

ORIGINAL ARTICLE

Two case studies of the treatment of simple onycholysis with disappearing nail bed caused by trauma by combined pharmacological, orthonyxia and taping methods

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Abstract

Background: Simple onycholysis is a common complaint after trauma and consists in separation of the nail plate from the nail bed. If untreated, prolonged onycholysis may cause a disappearing nail bed (DNB) that leads to the shortening or narrowing of the nail plate.

Objectives: This study is aimed at discussing possible treatment of chronic simple onycholysis with DNB by combined conservative methods.

Methods: Simple onycholysis and DNB treatment consists of Onygen® cream application, nail bed massages, bracing procedures and nail folds taping with kinesio tape.

Results: Long-lasting simple onycholysis with DNB may be fully eliminated by applying the combined pharmacological, orthonyxia and taping treatment.

Conclusion: Advanced simple onycholysis, which leads to the DNB and, in consequence, to the shortening or narrowing of the nail plate, causes cosmetic discomfort for patients. A damaged nail apparatus is also more susceptible to new traumas. Even long-standing onycholysis with DNB can be successfully treated with easy-to-apply conservative methods. The key point of therapy is the use of several methods of treatment with different effects on the nail apparatus. The effects of described therapy are highly satisfactory, the only drawback being its long term, which is caused by slow growth of the nails.

KEYWORDS

bracing procedure, nail fold kinesiology taping, Onygen, orthonyxia, simple onycholysis

1 | INTRODUCTION

Simple onycholysis is a common complaint and involves partial or full separation of the nail plate from the underlying nail bed. Onycholysis can be caused by onychomycosis, neoplasia, trauma, surgery, contact

dermatitis, psoriasis, lichen planus, chemotherapy, and drugs. The condition may affect both fingernails and toenails.^{1,2} Therapeutic strategy in the treatment of onycholysis requires determination and elimination of its cause, partial nail avulsion within the onycholytic area and nail apparatus regeneration.

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The trauma is a very common cause of onycholysis. Sharp lesion-induced onycholysis and chronic onycholysis can be distinguished. A sharp lesion usually results from, for example, a heavy object hitting a plate, raising the nail plate from the distal side when a foot has kicked against a hard object, or while hiking down in too tight shoes. After injury, the most common complications involve hematoma and spontaneous partial or complete detachment of the nail plate from the nail bed.

Chronic toes onycholysis is observed in people wearing too tight, narrow, or short footwear, which causes microtrauma to the nail apparatus. Onycholysis of the fingernails can be the result of fingernail care and/or manicures, occupational activities, onychophagia (biting of the nails) or onychotillomania (nervous tics). The plate separated from the underlying nail bed takes on a bright whitish color, and impurities and exfoliated keratin accumulate in the free space under the nail. The condition is further exacerbated by patients' attempts to treat onycholysis themselves using topical antimycotics products and cutting the separated portion of the nail plate.^{3,4}

When onycholysis is not treated promptly, the nail bed can epithelialize and develop finger/ toe prints (dermatoglyphics). This process is called a disappearing nail bed (DNB). Affected nails are shorter or narrower compared to unaffected contralateral finger/ toe. The distal and lateral nail folds of the toe enlarge and deform. This condition creates a physical barrier when the nail starts to grow out and predisposes to onychocryptosis and paronychia.¹⁻³ Very often mechanical damage also causes nail bed and matrix deformation. In consequence, growing nail plate is uneven and wavy. The advancement of initial onycholysis to DNB has been documented into grading system (Table 1).

1.1 | Treatment of onycholysis with DNB

There is still relatively little literature regarding onycholysis with DNB. Treatment methods described for this lesion involve surgical treatment and conservative options.

The conservative treatment includes taping of the distal skin of the digit using medical grade retention tape, partial removing of

detached nail bed and application on nail bed hydrogel dressing or emulsion with colostrum bovinum, wearing shoes with wide toe box to prevent further trauma and camouflaging with nail prosthetics and restoration system based on gels or acrylic used to build up the nail.^{5,6} These methods usually fail or prove to be insufficient.

Surgical treatment includes serial excision in order to elongate the nail, the application of gingival grafts and artificial dermis in an attempt to recreate the nail bed, or the excision of distal wedge of the skin in order to elongate skin distally and prevent distal ingrown of toenails. Surgical treatment gives satisfactory results but requires patient hospitalization, and is associated with the risk of postoperative infection, postoperative pain, and long healing time.³

This paper constitutes the first report of successful treatment of chronic simple onycholysis with DNB by conservative methods. It describes the treatment of two patients with advanced nail apparatus damages. Each case required an individual approach with the use of one, two or three described elements of the therapy.

