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Contents

Letter to the Editor

Asymptomatic pigmentation of the skin in a child: baby wipes, once again

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Key words: *baby wipes; pigmented lesions; botanical ingredients; cosmetics*

Letter to the Editor,

Wet wipes are commonly used for children hygiene to clean skin in diaper area; their practicality of use extends the application to hands and face, resulting in repeated daily use. Therefore, it is extremely important that their chemical composition is safe and mild on a baby's sensitive skin;However, in recent years many cases of allergic and irritant contact dermatitis due to baby wipes have been reported (1). We describe an unusual case of transient pigmentation of the skin in the skin area cleaned with a common Italian wipes brand.

A 2-year-old baby presented with a well-demarcated orange-brown pigmentation of the skin without other skin lesions or symptoms. Her mom reported the recent onset, firstly on buttock and thighs and then on the dorsal surface of the right hand (Fig.1, 2); also, the clothes worn by the child were stained with the same color. The history revealed the frequent use in these skin areas of baby wipes

containing natural plant extract. The producer, following numerous similar reports, withdrawn the product from the market and explained the effect with the presence of caproic aldehyde. Recently,

Fig. 1. *Sharply demarcated pigmentation of the legs.*

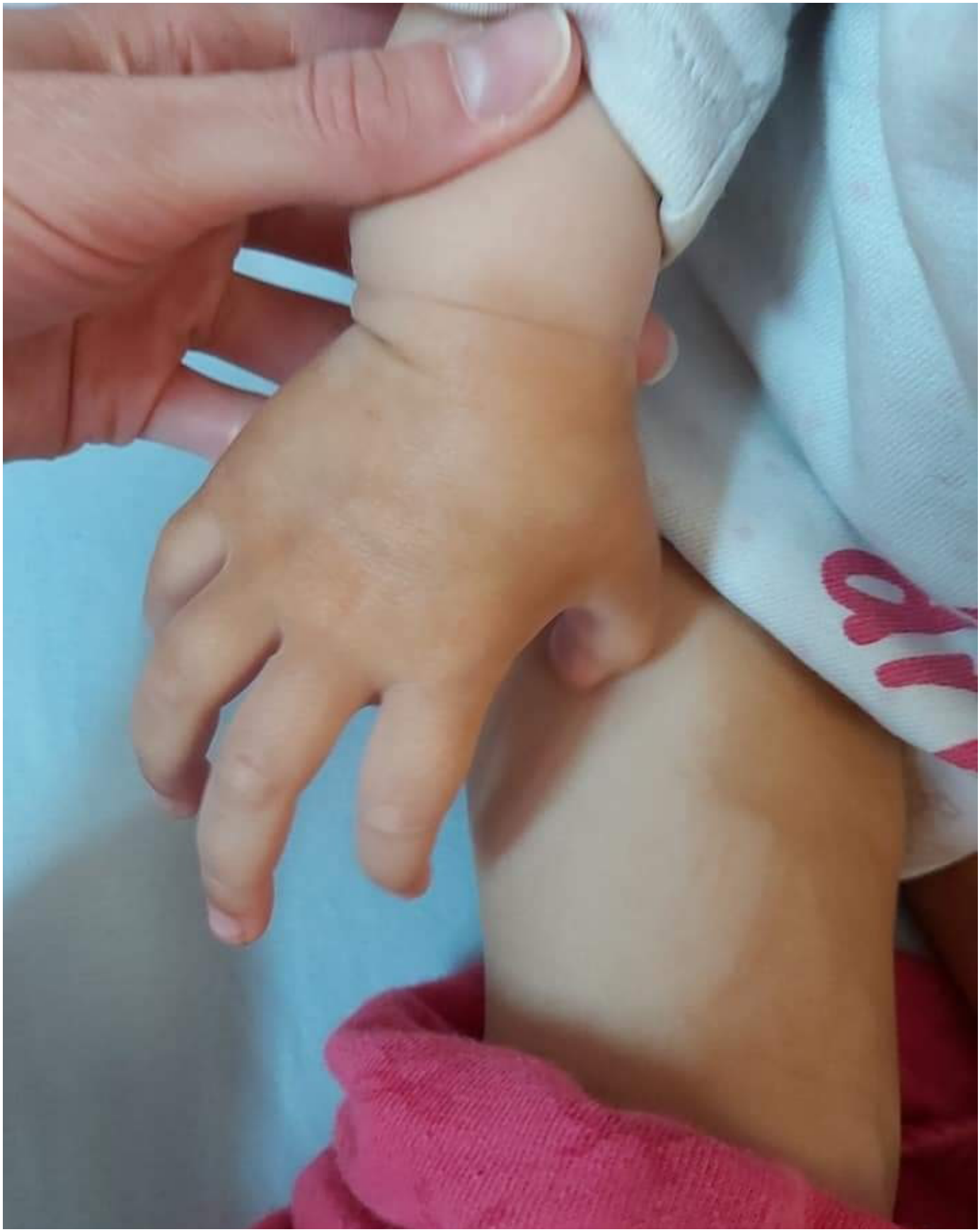

Fig. 2. *Pigmentation of baby's hand skin.*

the wipes had been reformulated with the addition of Opuntia ficus-indica stem extract. The skin pigmentation gradually disappeared in about 7 days with daily cleansing and rubbing with a sponge. We believe that caproic aldehyde is not the direct cause of pigmentation; in fact, this element is volatile and the cause of "a strange smell" reported by the mother is highly probable (2). The prickly pear cactus Opuntia ficus-indica is a tropical and subtropical plant with moisturizing properties and a demonstrated wound healing ability (3). The chemical analysis of stems has proved the presence of several compounds, among which there are vitamin A and β-carotene (4), well-known as skin colorants (5). In our opinion, the traces of caproic aldehyde present, demonstrates an unstable formula that probably has increased the pigmentation ability of Opuntia, also favored by the presence of gluconolactone as second ingredient. This case emphasizes the relevance of a correct formulation in childcare products.

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Topical application of fumaric acid esters improves appearance of nail psoriasis

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Key words: *nail psoriasis, fumaric acid esters (FAEs), topical treatment, NPQ10, mNAPSI*

Abstract

Background: Nail psoriasis usually represents a therapeutic challenge, as it poorly responds to conventional topical treatments, and usually requires systemic conventional or biological drugs to improve. **Objectives:** To evaluate the efficacy and safety profile of a new topical agent containing 1% fumaric acid esters (FAEs), in cream-gel vehicle, for treatment of nail psoriasis in patients failing to achieve a complete control of fingernail involvement with ongoing treatment for psoriasis for 12 weeks at least. **Methods:** Seventy-four psoriatic patients with mild to moderate psoriasis in treatment with PUVA, UVB-nb, Methotrexate, Cyclosporine, Acitretin and stable disease for at least 3 months before the enrollment into the study, who had failed to respond for their fingernail involvements were sequentially enrolled into the study. All patients were asked to implement ongoing therapy by applying a cream-gel twice daily for 24 weeks, 37 among them received a cream-gel containing 1% FAEs, the others 37 a placebo gel, free from fumaric acid esters. Disease severity of psoriatic nails was evaluated in both groups through the Modified Nail Psoriasis Severity Index (mNAPSI) calculated

both at T0 and T24. The impact of nail involvement on quality of life were also evaluated from the patient point of view through the self-administered Nail Psoriasis Quality of Life 10 Test (NPQ10), both at baseline and at T24. **Results:** A significant improvement of fingernail psoriasis occurred in most patients receiving the active treatment after 24 weeks, the mean value of mNAPSI moves from the baseline value of 14.89±2.105 (T0) to the post-treatment value of 5.89±1.64 ($p<0.001$) (T24). Similarly, the quality of life improved as demonstrated by the reduction of NPQ10 from a baseline value of 8.83±1.14 (T0). to the post-treatment value of 3.89 ±1.07 ($p<0.001$) (T24). **Conclusions:** Even if further studies on a larger series of patients are needed, our preliminary results seem to indicate that a cream-gel containing 1% FAEs, could be a promising treatment for fingernail psoriasis.

Introduction

Psoriasis is a chronic, inflammatory skin disease characterized by a broad spectrum of clinical manifestation involving skin, joints, scalp/hair, and nails (1-3).

The nail involvement is an extremely common feature of psoriasis, affecting approximately 10-55% of psoriatic patients (4). Moreover, about the 80-90% of patients with psoriatic arthritis suffers from nail psoriasis (5). Several data from literature have established that nail psoriasis is more frequent in males, involves fingernail preferentially, the onset usually occurs after development of cutaneous lesions, and it is usually associated with a higher severity and a longer duration of psoriatic disease (4-6).

The nail involvement usually remains the most frequent unmet need of psoriasis patients. A broad spectrum of nail alterations with wide range of clinical presentation may occur, depending on which part of the nail is mainly involved: nail matrix, nail bed, and perionychium.

The alterations most commonly detected are multiple and irregular depressions (pitting), onycholysis and subungual hyperkeratosis, related to the involvement of the nails' bed and matrix. Less common features of nail psoriasis are related to an intermediate matrix damage: trachyonychia, which makes the nails rough and dull and a partially whitish discoloration of the nail plate, named leukonychia.

The distal matrix involvement gives rise to paronychia, splinter hemorrhages, red lunulae and oil spots or salmon patches, the only pathognomonic lesions of nail psoriasis (7).

The diagnosis of nail psoriasis is easy when nail involvement is associated with cutaneous psoriasis, nevertheless it becomes difficult when nail involvement occurs isolated. Although biopsy of matrix or nails plate could be indicated for diagnostic confirm of nail psoriasis it is not a traditional diagnostic approach (8).

Treatment of nail psoriasis is a typical clinical challenge, since therapeutic response to topical treatment is very poor, owing to the limited penetration of active principles through the nails (9). Traditional systemic treatments, as cyclosporine, methotrexate and acitretin, are relatively

effective, but sometimes they show systemic toxicity, thus their use is recommended only when nail psoriasis is associated with moderate to severe cutaneous involvement (10).
Biologics are effective in psoriasis (4, 11-19), but their cost-effectiveness ratio is questionable for the treatment of those cases in which nail involvement is exclusive (17, 20, 21). Systemic therapy with fumaric acid esters (FAEs), for psoriasis was first reported in 1959 and has become widely used in Northern Europe, particularly in Germany and Netherlands (22-25).
A systematic review of the literature identified five randomized controlled clinical trials of systemic FAEs therapy for psoriasis (26) but no data have been reported on the use of topical FAEs in nail psoriasis.
The aim of this study was to evaluate efficacy, safety profile and patients' satisfaction related to a 24-weeks topical treatment with 1% FAEs in cream-gel vehicle, in stable psoriatic patients who did not achieve a satisfactory control of nails involvement with ongoing systemic treatments after 12 weeks at least.

Material and methods

Design of the study

This is a 24-week long pilot trial with a single blinded, controlled, and randomized design conducted in accordance with the Declaration of Helsinki.

Population

Seventy-four psoriatic patients (38 men, 36 women, aged from 29 to 76 years, average of 52.5ys) with mild to moderate psoriasis and fingernails involvement attending the Clinic of Dermatology of Ancona were enrolled sequentially from September 2016 to December 2017.
Main inclusion criteria were: age ≥18 years, diagnosis of psoriasis based on clinical data made by trained dermatologist, active plaque psoriasis treated topically, with BSA≤10, and/or PASI≤10and/or DLQI≤10.
Exclusion criteria were: pregnancy, breastfeeding, form of psoriasis other than plaque type (guttate, erytrodermic, generalized pustolar psoriasis and palmoplantar pustolosis), concomitant topical treatment for nails psoriasis, and systemic administration of methotrexate, cyclosporine, acitretin, PUVA, UVB-nb, for less then 12 weeks.
Informed consent was given by all the patients enrolled into the study.
Thirty-seven patients were randomized to receive the treatment based on topical application of a cream-gel containing 1% FAEs (study group), the others 37 were randomized to placebo (control group).

Diagnosis of psoriatic nail involvement and evaluation of disease severity

The diagnosis of nails involvement in patients was made by a specifically trained dermatologist, external to the study. Direct mycological examination, and mycological colture were performed before to enroll patients into the study, in order to avoid mycotic superinfections.

To evaluate the severity of nail psoriatic involvement and the response to treatment, the Modified Nail Psoriasis Severity Index (mNAPSI) was used; mNAPSI is a scale able to evaluate 8 parameters (pitting, leukonychia, red spots in lunula, crumbling, oil drop, onycholysis, hyperkeratosis and slinter hemorrhages) in each quadrant of the nail, giving that 1 nail a score of 0 to 3. This scale allows clinicians to estimate the severity of nail bed and matrix according to the area affected in the nail unit. mNAPSI calculation leads to a composite score ranging from 0 to 130, the higher score, the major the involvement of nails psoriasis (6). mNAPSI was calculated at baseline (T0) and 24 weeks after the treatment (T24) in both the groups of patients.

Topical treatment with 1% fumaric acid esters.

All the enrolled patients were instructed to apply a cream-gel twice daily, for 24 weeks on their fingernails, favoring the skin penetration of the drug through the massage of nail matrix for at least 60 s.

