia: Green nail syndrome caused by *Pseudomonas aeruginosa* in elderly persons. *Clin Interv Aging*. 2014;**10**:265–7.
5. Ohn J, Hur K, Park H, Cho S, Mun JH. Dermoscopic patterns of green nail syndrome. *J Eur Acad Dermatol Venereol*. 2021;**35(7)**:e464–6.
6. Mulita F, Tchabashvili L, Liolis E, Tasios K, Iliopoulos F, Kaplanis C, *et al*. Green nail syndrome caused by *Citrobacter braakii*. *Clin Case Reports*. 2021;**9(5)**:9–10.
7. Müller S, Ebnöther M, Itin P. Green nail syndrome (*pseudomonas aeruginosa* nail infection): Two cases successfully treated with topical nadifloxacin, an acne medication. *Case Rep Dermatol*. 2014;**6(2)**:180–4.