

LETTER

The Goldman-Fox syndrome: Treating and preventing green pseudomonas nails in the era of COVID-19

Dear Editor,

The Goldman-Fox syndrome, also referred to as the green nail syndrome, was recently spotlighted for its possible association with onychomycosis.^{1,2} However, there may be more to the Goldman-Fox syndrome than a *Pseudomonas aeruginosa* infection of a nail plate often previously damaged by dermatophytes, psoriasis or trauma.³ This opportunistic bacterium known as the “water bug,” *P aeruginosa*, can produce both localized and systemic infections and be spread cryptically, potentially from the infected nail of a caregiver to a wound or surgical site, and thus represents a potential threat to elderly, neonatal or immunocompromised patients who are at an increased risk of disseminated pseudomonas infection. This pathogen is known to cause pneumonia, endocarditis, otitis externa, urinary tract infections, osteomyelitis and sepsis and also may be evident in skin as necrotizing fasciitis or as ecthyma gangrenosum, the latter a sign of pseudomonas sepsis. It is salient that a Shanghai study documented, without commenting on pseudomonas nail infections in health care workers, that 80% of 61 patients hospitalized in the intensive care unit for a COVID-19 acute respiratory infection had bronchial aspirates positive for *P aeruginosa*.⁴

Persistent greenish pigmentation of the nail plate, originally described in 1944 by Goldman and Fox,⁵ should be viewed as a warning sign.^{3,6,7} This nontender paronychia infection is predisposed to by those whose hands are constantly wet (Figure 1).⁸ Sternal surgical site *P aeruginosa* infections were documented in 16 of 185 patients and meticulously traced to a gloved scrub nurse who was wearing flesh-colored nail polish to cover a *Pseudomonas* infection and coexistent onychomycosis of her right thumbnail.⁵ In another example, the Goldman-Fox syndrome manifest on the second fingernail of a post-operative intensive care unit employee resulted in many patients developing *P aeruginosa* infection or colonization.⁷ Thus, this infection represents an occupational disorder for those working in a health care setting, despite wearing of gloves when caring for patients, illuminating concern about Goldman-Fox syndrome in an era of rigorous frequent handwashing mandated by COVID-19 precautions.³

We recommend health care workers examine their own fingernails for green coloration, limit or avoid use of painted nails since they might hide nail green color indicative of pseudomonas infection, be educated about *P aeruginosa* the “water bug,” and be encouraged to employ methods to promptly dry hands after mandated frequent handwashing. Educating medical staff about the risks inherent in necessary and frequent handwashing, including the acquisition of the Goldman-Fox syndrome, would be desirable.

Although the best treatment is prevention, there are a number of therapeutic options.^{9–11} Ophthalmologic 0.3% gentamicin topical solution nightly for 3 months is an inexpensive easy-to-use choice.⁹ Application of acetic acid 1% compresses can be effective.⁵ Topical silver sulfadiazine, topical tobramycin and topical nadifloxacin are sometimes employed.^{9,10} Another option is the oral quinolone antibiotic ciprofloxacin utilized for 2 to 3 weeks.¹² Any coexistent nail dermatophytosis can be treated with a regime such as oral itraconazole for 3 months. Careful evaluation of the nail for a possible mixed infection with *P aeruginosa* and another organism, whether fungal or otherwise, is desirable.^{1,2,10} With onychomycosis the toenail may thicken and green simultaneously, sometimes becoming brittle and crumbly, facilitating a secondary pseudomonas infection and mandating the need to treat both. Rarely, another species of pseudomonas may be implicated, as stressed in a recent report of the Goldman-Fox syndrome caused by *Pseudomonas oryzihabitans* with its yellow pigment producing a yellow-green hue rather than the more typical green resulting from the *P aeruginosa* pigments pyoverdine and pyocyanin.¹¹ Both *Pseudomonas* species, *P oryzihabitans* and *P aeruginosa*, are opportunistic pathogens that represent a threat to the vulnerable.



FIGURE 1 Goldman-Fox syndrome: Green nail in otherwise health individual

CONFLICT OF INTEREST


The authors declare no potential conflict of interest.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to the conception, design and/or acquisition of the data in this work and approved the final submission.

DATA AVAILABILITY STATEMENT

Data availability statement: Data that supports the following information are available from the first author upon reasonable request.

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