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CASE REPORT

Onychomycosis treated with a dilute povidone–iodine/dimethyl sulfoxide preparation

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Background: Povidone–iodine (PVP-I) 10% aqueous solution is a well-known, nontoxic, commonly used topical antiseptic with no reported incidence of fungal resistance. We have been using a low-dose formulation of 1% PVP-I (w/w) in a solution containing dimethyl sulfoxide (DMSO) in our clinical practice for a variety of indications. Presented here is our clinical experience with this novel formulation in a severe case of onychomycosis that was resistant to any other treatment.

Findings: A 49-year-old woman who had been suffering from severe onychomycosis for years presented after failing to find any remedy including over the counter (OTC), topical, and systemic oral prescribed therapies.

Conclusion: The topical povidone–iodine/DMSO system was very effective in this case at alleviating the signs and symptoms of onychomycosis. This novel combination warrants further investigation in randomized, controlled trials to further elucidate its clinical utility.

Keywords: onychomycosis, povidone–iodine, fungus, nail

Introduction

Onychomycosis, most commonly caused by a dermatophyte infection of the nail plate, bed, and folds, affects an estimated 35 million Americans. Its incidence and prevalence is rising.[1–3] Current treatments for onychomycosis are marginally successful at best. The US Food and Drug Administration (FDA)-approved ciclopirox 8% nail lacquer has a cure rate of less than 10%.[4] FDA-approved oral treatments (terbinfine and itraconazole) have reported cure rates of 30%–40%.[5,6] The greatest obstacle to effective treatment of onychomycosis is the inability of the antifungal agent to reach the true nidus of infection, the subungual and periungual nail spaces. We have been using a novel 1% (w/w) povidone–iodine (PVP-I)/dimethyl sulfoxide (DMSO) solution prepared by licensed compounding pharmacies for topical therapy of onychomycosis. The PVP-I concentration was chosen based on reported antimicrobial efficacy along with the known pharmaceutical chemistry of PVP-I topical solutions.[7–9]

Case report

This is a non-interventional, non-experimental, retrospective review of an existing case. The case review was conducted according to all guidelines outlined in the Declaration of Helsinki. As this study involved no interventional experimentation whatsoever and is a retrospective review of a case, written consent from the patient was not required. A 49-year-old woman who had been suffering from severe onychomycosis for years presented after failing to find any remedy including OTC, topical,

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and oral prescribed therapies. Physical examination revealed onycholysis with abundant subungual debris. A greenish hue in areas of the dystrophic nail clinically suggested coinfection with *Pseudomonas aeruginosa*. Nail clippings were taken and fungal culture (Mycosel™ Agar, Becton, Dickinson and Company, Franklin Lakes, NJ, USA) was positive at baseline for *Trichophyton mentagrophytes* despite years of failed topical and systemic therapies. She was prescribed a 1% povidone–iodine solution in a liquid vehicle system that included 44% USP-grade DMSO. The prescription was prepared by a licensed compounding pharmacy. The patient was instructed to apply the liquid twice daily directly to the nail, under the nail plate to the subungual debris and the surrounding skin. Regular follow-up visits occurred for the next 24 weeks. By the 24-week visit, the nail had completely cleared and there was no longer any fungus present as determined by negative fungal culture. Physical exam revealed complete resolution of the onychomycosis, including elimination of the concomitant *P. aeruginosa* infection.

Discussion

Topical onychomycosis treatments typically require lengthy therapeutic courses to allow the inherently slow-growing infected nails to be replaced by newly deposited healthy nails. Antifungal resistance to the treating agent frequently develops during these extended treatment regimens. Antifungal resistance and poor topical response rates are further complicated by the inability of most topical agents to effectively penetrate the subungual and periungual infected tissues.[10] This leads to chronic reinfection, even during treatment, and contributes the extremely low success rates of most onychomycosis therapies.[11] However, treating the subungual and periungual infectious foci prevent the reinfection of the nail plate during prolonged therapeutic courses, thus allowing the newly deposited nail plate to grow out in a fungus-free environment.

The current case employing a 1% PVP-I formulation is the first reported example of combining a low-dose iodophor with a DMSO delivery system capable of penetrating the superficial skin structures. This enables efficient delivery of the active agent to the subungual and periungual spaces.[12–14] Although DMSO is an effective agent for transdermal drug delivery of small molecules, penetration into the nail has not previously been reported. We report here, for the first time, our experience with this well-tolerated formulation. It appears to eradicate fungal organisms from within the nail itself, rendering it an effective treatment for this case of refractory onychomycosis.

Conclusion

The topical PVP-I/DMSO system we have developed has been very effective in alleviating the signs and symptoms of severe onychomycosis in this refractory case. This novel combination warrants further investigation in randomized, controlled trials to further elucidate its clinical utility.

Disclosure

The authors report no conflicts of interest in this work.

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