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Case Report

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Benefits of PDRN associated with drug-delivery microneedling in the management of rosacea

Abstract

Rosacea is a chronic inflammatory skin disease that has prevalence in women in theirs latest 30-60's with low phototype, event thought it can happen in high phototypes. It is characterized by facial erythema, telangiectasia, papules, pustules and possible ocular manifestations; its etiology is unknown and possibly multifactorial were genetics, environmental, immune, microbial, neurovascular e triggering factors play a huge role in. This case report has the objective of presenting the benefits of the association of Polydeoxyribonucleotide (PDRN) and drug- delivery microneedling in the management of inflammation, vasodilation, and angiogenesis caused by rosacea. This study was based in a protocol using intense pulsed light (IPL), drug- delivery microneedling and PDRN was created based on the sensibility and inflammation of the patient skin at the beginning of treatment; IPL and drug- delivery microneedling were done monthly, in a two- week interval between the sessions. In total, four sessions of IPL and three sessions of drug-delivery microneedling were realized in a period of four months. This report brings results that corroborate the benefit of PDRN in the management of rosacea and skin kept in sensibility until 75%, when analyzed with Dermavision IA.

Keywords: PDRN, microneedling, rosacea, drug- delivery, intense pulsed light

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Abbreviations: PDRN, polydeoxyribonucleotide; IPL, intense pulsed light; RF, radiofrequency; DNA, deoxyribonucleotide

Introduction

Rosacea is a chronic inflammatory skin disease that affects the central portion of the face, where a dysregulation of vascular system and sebaceous glands occurs; it has prevalence in low phototypes such as types I and II in the Fitzpatrick classification although it can appear in higher phototypes (IV and VI in the Fitzpatrick classification).[1,2] The Fitzpatrick classification utilizes a person's skin sun reactivity to unprotected sun exposure and phenotype to create its scales were type I it's classified as a white skin that never tans and always burns and type III it's classified as a white skin that tans gradually with minimal burn. Women between 30 and 60 years are the most affected and in men, lower frequency, in the same age gap. Even though rosacea has a central facial prevalence, it can occur in areas with higher chances of sun exposure, such as ears, scalp, chest, neck and the upper part of the back.[3,4]

This condition is characterized by facial erythema, telangiectasia, papules, pustules and nodules, being persistent central facial erythema associated with periodic intensification followed by flushing, which can alternate in periods of intensification and remission.[5] The most common symptoms flushing, telangiectasia and erythema; in lower frequency it may occur ocular manifestations, such as blepharitis, telangiectasia on the margin of the eyelids and conjunctivitis.[6]

Rosacea disease remains underdiagnosed even with its higher prevalence; the global prevalence ranges from 2% to 22%.[7]

In 2002, Wilkin classified the disease in four subtypes: erythematotelangiectatic (1), papulopustular (2), phyma-tous (3) and ocular (4); the presence of central facial erythema and phymatous alterations are considered regardless of other criteria for the diagnostic of rosacea. The most common presentation are the subtypes 1 and 2, subtype 3 have a prevalence in men in the nasal portion of the face where it characterizes by edema, erythema and hyperkeratinisation of the region. Subtype 4 doesn't have gender prevalence and can occur associated with other subtypes or even alone.[8]

The pathophysiology of rosacea is considered multifactorial where genetic predisposition, immune and neurovascular dysregulation, environment and lifestyle of the patient influences the aggravation of the disease, based on this, the management of rosacea must encompass this triggers.[7] The focus point of the management is to reduce the symptoms of the disease and repair the epidermal barrier; this management can and should be associated with skincare (dermocosmetics) and aesthetic procedures.[3]

Some authors suggest using IPL, RF, ultrasound, electrosurgery and microneedling associated with systemic or topical drugs (antibiotics) and skincare.[7]

Microneedling is a mesotherapy technique that boosts the collagen production and skin hydration by mechanical puncturing creating channels in the epidermis and dermis; it can be performed with dermarollers and dermapen. The depth of the puncture depends on the area of the treatment, ranging from 0,25mm to 2,5mm, being the depth of 0,5mm the most indicated for transdermal penetration where it is possible to introduce substances with high molecular weight, acting as a method of drug-delivery. In higher depths it can function as a percutaneous collagen inductor.[5]

PDRN is a low molecular weight DNA extracted from salmon/trout sperm after the extraction goes through purification becoming a preparation with high percentage of DNA. Its mechanism of action comes from the cleavage into purine and pyrimidine deoxyribonucleotides by cell membrane enzymes; these deoxyribonucleotides act on adenosine A2A receptors stimulating the endothelial cell migration, proliferation of fibroblasts and others cell lineages and enhancing angiogenesis.[1]

