THERAPEUTIC MANAGEMENT OF A GREEN NAIL SYNDROME – PSEUDOMONAS AERUGINOSA AND TRICOPHYTON TONSURANS COINFECTION DETECTED BY MASS SPECTROMETRY

CONDUITA TERAPEUTICĂ A SINDROMULUI UNGHIILOR VERZI – COINFECŢIA CU PSEUDOMONAS AERUGINOSA ŞI TRICOPHYTON TONSURANS DETECTATĂ PRIN SPECTROMETRIE DE MASĂ

Keywords:
green nail syndrome, Pseudomonas aeruginosa, spectrometry, Tricophyton tonsurans, coinfection

Abstract

Background: Fungal infection stimulates bacterial colonization within the nail and overgrowth of Pseudomonas aeruginosa in culture inhibits the isolation of fungus. We present the case of a 51-year-old patient who was referred from the general practitioner for the evaluation of an old green yellowish discoloration of a painful nail and to establish a treatment to control the disease.

Materials and methods: On examination there was a green yellowish discoloration of the finger nail starting from the distal part of the nail and extending to the proximal part. On the distal nail area there was also onychodistrophy, central onycholysis and a degree of subungual hyperkeratotic deposit. Around the nail plate there were scales and a slight basal erythema with pruritus. Laboratory investigations were performed.

Results: The laboratory findings were normal except the bacteriologic culture from nail scraping that came up positive for P. aeruginosa and was also confirmed by MALDI-TOF spectrometry. Direct mycological microscopy (with KOH) of nail scrapings was negative, but the mycological culture was positive for Trichophyton tonsurans. One year after initiating treatment, the nail was normal.

Conclusions: Because P. aeruginosa expresses pyocyanin, a blue-green exopigment, green coloration of the nails should raise suspicion for Pseudomonas infection. Broad-spectrum antibiotics enhance fungal colonization by destroying competing bacterial flora.

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Case Presentation

A 51 years old patient was referred from the general practitioner with a discoloration of a nail within one year. He had been previously treated with topical antifungals, but the condition worsened. He worked in a swimming pool facility and reported a previous trauma.

On examination there was a green yellowish discoloration of the nail starting from the distal part of the nail and extending to the proximal part (Figure 1.a). On the distal nail area there was also onychodistrophy, central onycholysis and a degree of subungual hyperkeratotic deposit. Around the nail plate there were scales and a slight basal erythema with pruritus and pain upon palpation. Bacteriologic culture from nail scraping was positive for *Pseudomonas aeruginosa* and confirmed by MALDI-TOF spectrometry (Figure 1.b). Direct mycologic microscopy (with KOH) was negative, but the mycologic culture was positive for *Trichophyton tonsurans* (Figure 1.c). The diagnosis of Green Nail Syndrome-coinfection with *Pseudomonas aeruginosa* and *Trichophyton tonsurans* was made.

Bacterial infection with *Pseudomonas aeruginosa* was treated with Ciprofloxacin 500 mg/day for three weeks and local with tobramycin – 0.3% ophthalmic solution twice daily on and under the distal nail plate, followed by topical gentamicin and silver sulfadiazine for the same period.

After the first three weeks of antibacterial treatment, the patient was indicated to start an antifungal treatment for *Trichophyton tonsurans* with systemic itraconazole 500 mg/day for three weeks and local with cyclopex as a nail lacquer 14 day per month for the same period.


Rezumat

Introducere: Infecția fungică stimulează colonizarea bacteriană la nivelul unghiei și dezvoltarea de *Pseudomonas aeruginosa* pe mediul de cultură împiedicând izolarea fungilor. Prezentăm cazul unui pacient în varstă de 51 ani care se prezintă pentru evaluarea unei unghii dureroase, cu modificări pigmentare galben-verzui și pentru stabilirea conduitei terapeutice adecvate.

Materiale și metode: Examenul clinic a evidențiat prezența discolorației verzi-gălbui, începând de la extremitatea distală a unghiei și întinzându-se până la extremitatea proximală, la nivelul unei unghii ale unui membru superior. În plus, extremitatea distală prezenta de asemenea zone de onicodistrofie, onicoliză centrală și depozite hiperkeratozice subunguale. Zona periunghielă prezenta scuame și zone eritematoase, pruriginoase. Au fost efectuate investigații de laborator.

Rezultate: Rezultatele examenelor de laborator au fost în limite normale, cu excepția culturii bacteriene care a fost pozitivă pentru *P. aeruginosa*, confirmată prin spectrometrie MALDI_TOF. Examenul micologic direct (cu KOH) a fost negativ, dar cultura micologică a evidențiat prezența de *Trichophyton tonsurans*. La un an de la inițierea tratamentului, unghia a avut aspect normal.

Concluzii: Intrucât *P. aeruginosa* secretă piocianina, un exopigment albastru-verzui, colorația verzii a unghilor ar trebui să ridice suspiciunea de infecție cu *P. aeruginosa*. Antibioticele cu spectru larg au contribuit la colonizarea fungică prin distrugerea flori bacteriene rezidente.

Figure 1a. Green yellowish discoloration of the nail

Figure 1b. *Pseudomonas aeruginosa* confirmed spectrometry
Around the nail plate the use of a bifonazole cream for five weeks was recommended. One year later after the treatment was started, the nail was normal from dermoscopic, bacteriologic and mycologic point of view (Figure 1.d).

**Discussion**

Fungal infection stimulates bacterial colonization within the nail and overgrowth of *P. aeruginosa* in culture inhibits the isolation of fungus. Because *P. aeruginosa* expresses pyocyanin, a blue-green exopigment green coloration of the nails should raise suspicion of a *Pseudomonas* infection (1-4).

Itraconazole is often prescribed in “pulse doses” one week per month for two or three months. It can interact with some commonly used drugs such as the antibiotic erythromycin or certain asthma medications. The most frequent side effects of itraconazole include increased liver function tests, skin rash, high triglycerides, and gastrointestinal effects (nausea, bloating, and diarrhea) (5). Creams and other topical medications are usually not effective against nail fungus. This is because nails are too hard for external applications to penetrate. Ciclopirox and amorolfine are currently available nail lacquers which are effective for the treatment or prevention of fungal infections such as onychomycosis. The film is resistant to multiple washings and is effective in the treatment of onychomycosis (5, 6).

Ciclopirox targets a variety of metabolic processes in the fungal cell. It chelates with the polyvalent cations (Fe3+ and Al3+) that are involved in fungal enzymatic activity, ultimately interrupting intracellular energy production and toxic peroxide degradation. Ciclopirox may also inhibits fungal nutrient uptake, resulting in depletion of amino acids and nucleotides and reduction in protein synthesis. The most common are rash-related adverse effects such as periungual erythema and erythema of the proximal nail fold, which were reported more frequently in patients treated with ciclopirox nail lacquer topical solution, *i.e.*, 8%. Other adverse effects which were thought to be causally related included nail disorders such as shape change, irritation, ingrown toenail, and discoloration (6, 7).

Broad-spectrum antibiotics (*e.g.*, third-generation cephalosporins) enhance fungal colonization by destroying competing bacterial flora (8, 9).

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**Bibliography**


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