2 | MATERIALS AND METHODS

The proposed therapy of simple onycholysis with DNB caused by trauma encompassed pharmacological treatment, massage, orthonyxia and kinesiology taping.

The first stage of the treatment of chronic onycholysis with DNB involves preparation of the nail apparatus for the therapy. It consists in removing the detached part of the nail plate and cleaning the nail bed from dirt, keratin deposits or blood clots. Then, in order to regenerate the damaged nail bed, Onygen® cream (Podopharm, Poland) is used. In the course of the therapy, the cream should be massaged into keratinized nail bed twice a day, and then the occlusion in the form of an adhesive with a dressing should be applied to ensure proper, constant moisturization of the nail bed. Depending on the time since the damage occurred, the first effects of the treatment (growing out plate adhered to the nail bed) are visible after 1–6 months. Due to the slow regeneration of the nail bed, the growing nail, which is not yet able to bind to the nail bed, should be removed (every 1–2 months). The new nail growing out usually has a wavy or cavernous surface that reflects damage of the nail bed (this condition is seen very well in patient 2). In that case, the surface of the plate should be regularly smoothed using rotary devices with carbide milling cutters. If the growing forward plate has tendency to screw and penetrate into surrounding soft tissues, its shape should be corrected with orthonyxic braces. In order to elongate the skin away from the plate and reduce the size of the enlarged distal nail fold, the nail folds should be massaged and taped with kinesiotope (Figure 1).

2.1 | Patient 1

The 23-year-old female patient, without comorbidities, not using any medications, suffered a nail plate injury while trekking. The time that

TABLE 1 Grading system of onycholysis and DNB.³

Stage	Characteristic
I	Early, initial separation of 1 to 2 mm of the distal nail plate from the hyponychium
II	Separation of the distal one-third of the nail
III	Separation of one-third to two-thirds of the nail plates
IV	Onycholysis extending from the proximal nail fold to the distal end of the nail
V	Development of DNB, including partial cornification of the nail bed or hyponychium, and development of toe prints (dermatoglyphics) like those seen on the tip of the digit

FIGURE 1 (A) The nail apparatus with advanced onycholysis, DNB and enlarged and deformed lateral and distal folds. (B) The shape of the nail plate corrected with 3TO brace and nail folds treated with kinesiotope.



FIGURE 2 Photo documentation of the progress of therapy in case of Patient 1. (A). Patient nail apparatus after avulsion of onycholysis and cleansing of the nail bed (07.09.2019). (B) Nail plates shape corrected with Podofix® (18.11.2020). (C) The nail plates treated with 3TO braces. Visible correction of their shape and better adhesion to the nail bed (06.04.2021). (D) The nails after 2-year therapy. Visible proper adhesion of the nail plates to the nail beds and significant improvement of the shape of the nails (23.06.2021). (E) The condition of the nails of September 22, 2021, in which the patient decided to end the therapy, satisfied with appearance of her nails. Visible proper adhesion of the plates to the nail bed and almost correct shape of the nails.



elapsed from the occurrence of the injury to the commencement of therapy has been over 2 years. The therapy was carried out intermittently due to the COVID-19 pandemic, from September 7, 2019, to September 8, 2021. Due to the long time from the moment of damage to the initiation of therapy, and the deformation of the entire nail apparatus, it was necessary to regenerate keratinized and partially epithelialized nail bed, correct the shape of the plate and kinesiology taping the nail folds. The therapy was started with the removal of onycholysis and cleansing of the nail bed, then the patient used onygen under occlusion twice a day, massaged lateral and distal folds and taped the nail folds with kinesiotope.

Due to the physiological moisture of the feet causing the tapes to peel off, the taping was performed by the patient herself, after prior training, once a day. Skin for tape application was dried and degreased. Tapes were prepared with the width of the patient's

nail plates and with a length of 2/3 of the circumference of the big toes. The edges of the tape have been rounded, which protects the patches from premature detachment. The maximum tension (75%–100%) was used during the application of the tape. The anchors of the tape (the initial and final part), were applied without tension, according to the kinesiotaping methodology.

Once a month, the nail plates were shortened and smoothed in a podiatric office. After 5 months of therapy, the strongly arched nails started to ingrow into the surrounding soft tissues and their shape correction proved necessary. As the first step of orthonyxia, Podofix braces were applied. In the following year of the therapy, the Podofix braces were replaced with stronger 3TO braces. The therapy was completed after 2 years, when the patient decided that she was satisfied with the cosmetic effect of the therapy (Figure 2).