The galenic preparation used was a lamellar structure cream-gel with an acid-base balance, containing aqua, Paraffinum liquidum, poligliceryl-3-methyl-glucose- glistearate, capryc caprylic triogliceride, acrylates/beheneth-25 methacrylate copolymer, isopropyl myristate, cetearyl alcohol, mono- and bi-substitute of fumaric acid (1%), phenoxyethanol, dimethicone ceramides 3, 6 II and 1, phytosphingosine, cholesterol, sodium lauroyl lactylate, carbomer, xanthan gum triethanolamine, sodium hydroxide, sodium benzonate, potassium sorbate, betaglucan, allantoin, butylene glycol. The galenic formulation intended for the control group did not contain mono- and bi-substitute of fumaric acid esters. Safety and tolerability were examined by monitoring any adverse event reported by the patients.

Patient evaluation of life quality

Quality of life of the patient was evaluated through the NPQ10. Nail Psoriasis Quality of Life Scale (NPQ10) is a questionnaire that specifically evaluates the impact of nail psoriasis on the patient's functional status and quality of life. It is a simple, validated questionnaire containing 10 items which assess the location of the nail lesions, the degree of pain, how frequently nail involvement leads patients to negative moods and difficulty performing ordinary tasks, such as putting on shoes, getting dressed, driving and conducting domestic works. NPQ10 calculation leads to a composite score ranging from 0 to 20, the higher score reflects the worst quality of life (5). NPQ10 was calculated at baseline (T0) and 24 weeks after the treatment (T24) in both groups.

Statistical analysis

All patients were randomized through the on-line program "random number generator" from the GraphPad QuickCalcs (GraphPad Software© 2014). All data were analysed using the Graph-Pad Prism software (version 6.0, El Camino REAL, SAN Diego, CA). All reported data were continuous variables expressed as means±SD. The normal distribution of continuous variables was verified with Kolmogorov-Smirnov test. Statistical analyses included the Wilcoxon matched pair

signed rank test for paired data, a p-value less than 0.05 was statistically significant.

Results

All patients 74 enrolled (38 males and 36 females, aged from 29 to 76 years, average of 47.43±11.06) completed the study. At baseline, the patients from the study and control groups were similar for age, sex, PASI, DLQI and nail involvement, prevalence of ongoing systemic psoriasis treatments, and no statistically significant differences between study and control groups were found for mNAPSI and NPQ10 mean score (mNAPSI: 14.89±2.105 vs 13,73±1.694; NPQ10: and 8.83±1.14 vs 8.35±1.18), respectively.

In the study group, mNAPSI significantly decreased to a value of 5.89±1.64. ($p<0.001$) after twenty-four weeks of topical treatment, whereas patients included in the placebo group showed no significant changes in the mean value of mNAPSI. (Fig. 1, 2); moreover, a significant reduction of baseline mean value of NPQ10 to a post treatment value of 3.89 ±1.07 was observed only in the study group. ($p<0.001$) (Fig. 2). In

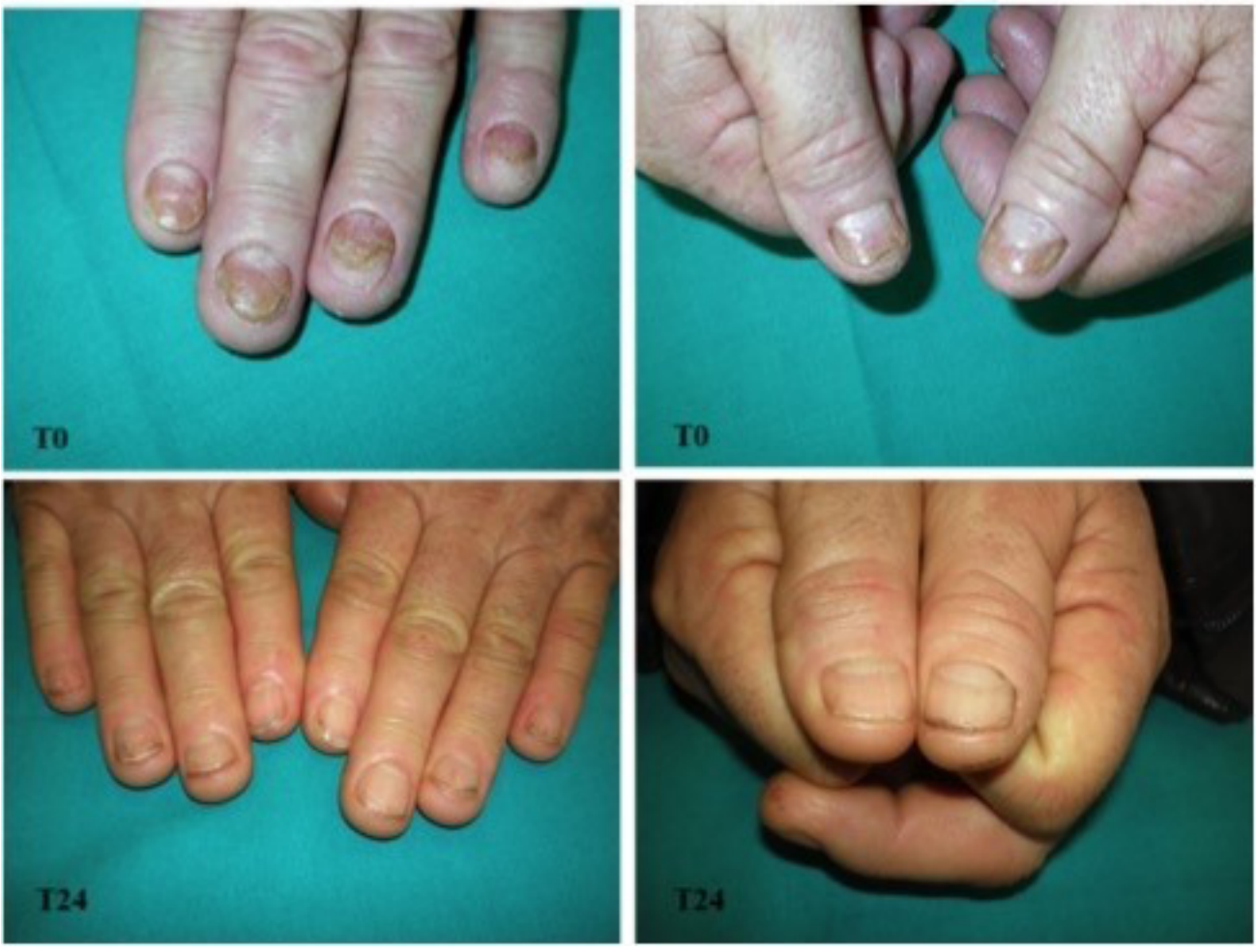

Fig. 1. *Nail improvement at baseline T0 and after 24 weeks of treatment. T24 in patient receiving topical fumaric acid esters.*

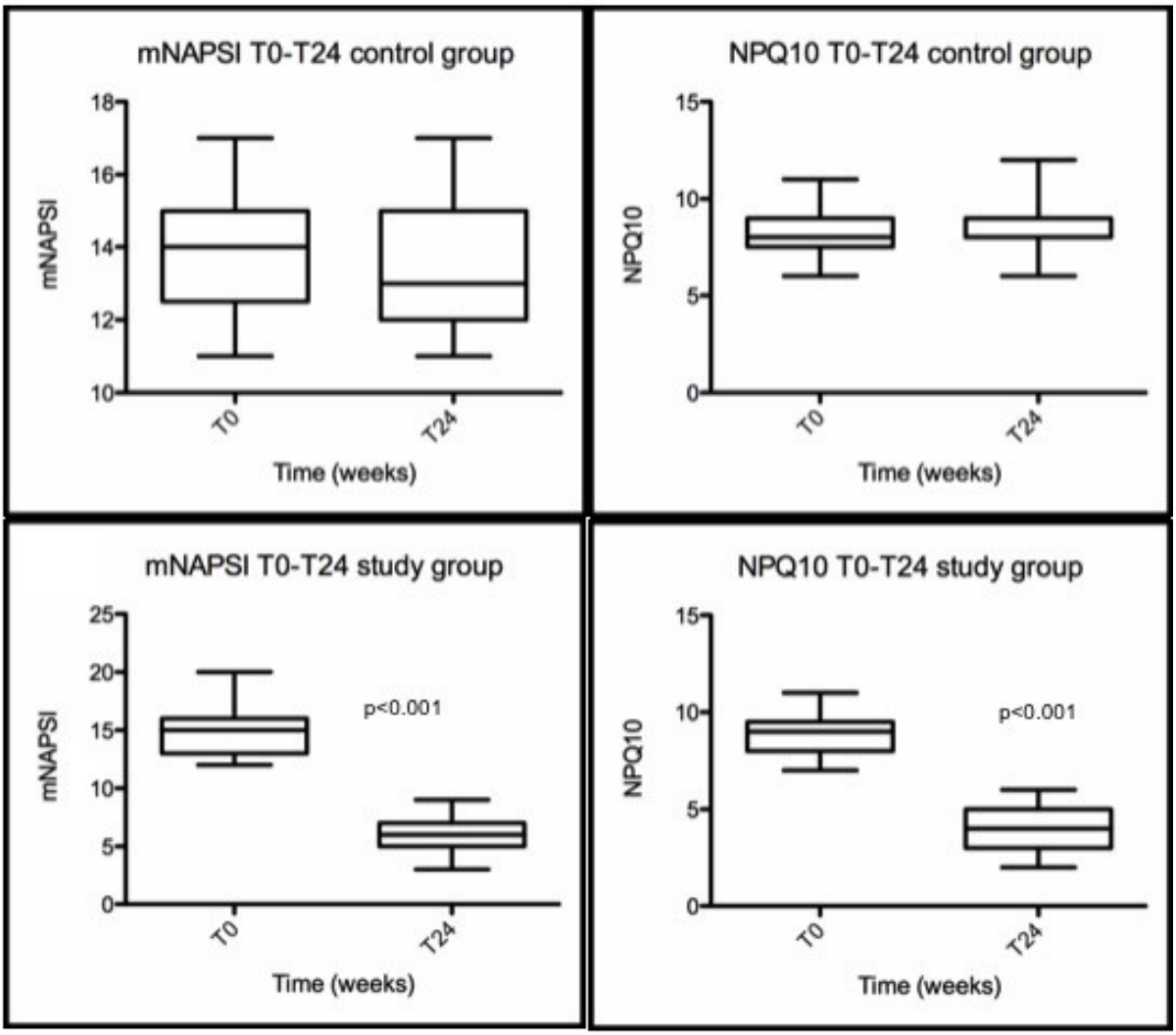

Fig. 2. *Comparison between baseline and post-treatment value of mNAPSI and NPQ10 in study and control group.*

conclusion, the treatment was well tolerated by all the patients, without occurrence of any side effects.

Discussion

Nail psoriasis still represents a therapeutic challenge in this era of biological approach to the disease, and its treatment remains an unmet medical need: the high cost/effect ratio limits the use of biologics for nail psoriasis (21). traditional treatments may be associated with severe systemic side effects which restrict their application similarly (9); moreover, topical treatments containing retinoids, calcipotriol, corticosteroids or 5-fluorouracil have been used

in the past, with poor results, owing to the poor penetration of the drug in the nails (9).

Systemic FAEs have demonstrated to be effective for treatment of psoriasis however their common side effects, such as gastrointestinal symptoms (abdominal pain, diarrhea, nausea, and malaise), flushing of the skin, lymphocytopenia, leukocytopenia, and elevated eosinophil counts, is the main limit for their use in psoriasis patients with isolated nail involvement (25).

FAEs are chemical compounds derived from unsaturated dicarbonic acid fumaric acid. In 1994 a defined mixture of FAEs, containing dimethylfumarate (DMF), zinc salts of monoethylfumarate (MEF), calcium and magnesium, was registered only in Germany (Fumaderm®) (22).

The mechanism of action by which FAEs acts on psoriasis is not fully understood; up to date, FAEs influence inflammatory cascade through an increase in the expression of glutathione and Nrf2 pathway genes in psoriatic skin and regulate the transcription factors PTTG1, NR3C1, GATA3 and NFjBIZ, which are important in normal cutaneous development, and in Th2 and Th17 pathways (23).

FAEs seem able to deviate the T-helper cell response to the Th2 phenotype through the generation of dendritic cells type II (II DCs) (24); moreover, FAEs have anti-inflammatory and immune-modulatory effects impairing IL-12 and IL-23 production and increasing the production of cytokines with anti-inflammatory properties as IL-10 (23, 24).

To the best of our knowledge, this represents the first randomized, controlled clinical trial aimed to evaluate the efficacy and safety profile of local fumaric acid esters in the treatment of nail psoriasis. During the 24-week treatment period, the patients did not develop any side effect and all showed an improvement of the nails' lesions, with a significant decrease of disease severity, and an improvement of patients' quality of life.

The preliminary results of this study show that a cream-gel containing 1% FAEs could be useful to achieve clinical control in those patients who fail to respond with ongoing treatment. Our preliminary results encourage further studies on the topical use of FAEs 1%, which seems to be a potentially promising adjuvant treatment for nail psoriasis.

