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Treatment of *Pseudomonas* Nail Infections with 0.1% Octenidine Dihydrochloride Solution

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Key Words

Nails, infection • *Pseudomonas* • Octenidine

Pseudomonas nail infection is a distressing and frustrating problem due to the unpleasant green discoloration of the nail. Its clinical presentation consists of greenish or bluish-black discoloration associated with proximal chronic paronychia and distolateral onycholysis [1]. Predisposing factors are exposure to a moist environment, microtraumas, onychotillomania and associated nail disorders such as psoriasis [1]. Although *Pseudomonas* nail infection is common, there are no controlled studies assessing systemic or topical treatments.

We present a small series of 15 patients (table 1), 4 males (age: 46–72 years, mean: 57.75) and 11 females (age: 39–73 years, mean: 57.72) with *Pseudomonas* nail infection (fig. 1). Fungal infection was excluded by microscopy and culture of nail scrapings. All patients had positive isolation by microscopy and culture of *Pseudomonas* from the deep section of the nail. All patients were treated topically by soaking the affected nails twice a day for 10 min in 0.1% octenidine dihydrochloride solution (Sol Octenisept 250 ml, Schuelke & Mayr, Norderstedt, Germany) for 6 weeks.

The beginning of the treatment was preceded by a 30-day washout period in subjects using topical or systemic antimicrobials. The patients were evaluated after 6 weeks of application of 0.1% octenidine dihydrochloride solution with microscopy and culture. Patients having both negative microscopy and culture results were considered as cured regardless of nail coloring, since the nail hue has been suggested to result from diffusion of pyocyanin rather than the true invasion of *Pseudomonas* in nail plate [1].

Ten patients reported that their hands were frequently immersed in water; the other 4 had diabetes or another nail disease and only 1 patient (No. 3) presented the *Pseudomonas* nail infection without any predisposing factors. At the end of the 6th week of application of 0.1% octenidine dihydrochloride solution, 12 of 15 patients (80%) had complete clearance of their affected nails (fig. 2). Three female patients (No. 2, 11 and 14) failed to respond, probably due to their occupations. No adverse effects were noticed during the application period.

Pseudomonas are gram-negative waterborne rod bacteria. The pathogenesis of nail infection by *Pseudomonas* remains obscure. It is considered to be a complication of onycholysis of various origin or chronic paronychia [2], and this is confirmed in our series (table 1). It also seems that a paronychia infection with *Pseudomonas* is usually preceded by onycholysis or paronychia, leading to pyocyanin pigment staining of the adjacent nail [1]. The disease commonly is restricted to 1 or 2 nails.

Pseudomonas is usually isolated on cultures of specimens taken from the paronychia. Topical treatment includes removal of the onycholytic portion of the nail and avoidance of wetness [3], brushing of the nail bed with a 2% sodium hypochlorite solution twice daily [1], application of diluted acetic acid or polymyxin B₂ and vinegar soaks (10-parts water and 1-part white vinegar) for 5–10 min twice daily for 5 days [4].

Octenidine dihydrochloride is a well-known topical antibacterial agent active. Octenidine has been shown to possess microbicidal activity against *Staphylococcus aureus*, *Staphylococcus epi-*

Fig. 1. *Pseudomonas* infection on toenail as confirmed by microscopy and culture.

Fig. 2. The same patients after 6 weeks of octenidine therapy. Microscopy and culture results were negative for *Pseudomonas*.

Table 1. Patient data

No.	Gender	Age years	Occupation	Duration of disease months	Cure after 6 weeks of treatment	Other sys-temic diseases	Coexistent nail diseases in <i>Pseudomonas</i> nails		
						diabetes mellitus	nail psoriasis	traumatic onychia	acute or chronic paronychia
1	male	48	cook	1	+	–	–	+	+
2	female	62	housewife	1	–	+	–	+	+
3	female	51	self-employed	3	+	–	–	–	–
4	female	49	housewife	2	+	–	–	–	+
5	male	75	pensioner	1	+	+	–	+	+
6	female	69	pensioner	3	+	–	–	–	–
7	female	72	housewife	6	+	–	–	+	–
8	female	48	clerk	2	+	–	+	–	–
9	female	53	cleaning lady	1	+	–	–	+	+
10	female	65	housewife	3	+	–	–	+	–
11	female	73	housewife	2	–	+	+	–	+
12	male	46	plumber	3	+	–	–	–	–
13	female	39	clerk	1	+	–	–	+	+
14	female	54	cleaning lady	1	–	–	–	–	–
15	male	62	pensioner	1	+	+	–	–	+

dermidis, *Proteus mirabilis*, *Streptococcus pyogenes*, *Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Serratia marcescens* and *Candida albicans* [5]. Octenidine displays low absorption and toxicity [6]. In addition, it is well tolerated by patients [7]. Other studies have also suggested that octenidine has a residual effect on microbial skin decontamination [8]. To our knowledge, this is the first study evaluating the treatment of *Pseudomonas* nail infection with this medication.

Based on our small series, 0.1% octenidine dihydrochloride solution seems to represent an interesting, well-tolerated, safe and efficacious therapeutic choice for the treatment of *Pseudomonas* nail infection.

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