IPL is a technology that emits non-coherent, non-collimated, polychromatic light of high intensity in short pulses in a wavelength range of 390 to 1200nm; thus, a specific wavelength is used for

each chromophore, such as oxyhemoglobin with a peak at 418 nm. The main aim of IPL in rosacea is to reduce blood flow, superficial telangiectasias and reduce the intensity of erythema.[2]

Material and methods

A specific protocol was developed with the withdrawal of digital images and taken into consideration the patient's complaints, acne scars and expression lines. The digital images were taken using Dermavision from Lumex company is a artificial intelligence equipment that emits a different type of lights for descriptive and quantitative analysis of the damage os the skin, such as positive, negative, infrared and ultraviolet polarized lights. The images were taken in the first session, sixth session and six months post treatment for treatment evaluation and progress analysis. Six biomarkers were taken into consideration: oiliness, pigment, acne, pores, erythrosine levels and digital thermography; this data gathering helped to analysis and quantify the results.

The protocol consisting of IPL Maxiflash from Bioset Company associated with Sensitive Mask PHA's from Ellementi Clinical Company and automated microneedling from Smart Gr Company (Smart Derma Pen). The products chosen were PDRN from EVO Company enhanced with growth factors (IGF 1%, bFGF 1%, VEGF 1% e cooper peptide 1%) from NEXT Company. The IPL used 16J on the middle and lower third of the face and 15J on the frontal region of the face, it was taken into consideration the patient's phototype, type III. In total were realized four sessions of IPL and three sessions of drug-delivery microneedling in a period of four months. Sessions were held every two weeks, IPL and Sensitive Mask PHA's being conducted on the same day and the drug-delivery microneedling after two weeks; there was a one- month break between sessions of the same procedure, as described in Table 1.

Table 1 Order of aesthetics procedures realized in each session

Session	Procedure
1°	IPL associated with sensitive mask PHA's
2°	Drug-delivery microneedling associated with PDRN
3°	IPL associated with sensitive mask PHA's
4°	Drug-delivery microneedling associated with PDRN
5°	IPL associated with sensitive mask PHA's
6°	Drug-delivery microneedling associated with PDRN
7°	IPL associated with sensitive mask PHA's

Source: Original data.

The patient was instructed to avoid triggers that promote vasodilatation such as sun exposure, hot and spicy foods, hot beverages, alcohol, perform physical exercises in hot environments or abrupt changes in temperature; patient was also instructed to avoid vasodilating drugs such as antihypertensives and drugs with angiogenic potential such as topical corticosteroids and topical tretinoin.

Results

The patient showed an 11% improvement in the total reduction of quantitative pore mapping in the digital images, being 70% before, 70% during, and 52% six months after the end of the treatment (Figure 1).

The patient showed during the treatment a 12% worsening of acne, being 4% before, 7% during and 16% after the end of treatment and patient reported using bioidentical testosterone in the post-treatment period (Figure 2).

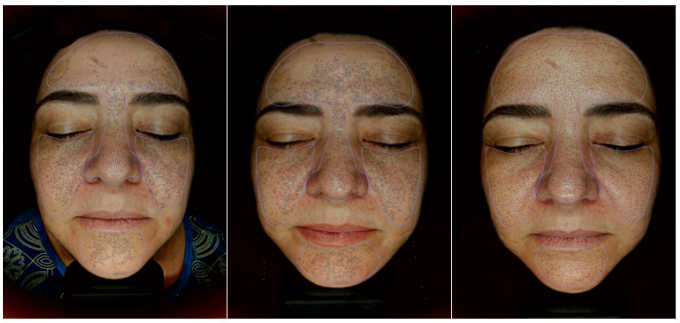

Figure 1 Quantitative mapping of pores.

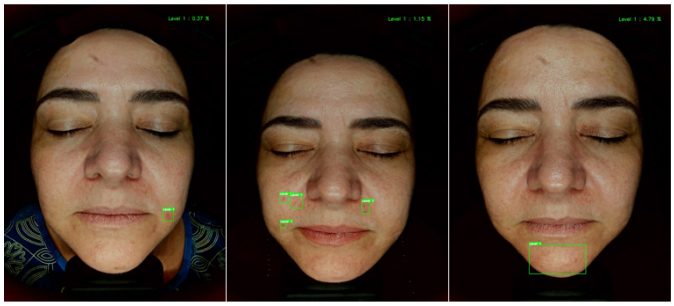

Figure 2 Quantitative mapping of acne.

The patient showed during the treatment a 13% improvement in oiliness (T zone), being of 67% before, 60% during and 54% six months after the end of treatment and a 1% improvement in oiliness (U zone), being of 46% before, 50% during and 45% six months after the end of treatment (Figures 3a-3b & 4).