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Letter to the Editor

A case of primary essential Cutis verticis gyrata

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Key words: *baby wipes; pigmented lesions; botanical ingredients; cosmetics*

Letter to the Editor,

Cutis verticis gyrata (CVG), a rare benign cutaneous disorder of the scalp, is characterized by convoluted folds and furrows that mimic the convolutions of the cerebral cortex (1). Initially classified as primary (idiopathic) or secondary CVG, it now falls under 3 categories: primary essential, primary nonessential, and secondary (2). Primary essential is distinguished from nonessential CVG by the absence of any neuropsychiatric pathology such as mental retardation, cerebral palsy, epilepsy, seizures, or ophthalmologic abnormalities (3). Secondary CVG on the other hand occurs as a result of inflammatory processes such as eczema, psoriasis and pemphigus or other pathologies including hamartomas, nevi, acromegaly, and pachydermoperiostosis. Although secondary CVG can occur at any age with no apparent gender differences, primary CVG usually occurs postpubertal, with 90% of cases presenting before 30 years of age and rarely occurring in young children (4). We herein report a case of late onset primary essential CVG.

A 38-year-old male presented with indolent foldings over the scalp increasing gradually in the last

six years. There were no other systemic complaints. Examination revealed soft, spongy, cerebriform foldings along with deep furrows in the anteroposterior as well as transverse dispositions, over the vertex and occiput (Fig. 1). Dermatoscopy revealed slight perifollicular scaling along with an increased density of the hair over the furrows as compared to the prominence of the folds (Fig. 2). Ophthalmological and neurological examinations revealed no abnormality; CT scan of the head was normal and family history, negative. Hematological, biochemical and hormonal investigations were within normal limits.

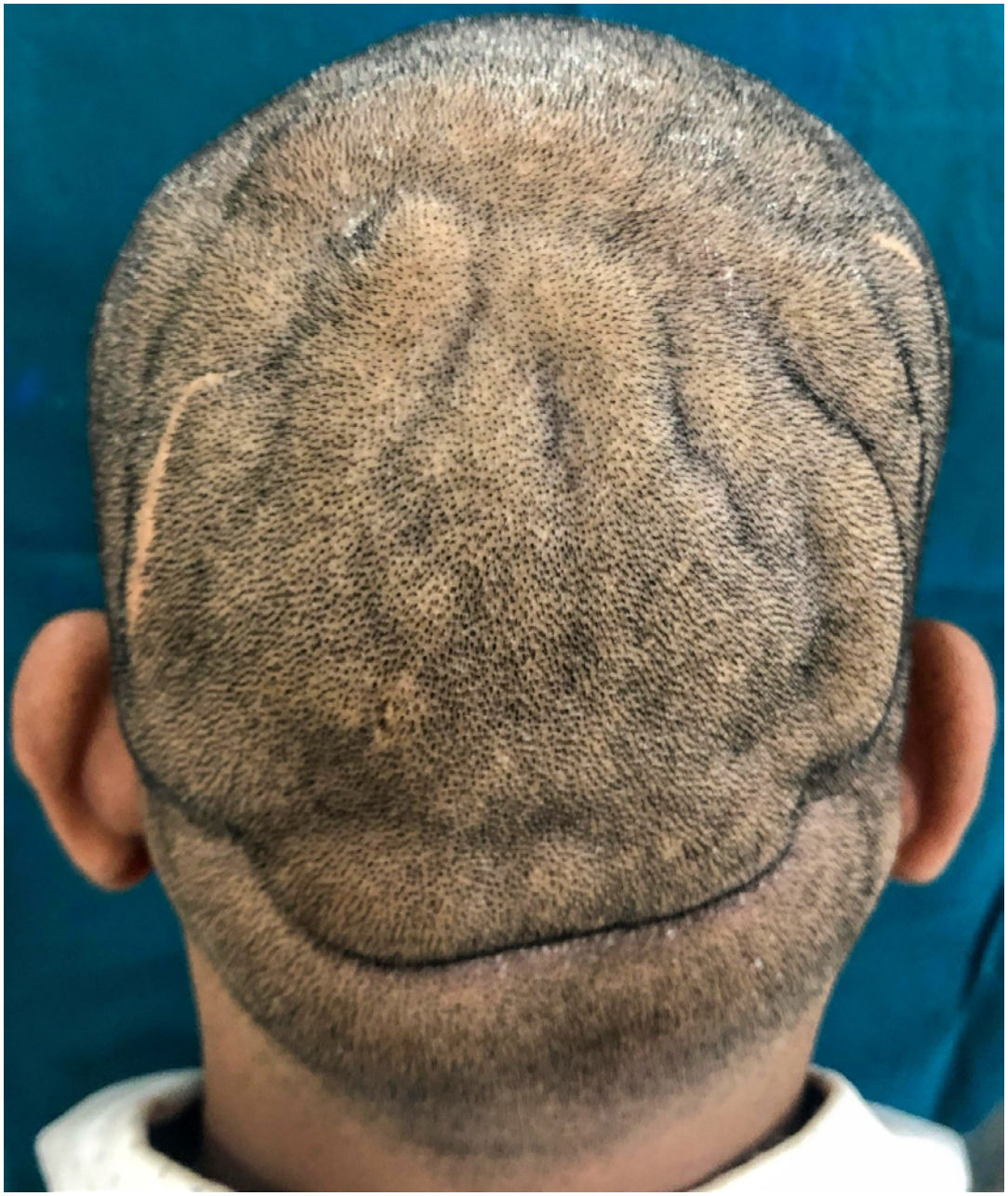

Fig. 1. *Scalp hypertrophy with convoluted folds and deep furrows resembling the surface of the brain in the vertex and occiput traversing anteroposterior and transverse dispositions.*

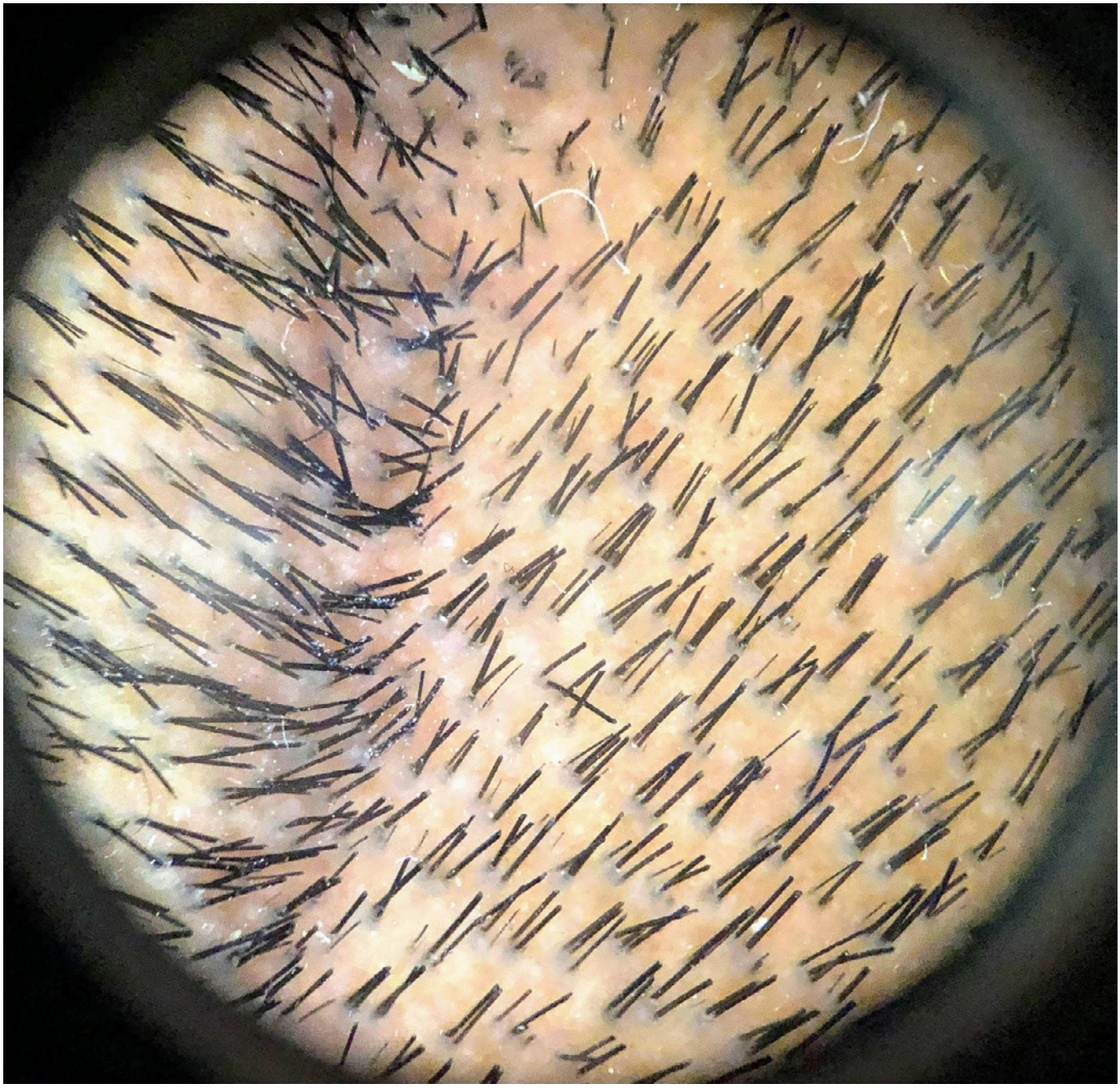

Fig. 2. *Dermatoscopic image showing increased density of hair in the furrows of the scalp.*

Diagnosed as a case of primary essential CVG, the patient was counselled regarding the benign nature of the disease and given the option to get the folds removed surgically, which he denied.

We report this case due to its late initiation. As discussed, most cases of primary essential CVG present during puberty, probably due to hormonal influence manifesting in post pubertal men, with only ten percent of patients presenting with CVG after the age of 30. Investigations, especially CT scan, are only necessary to rule out non-essential forms of CVG. Although primary CVG is a benign

process, patients can choose to undergo surgical treatment, determined based on the size and location of the folds for cosmesis. However, our patient denied surgery preferring to cover the folds with longer hair.

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The Trichopigmentation, a quick and innovative solution for the women's hair loss

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Key words: *trichopigmentation, scalp dermopigmentation, hair loss, shaved effect, density effect, hair transplantation, toppik, alopecia androgenetica*

Abstract

Today hair loss is mainly associated to men more than women. In reality, cases of female hair loss are increasing and appear at a younger age, around 25 years and below. Hair loss in women is mainly characterized by a diffused reduction of hair density over the scalp, in particular in the crown and frontal area. The Trichopigmentation, a new technique, that "disguises" the affected scalp, represents a quick solution for loss of density. The treatment is non-invasive and reversible, granting a natural result over the years.

Introduction

Hair loss is not just an aesthetic challenge but also a psychological issue that compromises quality of life.

Hair loss in women, as well as men, can be permanent and/or reversible. Reversible hair loss can be caused by medical therapies, pregnancy, stress, and poor nutrition. The most common cause of permanent hair loss in women is androgenetic alopecia that evolves from the progressive miniaturization of hair follicles to the decrease of the number of hairs, mainly in the central, frontal, and parietal scalp areas (1).

In women affected by androgenetic alopecia, hair loss is more likely to occur for the first time between 30 and 40 years old compared to 20 or 30-years-old for men. Today we are noticing an increase of cases even before that range, for example in UK, where 6% of women younger than 30 show an androgenetic alopecia (2).

Both topical and systemic drug therapies may arrest the progress and reverse miniaturization in patients with mild diffused alopecia. In the medium or advanced alopecia cases, hair transplantation, recognised as a successful technique for men, presents diverse limits in treating women, due to the specific way the androgenetic alopecia behaves with its characteristic pattern distribution.

Today, alongside pharmaceutical therapies, surgical transplantation, and hair prosthesis, there is also a new innovative treatment, the Trichopigmentation, that represents both a valid alternative and also a complementary technique to the current solutions, both surgical and pharmacological. Trichopigmentation is now a recognized technique within the hair loss surgery world and trichopigmentation and hair transplantation can coexist and even express their maximum potential in synergy, ensuring rapid results, non-traumatic and definitive in solving the problem of hair loss.

Undergoing a trichopigmentation treatment does not mean a halt in the pharmaceutical therapies, although topical products such as Minoxidil must be discontinued for a short time in conjunction with the treatment, but outside this time frame they can be safely used.

Trichopigmentation

TRICO (from the greek thríx trichós). which means "hair", PIGMENTATION introduction of specific pigments in the dermis.

It is an INNOVATIVE, REVERSIBLE and NON-INVASIVE technique that allows to intervene on the scalp, affected by different types of Alopecia or by scars, both in men and women. It can be considered a valid alternative to transplantation in patients with a very extensive degree of baldness or as a complement to surgery. It is defined as a special type of camouflage where the pigment is inoculated inside the dermis in order to remain unchanged for long time and avoids the daily application of other masking systems such as microfibers of keratin.