2.2 | Patient 2

A 65-year-old male patient, with advanced CVI (wearing compression stockings that disturb the blood supply to the matrix and nail bed), after liver transplantation, with post-transplant diabetes and with an artificial pacemaker. The man suffered a nail injury while working in a locksmith about 30 years ago. After injury that caused deep damage to the nail bed, the nail plate never grew back. The therapy has been conducted since August 17, 2019, to the present day. The treatment was started with removal of impurities from the nail bed, then the patient mildly massaged the nail bed every day for 2 min and used Onygen® cream under the occlusion twice a day. Once a month, the nail bed was cleaned of slowly growing keratin hyphae in the podiatry office. The attached nail began to form after several months of therapy, and then the photographic documentation began to be taken. Due to the high disease burden of the patient and the time that has elapsed since the injury, the regeneration of the nail apparatus is slow but effective (Figure 3).

3 | RESULTS

Long-standing onycholysis with DNB may be fully eliminated by applying combined: pharmacological, orthonychia and taping treatment. The proposed procedure is effective even in the treatment of long-term simple onycholysis with advanced DNB. Satisfactory results can be obtained even in patients with many comorbidities.

4 | DISCUSSION

Although onycholysis and DNB are common phenomena, little studies of current treatment options are available. Effective conservative treatment of onycholysis with DNB is possible, but requires individual, creative approach to each patient. The combination of several available therapeutic methods, depending on the level of damage of the nail apparatus, is necessary.

The key element of therapy involves regeneration of keratinized or epithelialized nail bed. In the proposed therapy we applied Onygen® cream that contains colostrum bovinum rich in over 250 compounds. Proteins (immunoglobulins, lactoferrin, lysozyme, lactoperoxidase) are of the greatest value in colostrum. Bovine colostrum contains also fats (40%), carbohydrates, growth factors, and nucleic acid derivatives. Additionally, the colostrum is characterized by a high content of vitamins B, A, D and E, as well as calcium. The cream contains squalane and sea buckthorn and avocado oils [onygen, podopharm]. This product is very effective in DNB treatment. In this paper we presented two cases of patients with long-standing onycholysis and DNB and showed that even patient with many comorbidities can be successfully treated with Onygen.

Dias et. al described the treatment of DNB in finger after onychomycosis with tretinoin. In this therapeutic option, partial nail avulsion of the onycholytic area and daily treatment with 0.025% tretinoin gel on nail bed were conducted, which resulted in complete improvement of the condition at three-month follow-up. Retinoids have the potential to delay epithelial keratinization and promote adhesion of the nail plate to the nail bed.¹



FIGURE 3 Documentation of patient 2 therapy. (A) Patient's nail bed after 17 months of therapy with Onygen® Cream (16.01.2021). (B) Patient's growing nail after 19 months therapy with Onygen® Cream. The nail grows out uneven and jagged (20.03.2021), (C) The appearance of the nail after 23 months therapy with Onygen® Cream (14.07.2021), (D) The appearance of the nail after 25 months therapy with Onygen® Cream (22.09.22). The research obtained a positive opinion of the Ethics Committee of Medical University of Silesia. All volunteers gave informed consent to participate in the study.

In order to correct the shape and direction of a new nail growth we decided to apply methods used in the treatment of ingrown toenails. Orthonyxia and taping methods are well documented conservative method in the treatment of onychocryptosis. The variety of available orthonyx braces allows for their individual selection depending on the degree of nail plate penetration into the shafts, its thickness and length.^{7,8} Even severe cases of onychocryptosis with paronychia can be successfully treated with this method.⁹ In literature, some variable methods of nail fold taping can also be found.¹⁰⁻¹² Well documented are slit tape-strap procedure, Nishioka's procedures and anchor technique. In taping procedures, strips of strongly adhesive, soft cotton, elastic tape is used to gently pull and secure the affected nail folds away from the overlying nail plate.¹² Shahwan et al. described modified anchor taping technique for distal onychocryptosis.¹⁰ This kind of nail ingrowing occurs very commonly with onycholysis in DNB. In our practice, we apply taping with Kinesio tape in the treatment of onycholysis and DNB. Kinesiology tape is a highly elastic adhesive that was originally utilized in therapeutic taping technique which alleviates pain and facilitates lymphatic drainage by microscopically lifting the skin. Kinesio taping is commonly applied in the treatment symptoms of musculoskeletal injuries. In the treatment of onycholysis with DNB, the tape parameters such as strong adhesion and its simultaneous flexibility are essential. Kinesio tape enables effective mechanical correction of the nail apparatus. The great advantage of kinesio tapes is the possibility of their various applications, depending on the degree of DNB and deformation of the nail folds. The drawback of taping procedure is that tapes often detach within a few hours because of the exposure to moisture from sweat and the tapes must be reapplied several times per day. In the course of treatment, it is essential to teach patient how to cut and apply tape to their nail folds. The effectiveness of taping with kinesio tape in podiatric therapies is confirmed by Geizhals.¹¹