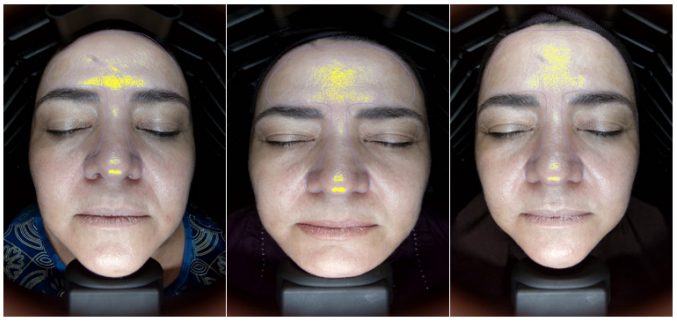

Figure 3a Topographical evolution of T-zone oiliness at levels.

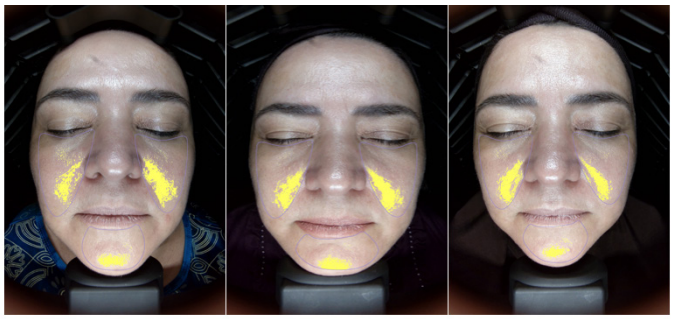

Figure 3b Topographic evolution of U-Zone oiliness at levels.

The qualitative mapping of digital thermography relating to before, during, and six months after the end of treatment, showing relation of decreasing levels of inflammation due to the decrease in local temperature.

The patient showed as 11% improvement in the total reduction of quantitative mapping of erythrosine levels 82% before, 75% during

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and 75% after six months of treatment, showing relation of decreasing levels of skin sensitivity and capillary fragility (Figure 5).

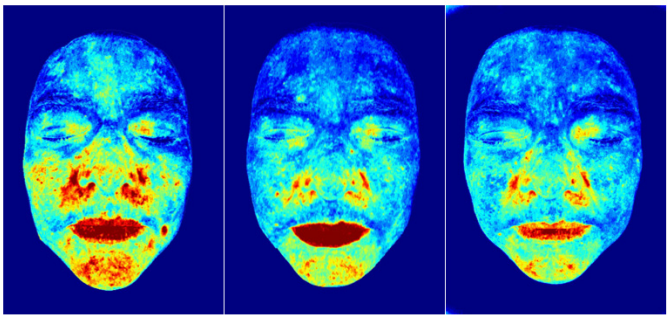

Figure 4 Qualitative mapping of digital thermography.

Figure 5 Quantitative mapping of erythrosine.

Discussion

The significance of this case report lies in creating new directions for professionals in the biomedical area to enhance clinical judgement; thus, creating better therapeutic options for the management and treatment of rosacea since there are various possibilities of treatment. The improvement of the patient's sensibility and management of skin barrier are visible not only during the treatment but also after improvement of erythrosine levels in addition skin balance oiliness and decreasing of the acne (Figure 6). It is important to highlight that these results were possible by associating multiple aesthetics procedures, home care and lifestyle changes to achieve the best possible result within four months. Patient satisfaction was high, even though not documented. This report also opens a possibility for new experiments and studies related to rosacea for evaluation of new possibilities of the use of PDRN for each aesthetic procedure.

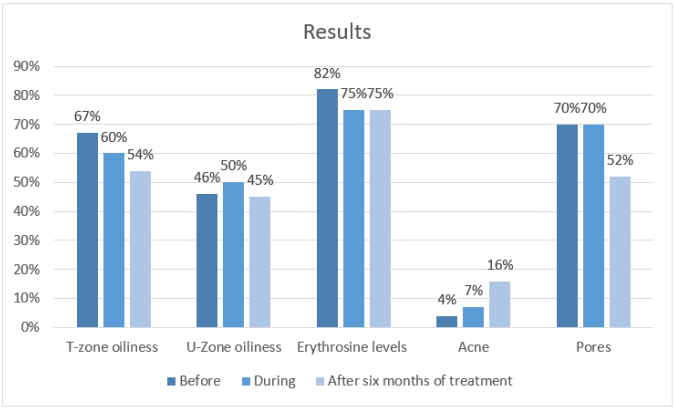

Figure 6 Comparative results of before, during and after six months of treatment.

Source: Original data.

Conclusion

This report brings results that corroborate the benefit of PDRN in the management of rosacea, since we can see that even after the end of the protocol the patient's skin kept its sensibility better, when analyzed with Dermavision IA. It is important to highlight that even with various possibilities of treatment many professionals neglect the management of rosacea for lack of knowledge. This report will also serve as a bibliographic resource and informative text on the possibilities for treatment of chronic dermatological diseases such as rosacea being performed by biomedical professionals.

Acknowledgments

None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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