The device and the dermograph-handle are specially designed to work on the superficial derma; the pigments and needles are scalp specific, sterile and disposable. The pigment used in the trichopigmentation are completely different from the ones used for tattoos. The pigment formula is carried out with the aim of obtaining a mixture of components that do not change colour over time. It remains for a maximum duration of 24/36 months (subjective factor). The professional path of the technician specialized in Tricopigmentation is totally different from a tattoo maker.

The Trichopigmentation treatment is painless, hence, in most cases, it does not require the help of local anaesthetic creams. The treatment does not create any damage to the miniaturized

hair; on the contrary, the action of the needle (if performed by expert hands) recalls blood on the scalp surface that represents a beneficial action for the suffering follicle units. It is not uncommon that after a treatment on hairless areas, the mild regrowth of fluff can be noticed.

Why is trichopigmentation temporary/reversible?

It is inevitable to observe morphological changes over time, hence, the reversibility of the Trichopigmentation grants several positive aspects:

- The patient is free to choose whether to maintain the treatment over time;
- Guarantee of maintaining a natural result over the years;
- Possibility to take advantage of new and possible innovative and alternative techniques;
- Review of the treatment after hypothesis of greying;
- Gain time to evaluate a potential hair transplantation treatment;
- Achieve the 3D effect over time.

On the contrary a definitive treatment will not benefit from the above listed advantaged and it will be simply considered as a Tattoo with the following implications:

- Indelible
- Irreversible
- Subjected to deterioration and colour change (blue colour)

Trichopigmentation protocol

Trichopigmentation is used to:

- Reconstruct the shaved effect completely, in a natural way and with the right density depending on the degree of baldness. The shaved effect is mainly requested by male patients.
- In case of thinning hairs, it creates a density effect with the aim to reduce the transparency and to increase the thickening effect. The Density effect is used for both female and male.
- Mask the post-transplant (FUE and Strip), post-traumas or lesions scars.

Density effect

The density effect allows to reduce the transparency in the areas characterized by thinning, and increase the thickening effect.

Density Effect Protocol

To obtain an optimal density effect, the treatment is always performed in 3 sessions: the first two in 2 consecutive days, the third one after one month.

Maintaining the result

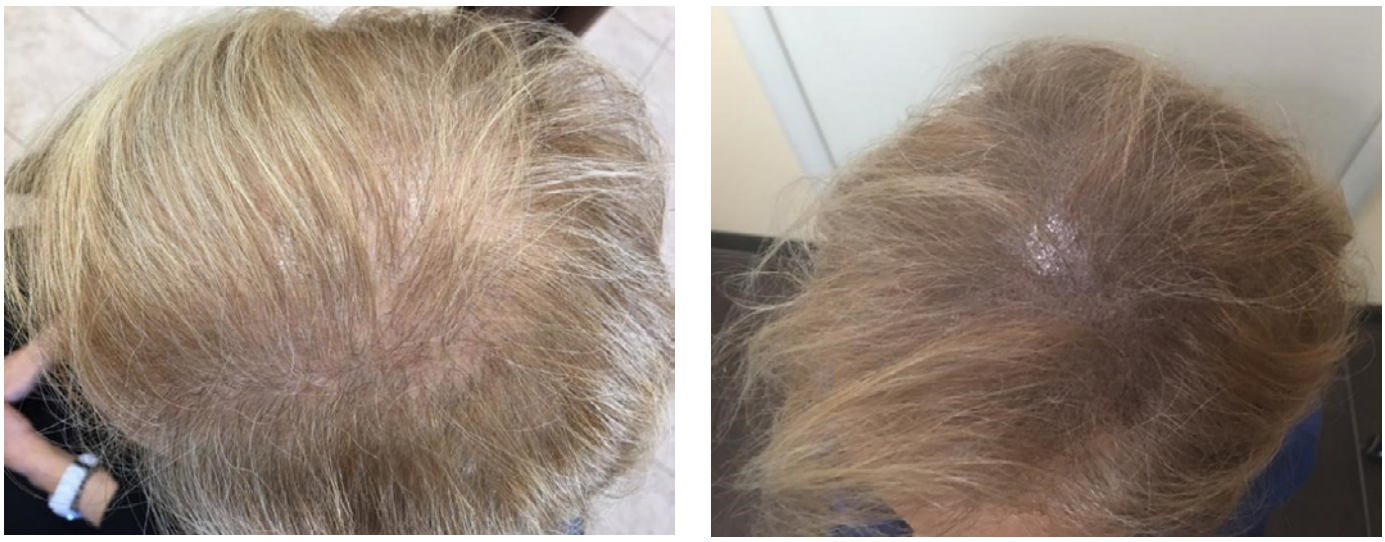
Being a reversible treatment, maintenance is necessary, and, depending on the case, consists of 1 or 2 annual sessions. Thanks to the periodic maintenance, the treatment effect helps maintain a natural aspect.

Density effect treatment in women

Conclusion

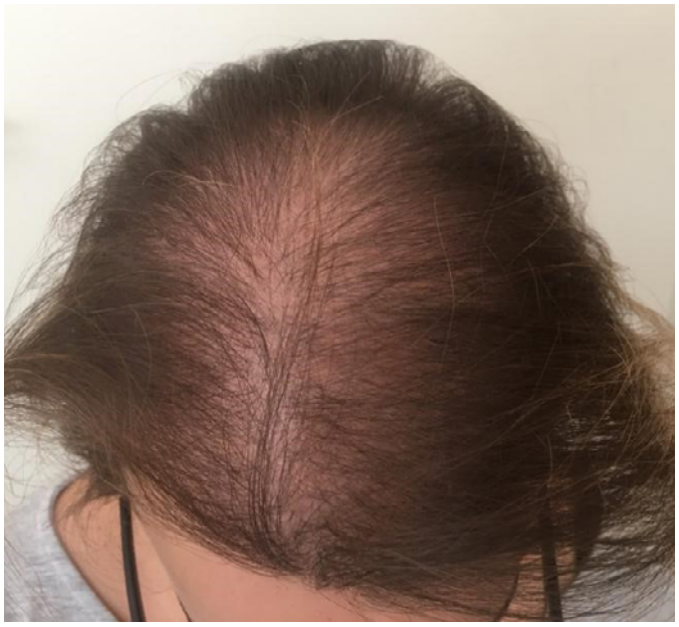
A B

Fig. 1.*(A-B): Density Effect. Ludwig grade 2 (Ref. 3) Pre(1A) and post(1B) treatment.*

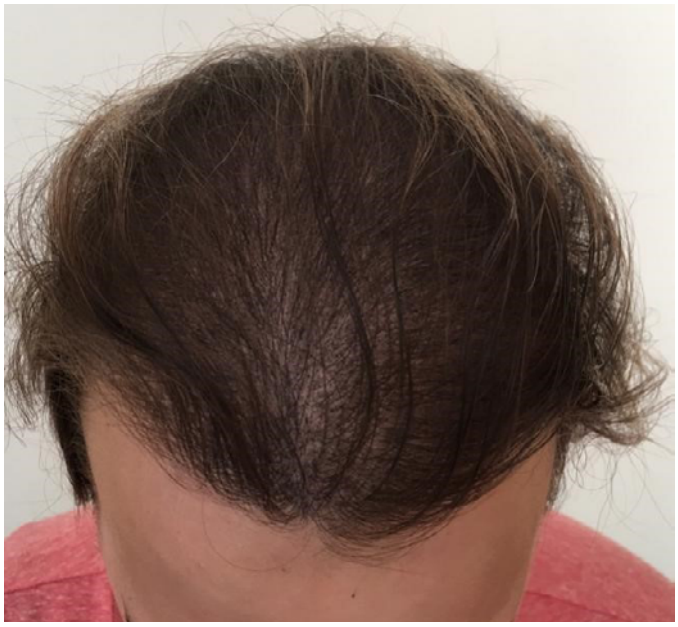


A B

Fig. 2.*(A-B): Density Effect. Ludwig grade 2 (Ref. 3) Pre (2A) and post(2B) treatment, blond hairs.*



A



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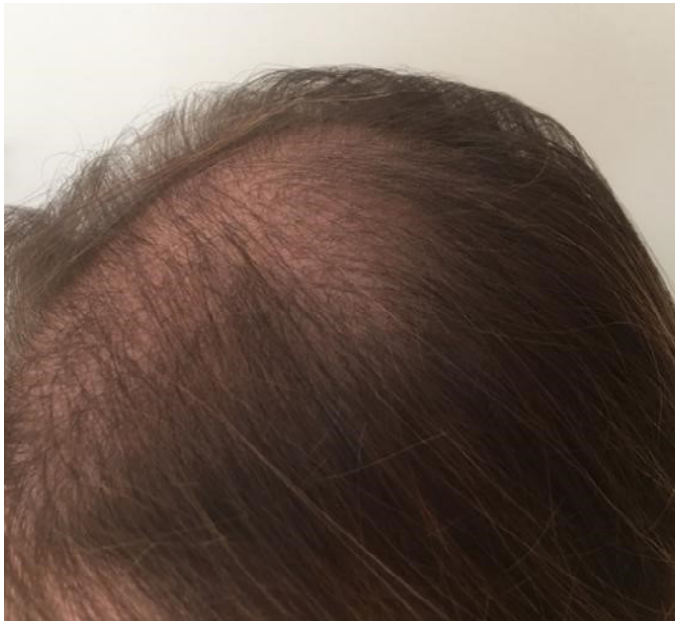
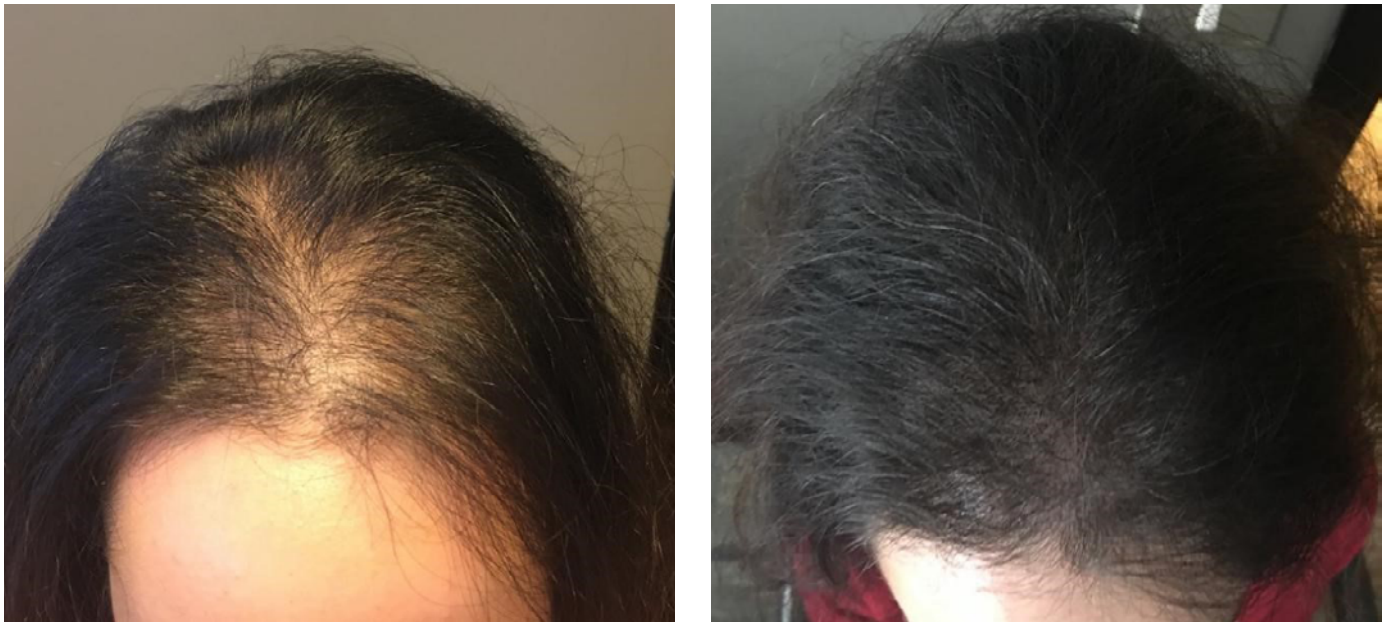