5 | CONCLUSIONS

Advanced simple onycholysis, which leads to the DNB and, in consequence, to the shortening or narrowing of the nail plate, causes cosmetic discomfort for patients. A damaged nail apparatus is also more susceptible to new traumas. Even long-standing onycholysis with DNB can be successfully treated with easy-to-apply conservative methods. The key point of therapy is the use of several methods of treatment with different effects on the nail apparatus. In our therapy we applied cream Onygen that promoted nail bed regeneration, nail bed and nail shafts massage, taping and orthonyx braces. Massages facilitates cream ingredients penetrations of nail bed and make nail folds more flexible. Taping procedures allows to reduce the size of the enlarged distal and lateral nail folds. The application of orthonyx braces allows to correct the shape and direction of a new nail growth. The effects of described therapy are highly satisfactory, the only drawback being its long term, which is caused by the slow growth of the nails.

DNB is still a rather new concept and relatively little is known about its treatment. To our best knowledge, the study is the first one showing the results of the treatment of onycholysis and DNB by combined pharmacology, orthonyxia and taping procedures.

AUTHOR CONTRIBUTION

A Statement of Contribution Katarzyna Adamczyk (PhD) is the main author of the publication; he designed, conducted research, compiled statistically the results, wrote a dissertation. Agnieszka Garnarczyk (PhD) participated in the research and substantially improved the content. Dominika Wcisło- Dziadecka (PhD, MD, Prof. SUM) participated in the research and substantially improved the content.

CONFLICT OF INTEREST STATEMENT

All the author declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.


ETHICAL APPROVAL

The authors confirm that the ethical policies of the journal, as noted on the journal's author guidelines page, have been adhered. The research obtained a positive opinion of the Ethics Committee of Medical University of Silesia. All volunteers gave informed consent to participate in the study.

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REFERENCES

1. Dias PCR, Miola AC, Miot HA. Successful management of chronic refractory onycholysis by partial nail avulsion followed by topical tretinoin. *An Bras Dermatol*. 2019;94(1):1118-1119.
2. Daniel R, Meir B, Avner S. An update on the disappearing nail bed. *Skin Appendage Disord*. 2017;3:15-17.
3. Filisio F, Busch S, Wickramage DJH, et al. Disappearing nail bed. Review of etiology, grading system, and treatment options. *Clin Podiatr Med Surg*. 2021;38:521-527.
4. Ciupińska M, Klamczyńska M. Wybrane zagadnienia z zakresu patologii kończyn dolnych. In: Klamczyńska M, Ciupińska M, eds. *Podologia*. PZWŁ; 2020:65-184.
5. Sobolewska E, Michalski JA, Klamczyńska M. Rekonstrukcja paznokci. In: Klamczyńska M, Ciupińska M, eds. *Podologia*. PZWŁ; 2020:431-447.
6. ONYGEN krem. https://podopharm.pl/index.php/onygen_krem. Accessed September 28, 2022
7. Niederau A. The big book of nail diseases. Cause, podiatry diagnosis, therapy, prophylaxis. *Neuer Merkur GmbH*. 2018;111-186.
8. Antończak P, Jurzak M, Adamczyk K, Garnarczyk A. Ingrown toenail: pathogenesis, prevention and conservative treatment. *Przegl Dermatol*. 2015;102:343-348.

9. Jakubowska M, Wcisło-Dziadecka D. Conservative management of a severe case of onychocryptosis at a podiatric clinic—a case study. *J Cosmet Dermatol*. 2022;21:1093-1097.
10. Shahwan KT, Knackstedt T, Carr DR. A modified anchor taping technique for distal onychocryptosis. *Cutis*. 2021;108:159-160.
11. Geizhals S, Lipner SR. Clinical pearl: kinesiology tape for onychocryptosis. *Cutis*. 2019;103:197.
12. Watabe A, Yamasaki K, Hashimoto A, Aiba S. Retrospective evaluation of conservative treatment for 140 ingrown toenails with novel taping procedure. *Acta Derm Venerol*. 2015;95:822-825.

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