C

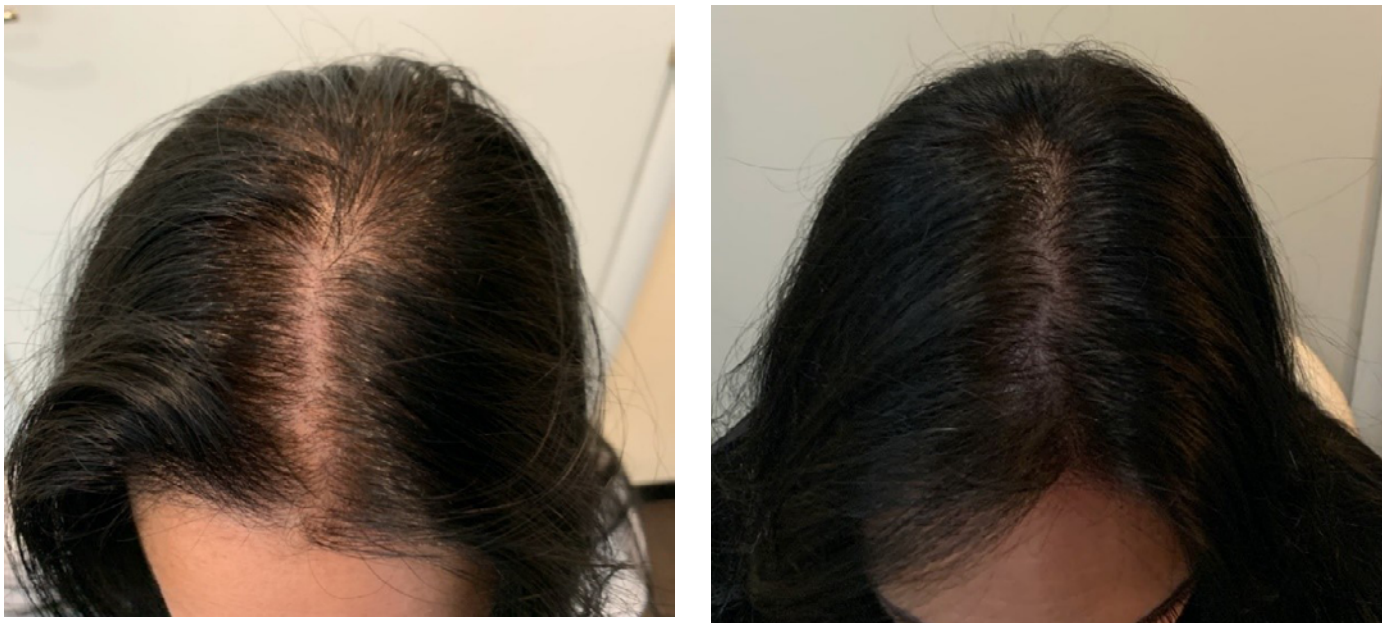
D

Fig. 3.*Density Effect. Ludwig grade 2 (Ref. 3) Pre (3A, 3C) and post (3B, 3D) treatment.*



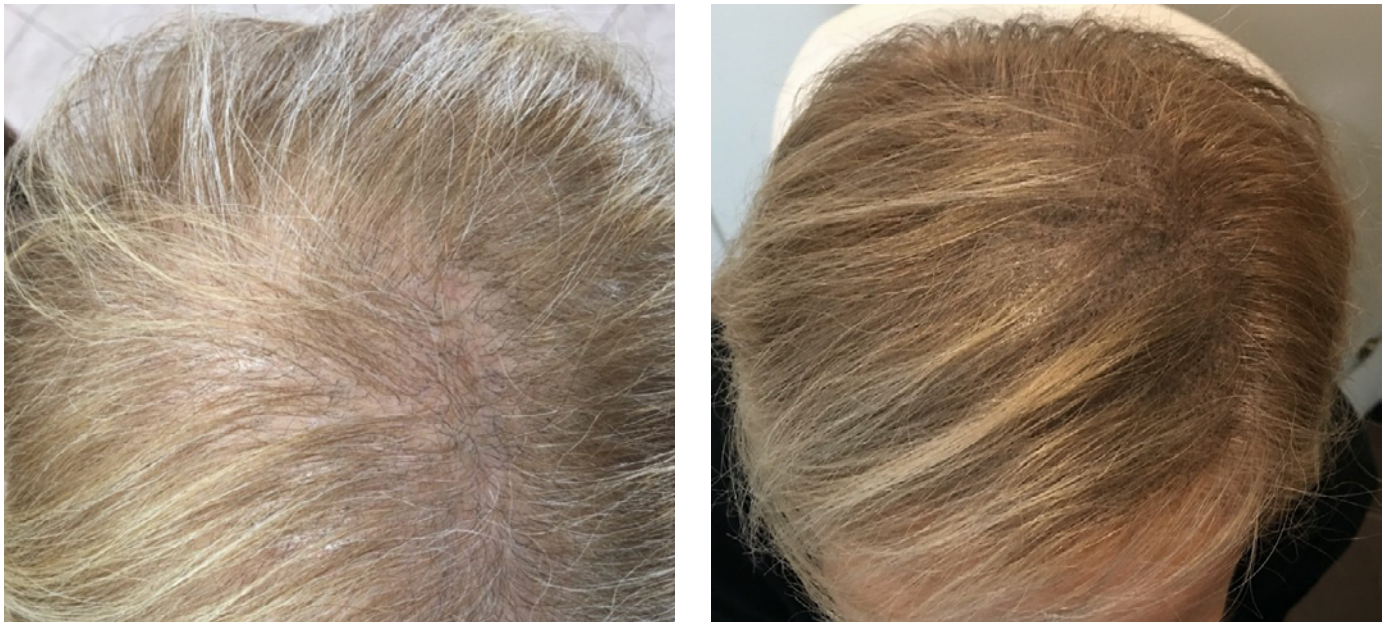
A B

Fig. 4.*(A-B): Density Effect. Ludwig grade 1 (Ref. 3) pre (4A) and post (4B) treatment.*



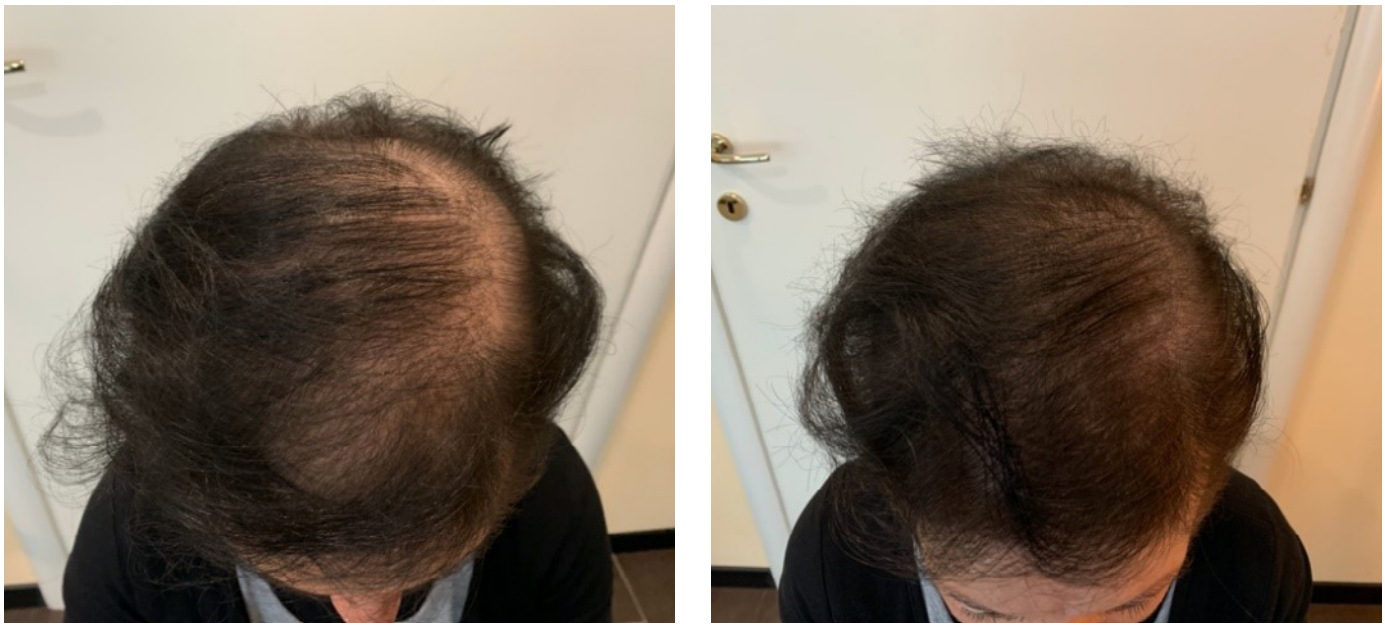
A B

Fig. 5.*(A-B): Density Effect. Ludwig grade 1 (Ref. 3) pre (5A) and post (5B) treatment.*



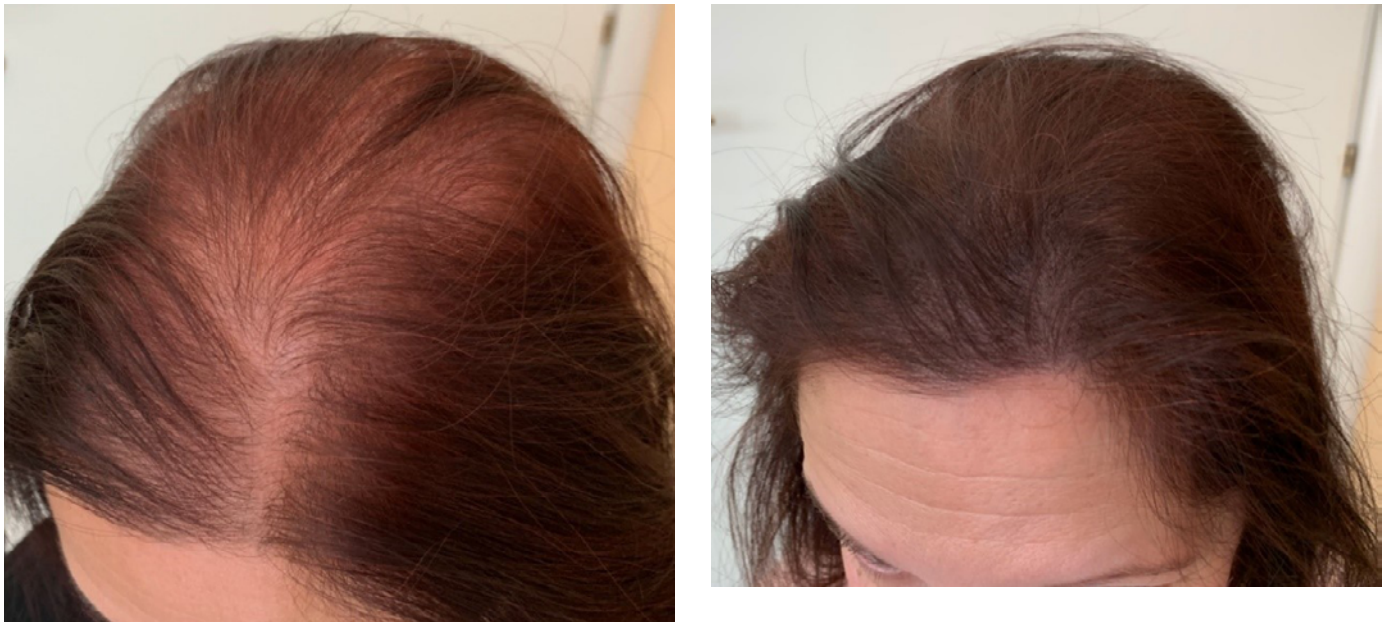
A B

Fig. 6.*(A-B): Density Effect. Ludwig grade 2 (Ref. 3) pre (6A) and post (6B) treatment, blond hairs.*



A B

Fig. 7.*(A-B): Density Effect. Ludwig grade 2 (extended) (Ref. 3) pre (7A) and post (7B) treatment.*



A B

Fig. 8.*(A-B): Density Effect. Ludwig grade 2 (extended) (Ref. 3) pre (8A) and post (8B) treatment.*

Today, trichopigmentation or scalp dermopigmentation represents a concrete solution to hair loss for both women and men. The trichopigmentation has proven to be innovative, reversible, and non-invasive, that can develop with the morphological changes of the patient.

For women, trichopigmentation represents a quick solution that grants a natural effect. It contributes in achieving an immediate life quality improvement, insuring freedom from keratin powders or similar products.

To perform a successful treatment, the operator must use specific equipment, certified pigments, a proven protocol and a strong experience in managing the different scalp types and pathologies.

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Clinical, dermoscopic and histopathological findings in a case of Favre Racouchot syndrome

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Letter to the editor,

Favre-Racouchot syndrome (FRS), a heliodermatosis affecting 1.4% of the general population, is characterized by comedones, cysts and actinically damaged skin (1). Though its etiology is unknown, its chief risk factors include sun exposure and smoking (2). FRS usually presents in a bilaterally symmetrical, photodistributed manner and is clinically characterized by large, non-inflamed, black, white, or yellow comedones, deep wrinkles, furrows and waxy plaques on the affected zones (3, 4). Histopathology shows alteration of the pilosebaceous unit, dilated infundibulum and large, round cystic spaces along with regression or absence of sebaceous glands, with or without solar elastosis (5). Treatment options include topical retinoids, comedo extraction, curettage, excision, dermabrasion, and carbon dioxide laser ablation. Daily oral isotretinoin (0.05-0.10 mg/kg/day) given in conjunction with topical tretinoin has also been found effective (5). Smoking cessation and sun protection are important adjunctive measures.

A 65-year-old elderly male, farmer by occupation, non-smoker, presented with gradually extending yellow plaques studded with multiple, open, hyperpigmented cystically dilated comedones over the bilateral temporal and periorbital regions for 20 years (Fig. 1). There was no history of pain/itching over the lesion. Dermoscopy showed comedo-like openings, cysts, reticulate honeycombed pigmentation and scattered perifollicular scaling (Fig. 2). Skin histopathological examination revealed dilated pilosebaceous openings and large, round, flattened-epithelium

lined spaces-both filled with layered horny material. Sebaceous glands (as also the epidermis) were atrophic. Solar elastosis was pronounced in the dermis (Fig. 3). Diagnosed as a case of Favre-Racouchot syndrome, the patient underwent serial excision using carbon dioxide laser and is under regular follow up.

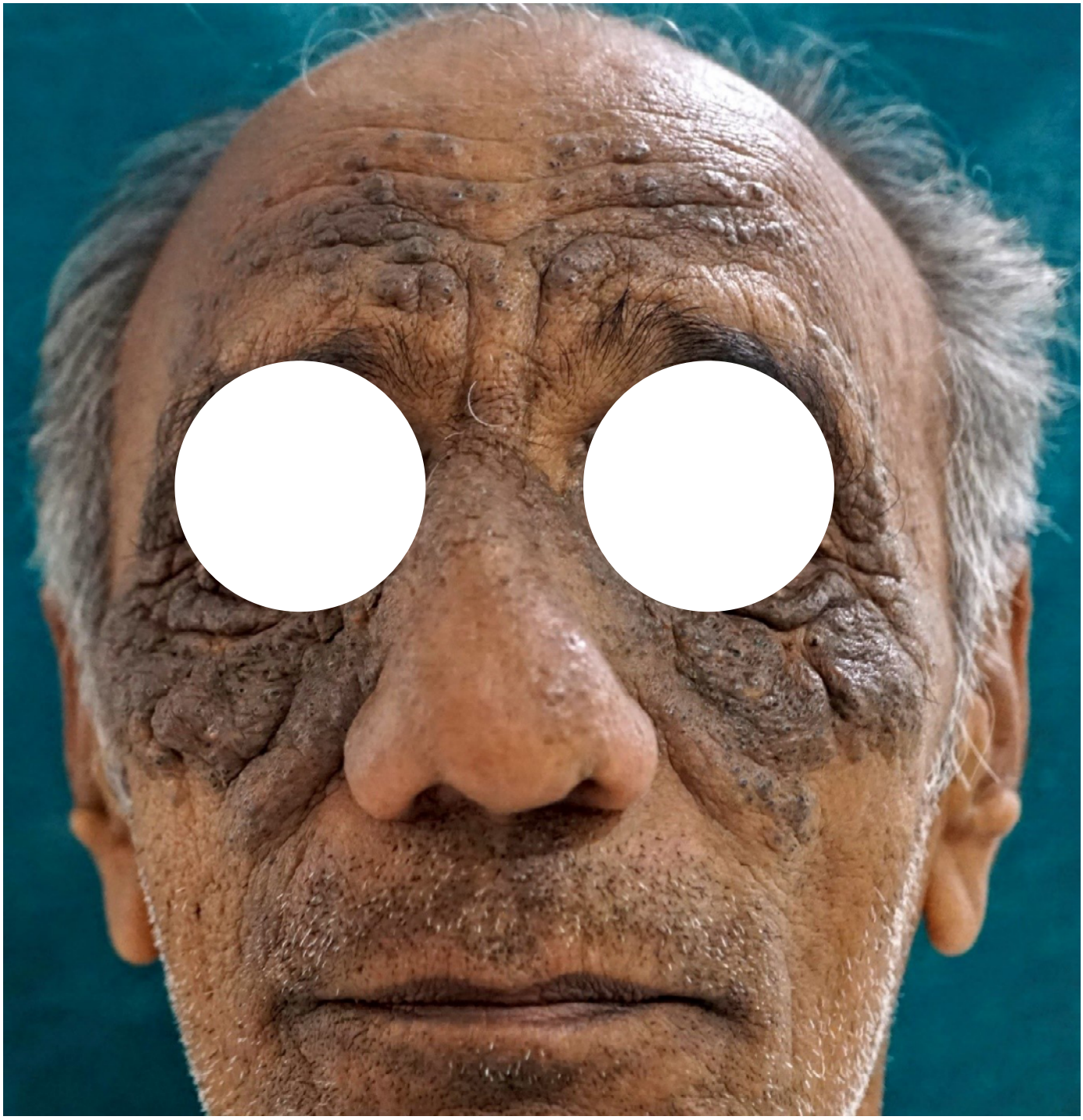

Fig. 1.*Well defined hyperpigmented plaques with dilated comedones over temporal and periorbital regions.*

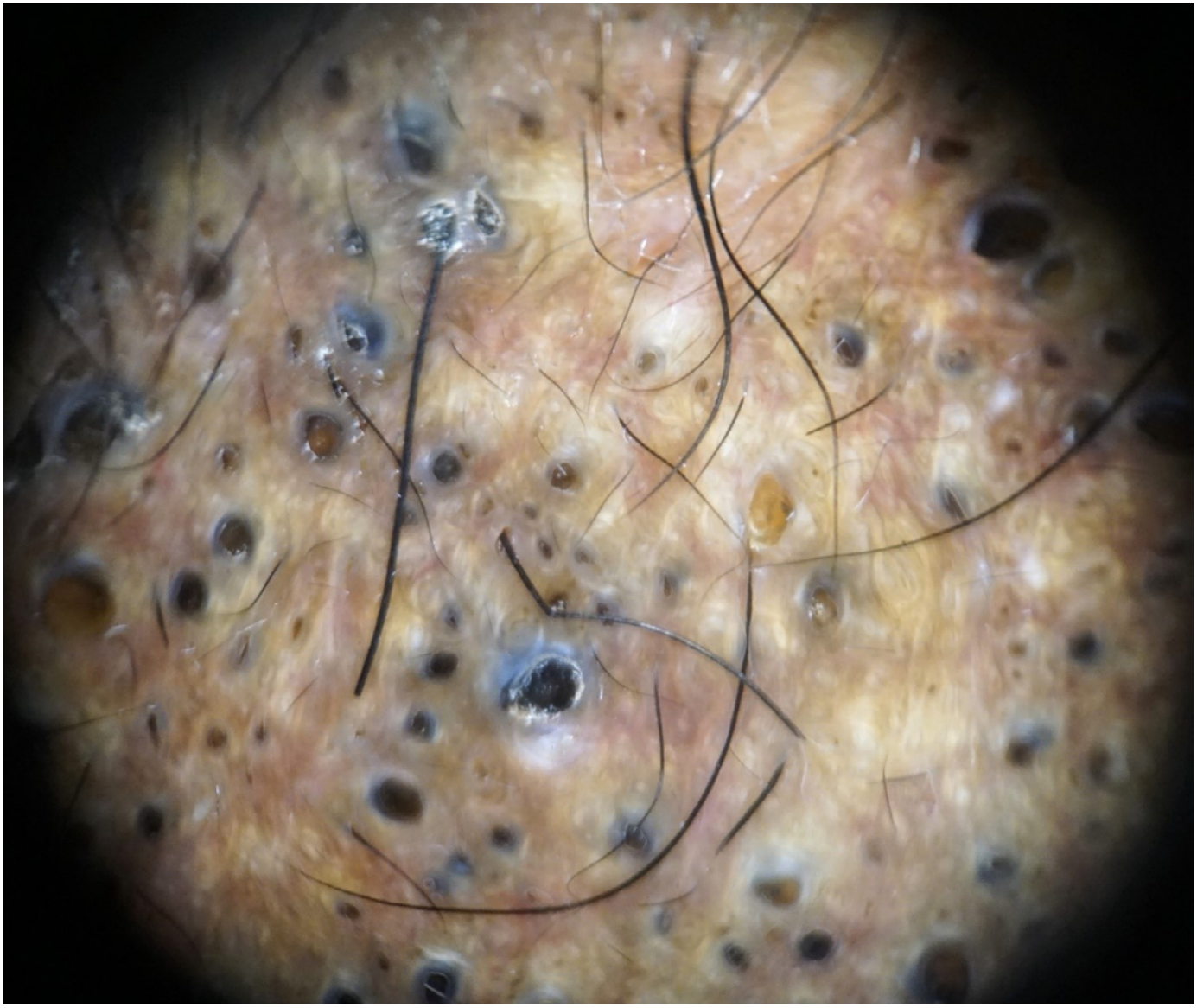

Fig. 2. *Dermoscopy image showing cystically dilated comedones, reticulate honeycombed pigmentation and scattered perifollicular scaling.*

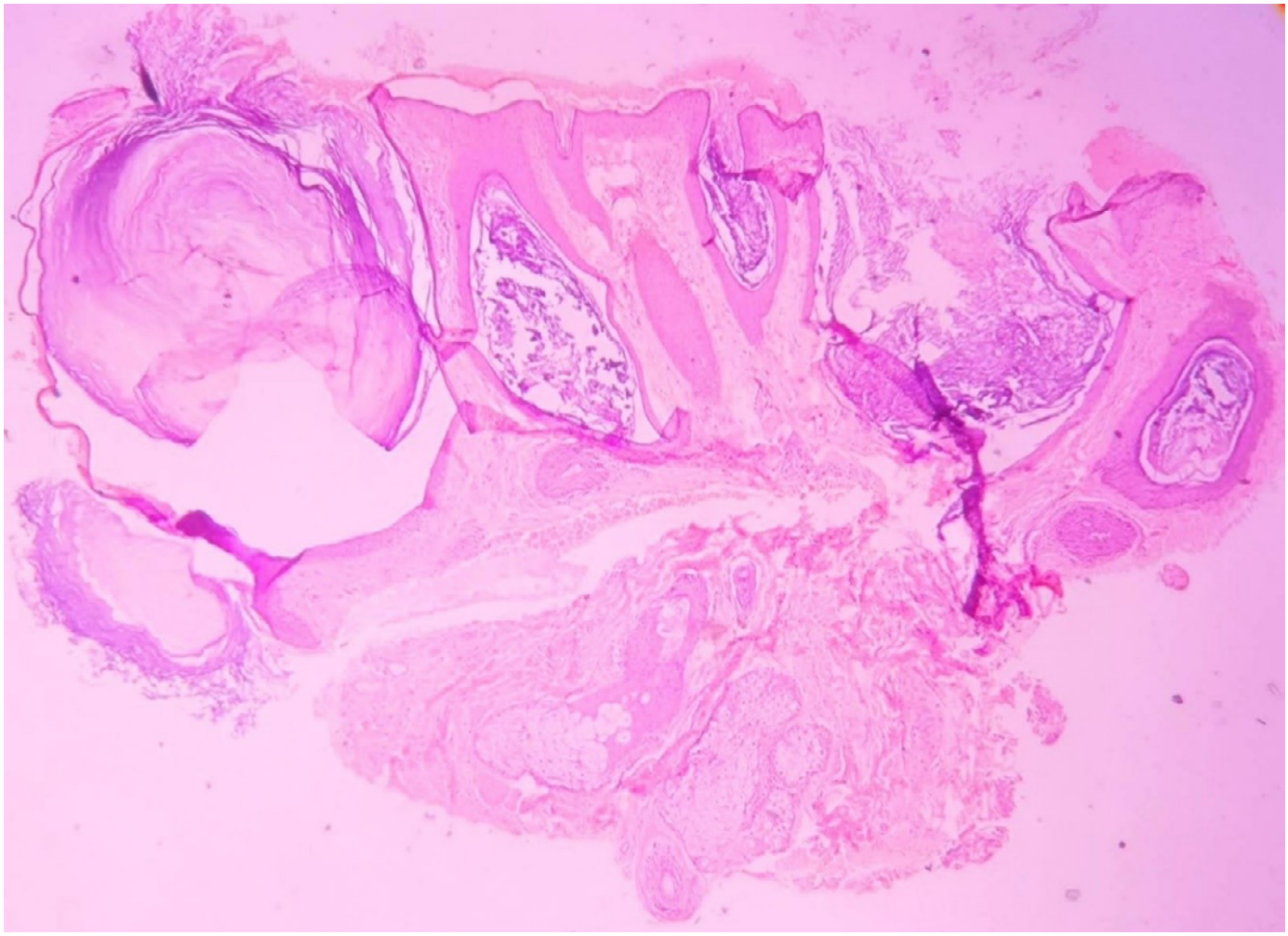

Fig. 3. *Layered horny material within dilated pilosebaceous openings and epithelium-lined spaces, atrophic sebaceous glands and pronounced dermal solar elastosis (H and E, x40).*

FRS also known as solar comedo (5), senile comedones or nodular cutaneous elastoidosis (6) needs to be regularly followed up as it may rarely lead to epithelial cancers such as basal cell carcinoma, squamous cell carcinoma or melanoma. Though the condition is predominantly found in elderly white men who smoke, our patient, a nonsmoker, developed severe lesions despite having dark skin (Fitzpatrick type V). Very few cases of the disease have previously been reported in the Indian population (7). The few dermoscopic studies carried out in Caucasian population have shown lesions of FRS to contain yellowish lobular-like structures with central ulceration and rare peripheral telangiectasias, findings which were not seen in our patient, probably as a result of his darker skin type. Although histopathology is infrequently required for diagnosis, it typically shows epidermal atrophy, significant solar elastosis and absence of sebaceous glands (8). Our patient was treated with topical retinoids, comedone extraction and serial excision with carbon dioxide laser. Though the patient tolerated the procedure well, frequent recurrence of the lesions was observed, probably due to the unavoidable heliocentric nature of his work.

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Hyperhidrosis - state of the art focusing on the medical cosmetology practice.

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Abstract

Hyperhidrosis is a condition characterized by excessive sweating which may have a primary or secondary cause. The diagnosis is facilitated by the guidelines of the Canadian Hyperhidrosis Advisory Committee. Prior to initiating treatment, the severity of the condition is determined based on the Hyperhidrosis Disease Severity Scale or objective examinations (Minor test or gravimetric method). The therapeutic options depend on the type of hyperhidrosis and are divided into topical, systemic and procedural modalities. The first-line drugs are topical preparations including aluminium salts, glycopyrrolate 2% and tannic acid solutions. Systemic therapies are based primarily on anti-cholinergic and β-adrenolytic drugs. Procedural therapies include botulinum toxin treatment, iontophoresis, laser therapy as well as techniques based on microwaves and ultrasounds. If these modalities fail, the remaining option is surgery, including sympathectomy or surgical removal of sweat glands.

Pathogenesis and classification

According to the simplest definition, hyperhidrosis is a condition manifested by excessive sweating (1). A number of extensions of this definition are available in the literature. Hyperhidrosis is a chronic disorder characterized by unexpected and excessive secretion of sweat. The condition can lead to emotional and social problems, cause psychological dysfunction and negatively impact the professional activity and the quality of daily life of affected individuals (2). Hyperhidrosis is characterized by perspiration in excess of the physiological amount necessary to maintain the body's thermal homeostasis. Clinically, the disor der can be divided into primary and secondary. Secondary hyperhidrosis can be induced by drugs taken by the patient or by other underlying conditions.

The cause of primary hyperhidrosis is unknown, though it is believed to be linked to an increased activity of the sympathetic nervous system in which acetylcholine acts as a transporter between nerve fibre endings and sweat glands (3). Excessive secretion of sweat is observed in areas with an increased concentration of eccrine glands. No hypertrophy or hyperplasia of sweat glands is found (4). The onset of primarymhyperhidrosis typically begins during childhood and the disorder persists into adulthood. The condition most commonly involves the axillae, hands, feet and face (5). Secondary hyperhidrosis can be divided into topical and generalized. The disorder can be caused by infections, endocrine disorders (hyperthyroidism, hyperpituitarism, pheochromocytoma, acromegaly, carcinoid syndrome, diabetes), physiological conditions (menopause, pregnancy), neurological disorders (Parkinsonism, stroke, spinal cord injuries), cancers (e.g. lymphomas), treatment with certain medications including antidepressants (selective serotonin reuptake inhibitors and tricyclic antidepressants), and abstinence syndrome due to withdrawal from alcohol or other psychoactive substances (6).

Local hyperhidrosis may be caused by damage to the nerve centres in the central or peripheral nervous systems. For example, diabetic complications in the form of neuropathy may induce excessive secretion of sweat at sites of neural damage. Central nervoussystem infections and haemorrhages may result in hyperhidrosis on the side contralateral to injury (7).

Excessive perspiration may lead to the onset of another disease or exacerbate existing disorders, for example increase the severity of psoriasis or renal failure in the elderly (8). Patients with the disease report problems in the workplace and reduced productivity, large amount of time spent on managing the disease as well as difficulties in maintaining relationships with friends and engaging in sexual relations(9). In addition to social aspects, local hyperhidrosis may induce the development of bacterial or fungal infections, eczema lesions (10).

Diagnostic work-up

The first stage of the diagnostic work-up involves determining the type of hyperhidrosis: primary or secondary. Primary hyperhidrosis is more common. The diagnosis is based on clinical examination. An important step is taking the patient's detailed medical history. According

to the guidelines established by the Canadian Hyperhidrosis Advisory Committee, the diagnosis of hyperhidrosis requires that the symptoms persist for at least 6 months and at least 4 of the following criteria are met: involvement of areas with a higher concentration of eccrine sweat glands (armpits/hands/feet/face), bilateral and symmetrical distribution, absence of sweat during sleep, episodes at least once a week, onset at the age of ≤ 25 years, positive family history, and interference with activities of daily living (11, 12) (table I). The causes of secondary hyperhidrosis should be excluded in each case.

Hyperhidrosis Advisory Committee
Excessive sweating lasting at least 6 months
Areas with a higher concentration of eccrine glands (armpits/hands/feet soles, face)
Bilateral and symmetrical distribution
Absence of sweat during sleep
Episodes at least once a week
Age of the onset ≤ 25 years
Positive family history
Interference with activities of daily living
Diagnosis: satisfaction of ≥ 4 criteria

Table I. *Criteria for primary hyperhidrosis according to the Canadian.*

The severity of excessive sweat secretion is assessed using the Hyperhidrosis Disease Severity Scale (HDSS). The scale consists of four options (table II). A score of 1 or 2 indicates mild or moderate hyperhidrosis, and a score of 3 or 4 – severe hyperhidrosis (12).

How would you rate the severity of your hyperhidrosis?
1. My sweating is never noticeable and never interferes with my daily activities
2. My sweating is tolerable but sometimes interferes with my daily activities
3. My sweating is barely tolerable and frequently interferes with my daily activities
4. My sweating is intolerable and always interferes with my daily activities

Table II. *Hyperhidrosis Disease Severity Scale.*

The amount of secreted sweat can also be assessed using the gravimetric method which involves weighing filter paper before and 10 minutes after applying it to the test area. Measurements are performed in specific conditions: at the same time of the day, at a temperature of 22–24°C and relative humidity of 40–60%. Data based on gravimetric measurements indicate that the production of 100 mg/5 min of sweat by the glands located in the axillary and palmar regions represents the cut-off value between the physiological state and hyperhidrosis (6).

The surface of excessive sweat production can be determined using the starch-iodine test (Minor test) in which the area affected by hyperhidrosis changes colour to brown-violet (13) (Fig. 1).

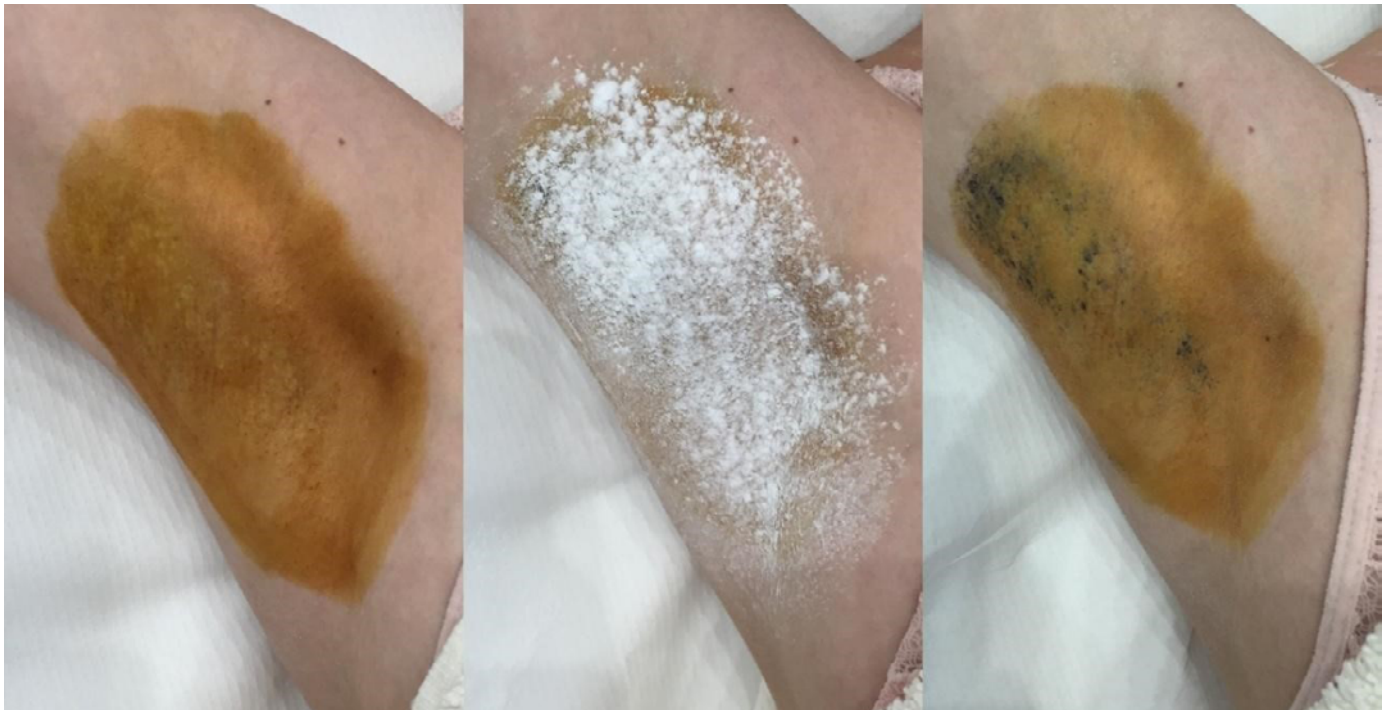

Fig. 1.*Starch-iodine test. Iodine is applied in the test area and, subsequently, starch is sprinkled. A change in colour indicates the area of excessive sweating.*

Therapeutic modalities

Treatment depends on the type of hyperhidrosis. The first step in secondary hyperhidrosis is eliminating the cause of the disorder. Where this is not possible, the remaining option is symptomatic treatment.

The therapy is focused on relieving the symptoms and reducing sweat secretion in order to improve the quality of life of patients and their social functioning (14). The existing methods of treatment can be divided into topical, systemic and procedural (performed, among others, using advanced medical devices).

Topical treatment

Topical preparations are used as the treatment of choice for hyperhidrosis due to the fact that they are safe, effective, easy to use, widely available and inexpensive.

The main ingredients of topical preparations are aluminium salts (15, 16). Products containing aluminium chloride hexahydrate are currently considered to be the most effective available antiperspirants (16). The mechanism of action of this substance is attributed to the interaction between aluminium chloride and keratin in sweat ducts (causing their closure) or its direct effect on the secretory gland epithelium (15). The solution should be applied every evening until the desired result is obtained, after which the intervals between applications are increased (17). The effect is transient, as normal sweat production returns with epidermal renewal. Consequently, patients require maintenance treatment with the preparation once or twice a week (16). The substance is also effective in the treatment of palmar hyperhidrosis, however in this location the effect is maintained for only up to 48 hours (15, 18). The most common side effect is irritation (19), especially after application on damp skin, which can be alleviated by using corticosteroid creams (17).

Glycopyrrolate 2% is a topical anticholinergic agent which reduces excessive sweating through competitive binding to muscarinic receptors (20). It is used in the treatment of facial hyperhidrosis (21) and, less commonly, axillary hyperhidrosis (18). Glycopyrrolate 2% can be used twice a day, although some authors recommend only night-time application. The skin around the eyes, nose and mouth should be avoided (22). A 0.5% cream with glycopyrrolate has found application, among others, in the treatment of secondary hyperhidrosis in diabetic patients (23).

A 2-5% solution of tannic acid acts at the level of the stratum corneum, causing denaturation of keratin and leading to the superficial closure of sweat gland openings for a few days (16). It has applications in the management of excessive sweating of the hands and feet (17).

Other medications including 5-20% formalin solu tion or 10% glutaraldehyde solution are not widely used in the treatment of primary hyperhidrosis because they have been shown to cause local skin irritation, allergy and nervous system toxicity (24).

Systemic treatment

Systemic treatment can be considered in patients with hyperhidrosis who fail to respond to topical therapy. The main option in clinical practice comprises anticholinergic drugs including glycopyrrolate, methantheline bromide and oxybutynin (currently the most widely used medication). -adrenolytics are used to reduce symptoms induced by anxiety and social phobia. Other substances reported in the literature include -adrenergic receptor agonists: clonidine, benzodiazepines, calcium channel blockers or gabapentin (25, 26).

Oxybutynin is a drug with antimuscarinic properties which was first used in 1988 (27). It was recognized as a therapeutic option when a correlation was found between the overexpression of acetylcholine and 7 nicotinic receptors in the sympathetic ganglia of patients suffering from excessive sweating (28, 29). Oxybutynin is a good first-choice therapy of primary hyperhidrosis affecting the plantar, axillary, palmar and facial areas (23). A randomized controlled study has been conducted in patients with plantar and axillary hyperhidrosis. Among 25 patients receiving placebo 72.7% noted no improvement, and among 25 patients receiving oxybutynin 73.9% observed the resolution of symptoms (30). The substance also offers an alternative therapeutic modality in elderly patients who are unable to be treated surgically or who have failed topical therapy. There is no significant difference in terms of improvement and resolution of symptoms across patient groups depending on age, sex or body mass (31). Attempts have been undertaken to apply oxybutynin topically in the form of 10% gel twice a day.

Methantheline bromide was used in the treatment of topical hyperhidrosis as early as in 1951 (32). Only one randomized double-blind study has been conducted to date. The study group consisted of 41 patients (including 31 women) at an average age of 28 years. The therapy was found to be effective in patients with hyperhidrosis in the axillary area. However, no improvement was noted in patients with palmar hyperhidrosis (33).

Glycopyrrolate is a drug used in the management of patients with peptic ulcer disease, but it also has a blocking effect on excessive perspiration. A study has been conducted in a group of 36 patients with primary hyperhidrosis. The analysis comprised psychological aspects, changes in daily activities and in the autonomous nervous system in relation to a decrease in the amount of secreted sweat. An improvement in the form of reduced production of sweat and increased comfort of daily life was noted in 75% of study patients (33).

The optimal doses of each of the above-described drugs are still under investigation, but the most commonly used dosage regimens are: oxybutynin 5-7.5 mg twice daily, methantheline bromide 50 mg twice daily, and glycopyrrolate 1–2 mg twice daily (15).

Oral anticholinergics are a potential therapeutic modality with proven efficacy, but their use is limited because of side effects including dry mouth, blurred vision, difficulty in passing urine, dizziness, tachycardia or gastric disorders (34).

Procedural treatment

If no improvement is noted after topical and systemic treatment, a variety of medical procedures are available for therapy. They have diverse mechanisms of action, efficacy and possible side effects.

Botulinum toxin

Botulinum toxin blocks the release of acetylcholine and many other neurotransmitters from presynaptic vesicles by deactivating SNARE (soluble N-ethylmaleimide-sensitive-factor-attachment protein receptor) proteins (15). It inhibits the release of acetylcholine not only in the neuromuscular junctions but also in the postganglionic sympathetic fibres innervating the sweat glands. Based on these properties, it has found applications in the treatment of hyperhidrosis (17). In 2004 the US Food and Drug Administration (FDA) approved the drug Botox for the treatment of severe axillary hyperhidrosis that cannot be effectively controlled with topical agents. It also has clinical applications in the treatment of palmar hyperhidrosis (35). Four botulinum toxin type A preparations are available in Poland. The administration of botulinum toxin requires multiple intradermal injections, approximately 2 cm apart, using a 30-G needle (15, 18).

In the treatment of axillary hyperhidrosis, a minimum of 50 units are administered to each armpit, which reduces perspiration for approximately 6 months. When higher doses are used, the treatment response persists for up to 15 months. The treatment of palmar hyperhidrosis involves the administration of 100–200 units per hand, and the effects of treatment persist for about a year (17). A number of methods are used to reduce pain associated with the procedure, such as topical anaesthetics, ice packs or adding lidocaine to botulinum toxin (15, 17, 18). Absolute contraindications to using botulinum toxin include infections and allergies to any of the ingredients of the preparation. Relative contraindications include diseases causing muscle weakness (amyotrophic lateral sclerosis, myasthenia gravis, Lambert-Eaton myasthenic syndrome) that may present with dysphagia or respiratory disorders (36).

Iontophoresis

One of the simpler procedural methods to managehyperhidrosis with the use of medical equipment is iontophoresis. The precise mechanism of action of this method remains hypothetical. Theories attribute it to the blocking of nerve conduction and change in pH level reducing gland activity (37). Since the technique is simple and safe, a variety of devices designed for home-based treatments have appeared on the commercial market. The desired effect requires multiple procedures which need to be repeated frequently (18).

Laser therapy

Hyperhidrosis can be treated with a variety of types of laser devices offering the option of selecting the depth of penetration and the amount of delivered energy. The mechanism of action is based on inducing local thermal damage aimed at destroying the sudoriferous and sebaceous glands. Despite visible improvement determined by the Minor test carried out 9 months after the procedure, treatment with YAG 1064-nm lasers failed to induce a change in the histopathological findings (38). The 800-nm diode laser has been found to be ineffective (39). Laser with the wavelengths of 924 and 975 nm produced improvement (assessed by the Hyperhidrosis Disease Severity Score) 1 and 12 months after the treatment (40). The efficacy of using devices generating radiation at the wavelengths of 1210 and 1440 nm is currently being studied (18).

Microwaves

Heat produced by the rotation of molecules with high dipole moments (H2O) stimulates microwaves into producing a selective effect on the eccrine glands, avoiding the destruction of surrounding tissues (e.g., fat) (41). Microwave thermolysis has been demonstrated as an effective procedure (18). In one of the studies, subjects received two therapeutic sessions under infiltration anaesthesia. The efficacy of the method was assessed at 69% at the 12-month follow-up (41). Adverse reactions include temporary tenderness, swelling and numbness (42).

Ultrasounds

Ultrasound technology is yet another method to selectively target the glandular tissue for the treatment of hyperhidrosis. In a randomized double-blind and placebo-controlled study involving 12 subjects, 83% of them experienced a greater than or equal to 50% reduction in sweat secretion measured using a gravimetric technique after a 12-month follow-up (43). Other studies demonstrate even greater efficacy of ultrasound therapy and durability of therapeutic effects after two years. However, the study groups were relatively small (42).

Radiofrequency microneedling

Non-ablative radiofrequency is a relatively new technique. The procedures make use of the thermal effect of radio frequency waves (1 MHz) in human tissues. They cause both positive and negative ions in electrolytes to vibrate, resulting in the rapid heating of tissues (55–70°C). In the latest devices, microneedles generate fixed power which operates for a defined time at a depth set by the operator. The aim of the process is to induce thermal destruction of sweat and sebaceous

glands. The therapy, used in 20 subjects, has caused a minimum of 25% improvement in all patients after two treatments (44). A 2016 study conducted in 30 patients also confirms the efficacy of the method after 3 treatments (45). There are recommendations to repeat the procedure after 1 year, particularly in patients with a high body mass index) (46). Side effects, which may include a tingling sensation, swelling or redness in the treated area, subside within a week, and the procedure requires only local anaesthesia (44).

Surgical methods

Surgical methods are used when other treatments prove to be ineffective. They include the disruption of nerve fibre continuity (sympathectomy) or the surgical removal of sweat glands.

Sympathectomy carries a high risk of complications and adverse effects such as compensatory sweating of other parts of the body, gustatory sweating (affecting nearly one third of the patients undergoing the procedure) or phantom sweating (found in almost a quarter of patients) (47). Consequently, sympathectomy is recommended only in special cases when other therapeutic options have been exhausted and after thoroughly discussing the problem with the patient.

Local surgical excision of sweat glands as an option for the treatment of axillary hyperhidrosis has been used for several decades. The procedure is performed under local anaesthesia, either with or without excision of overlying skin (skin-sparing procedure) (48). Advocates of radical skin excision consider this method to be more complete, as in addition to the sweat glands at the interface between the skin and subcutaneous tissue, it also involves the removal of sweat glands present in the skin (49). Although the method is effective, the postoperative course is often associated with numerous complications including infections, haematomas, tissue necrosis, atrophic or hypertrophic scars (48).

Subcutaneous axillary curettage using liposuction devices (liposuction-curettage) is an effective procedure for the treatment of hyperhidrosis. It is considerably less invasive and produces better cosmetic results with less scarring compared to traditional surgical excision (50). The concurrent suction of fatty tissue leads to better outcomes than curettage alone which only causes damage to the glands without removing them (6).

Surgical methods of axillary sweat gland removal or liposuction are considered to be safe techniques; however they should be recommended only if conservative methods have failed (47).

Discussion

Hyperhidrosis is a disorder that strongly affectsnmany aspects of patients' everyday lives. Before the initiation of therapy, the disorder should be accurately diagnosed. The choice of treatment should be made on an individual basis depending on the clinical picture, and therapy

should start with the least invasive methods. Several therapeutic options are available, however some of them still need to be refined or studied in a larger number of patients.

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Topical foam medications in dermatology

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Abstract

Selection of drug formulation is very important for efficacy of agent and patient compliance. Foam is a popular vehicle for dermatologic topical treatments. Use of foam as a vehicle adds variety of advantages to medications. Nowadays topical foam medications are popular among dermatologists for variety of indications.

Introduction

Availability of various topical treatments for skin diseases is an advantage for dermatologists. Lotions, creams, ointments, gels, sprays, powders, and foams are generally used as a vehicle for well-known topical agents. Foam vehicles have been popular for a while. They have better topical drug delivery, yielding maximum efficacy and increasing tolerability of well-known active drugs (1-4, 5) Most popular examples of topical foam medications are clobetasol propionate foam, 0.05% and minoxidil foam, 5%.

Discussion

A wide variety of foam medications are evolving that have a specified technology. They are mostly developed for better and faster penetration of active ingredient through the stratum corneum with permeation into epidermis and dermis, ease of spread over large body surfaces and/or hair-bearing areas of body with lack of residue (1, 4, 5). Features of medication and characteristics of the underlying skin disease affect choice of vehicle (1-3). There are hydroethanolic-based, aqueous foams and emollient-based foams.1 Latter two foams are similar that have better skin tolerability without irritant effect of hydroethanolic-based foams, allow for optimal compatibility with

diverse active ingredients (1).

In the literature there are several studies and case reports about use of topical foams. One of the mostly preferred drugs by dermatologists are topical corticosteroid formulations. Bergstrom et al reported a randomized single-blind study of clobetasol propionate foam, 0.05% compared with clobetasol propionate cream, 0.05% and solution, 0.05% for treatment of psoriasis. Although the difference was not statistically significant, author suggested higher efficacy of foam versus cream/solution (2). In a retrospective study, clobetasol propionate foam, 0.05% was found significantly more efficient than narrow band-ultraviolet B treatment for vitiligo (3). Tosti and his colleagues demonstrated that clobetasol propionate foam, 0.05% is an effective, safe and well-tolerated topical treatment for alopecia areata with good cosmetic acceptance (4). In a case report, clobetasol propionate foam, 0.05% in combination with coal tar foam, 2% induced remission successfully (6).

In a case report, clobetasol propionate 0.05% emollient foam in combination with coal tar 2% induced remission and followed by alternately use of these agents as a maintenance regimen with promising result in psoriasis treatment (7). In another study, calcipotriene and betamethasone dipropionate aerosol foam demonstrates statistically significantly greater efficacy and similar tolerability compared with calcipotriene and betamethasone dipropionate ointment for psoriasis treatment (5).

Minoxidil is a well-known and accessible drug that is used frequently in androgenetic alopecia and female pattern alopecia. In a randomized, single-blind trial; minoxidil foam, 5% once daily is found as effective as minoxidil solution, 2% twice daily in the treatment of androgenetic alopecia in women with less side effects (7).

Topical antifungal drugs are also frequently preferred by dermatologists. Ketoconazole foam, 2% has an equal efficacy and tolerability compared to ketoconazole cream, 2% in the treatment of fungal infections and seborrheic dermatitis (8).

Patients frequently attend to dermatology clinics with inflammatory fascial dermatosis especially acne vulgaris. Treatment of these diseases could be challenging for dermatologists. Use of azelaic acid foam, 15% in rosacea treatment presented less neurosensory cutaneous adverse events, such as stinging, burning, and tingling when compared with azelaic acid gel, 12% with similar efficacy (1). Bikowski suggested that benzoyl peroxide foam, 9.8% facilitates application of large areas like trunk, increased hydration of the skin, improving efficacy and minimizing the potential for bleaching of clothing (9). Tazarotene foam, 0.1% could be treatment of choice for acne patients by offering uniform spreading, less stickiness, less greasy feeling.10 In a comparison study, clindamycin phosphate foam, 1% group had the same or better skin improvement effects with cosmetic benefits thus, increase compliance than clindamycin phosphate topical gel 1% group (11).

Foam formulation of 10% sodium sulfacetamide and 5% sulfur provides easy application with no residue in the treatment of inflammatory facial dermatoses (12). Minocycline foam, 1.5% for the topical treatment of moderate to severe papulopustular rosacea was found effective with good safety profile (13).

Another example of foam medication is aluminum

sesquichlorohydrate foam, 20% which is an effective foam drug with rare transient itching sensation side effect in axillary and palmar primary hyperhidrosis (14).

Cosmetic procedures are becoming more popular among dermatologists today. Frankel et al suggested that lidocaine foam, 4% could be a safe and effective local anesthesia medication with cosmetic procedures (15).

Conclusion

There is growing tendency to use foam medications in dermatology. Foam drugs are usually more effective than conventional formulations with good safety profile and patient compliance. Further studies are needed about use of foam medications in dermatology. Foam medications are summarized in Table I.

Foam medication	**Indication**
Clobetasol propionate foam, 0.05%	Psoriasis, dermatitis, vitiligo
Calcipotriene and betamethasone dipropionate aerosol foam	Psoriasis
Coal tar foam, 2%	Psoriasis
Minoxidil foam, 5%	Androgenetic alopecia
Ketoconazole foam, 2%	Fungal infections and seborrheic dermatitis
Azelaic acid foam, 15%	Rosacea, acne
Benzoyl peroxide foam, 9.8%	Acne
Tazarotene foam, 0.1%	Acne
Clindamycin phosphate foam, 1%	Acne
Sodium sulfacetamide, 10% and sulfur ,5%	Inflammatory facial dermatoses
Minocycline foam, 1.5%	Papulopustular rosacea
Aluminum sesquichlorohydrate foam, 20%	Axillary and palmar primary hyperhidrosis
Lidocaine foam, 4%	Local anesthesia

Table I. *Summary of topical foam medications and indications of them.*

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