Review Article

Role of Dermoscopy in Laser Therapy

Shehnaz Z. Arsiwala, Nazneen Arsiwala

Dermatocosmetic and Laser Centre, Prince Aly Khan Hospital, Mumbai, Maharashtra, India

Abstract

Lasers have revolutionized the interventional dermatology field over the last two decades. Dermatologic conditions previously untreatable are now treated with lasers and lights. A large number of laser systems with advances in technologies have expanded applications of lasers for conditions like birth marks, acne scars, wrinkles, pigmentation, etc. Newer avenues and protocols are now set to treat skin conditions with lasers. The applicability of laser for any indication is dependent on laser tissue interaction which is well documented. For a successful outcome with laser therapy, a right end point of treatment should be achieved. The laser physician often adjusts parameters for laser therapy depending on tissue response, the ultimate aim being achieving optimum outcome with minimum side effects. Gadget based skin evaluation techniques are now an integral part of dermatology and are extending to interventional dermatology too. Application of dermoscopy before, during, and after lasers in various indications has been documented and reviewed. The representative cases highlighted in article emphasize the added dimension to non-invasive diagnostic capabilities of a dermatologist by enabling subsurface microscopy and enhancing therapy outcomes, and incorporation of these into daily practice offers value addition to not only evaluation but also gauging response to therapies. Use of dermoscopy before, during, and after laser therapies is an invaluable non-invasive tool to assess the right indication, initiate appropriate priming, achieve good end point, gauge untoward side effects, achieve good results, and engage patient confidentiality. Comparison of high magnification digital images is also enabled by digital videodermoscopy. Structured studies and protocols are needed to standardize the use of dermoscopy integrated with laser procedures.

Keywords: *Dermoscopy, end point, lasers, tissue interaction*

Introduction

Lasers have revolutionized the interventional dermatology field over the last two decades. Dermatologic conditions previously untreatable are now treated with lasers and lights. A large number of laser systems with advances in technologies have expanded applications of lasers for conditions like birth marks acne, scars, wrinkles, pigmentation, etc. Newer avenues and protocols are now set to treat skin conditions with lasers. The applicability of laser for any indication is dependent on laser-tissue interaction which is well documented. For a successful outcome with laser therapy, a right end point of treatment should be achieved. The laser physician often adjusts parameters for laser therapy depending on tissue response, the ultimate aim being achieving optimum outcome with minimum side effects.

Gadget-based skin evaluation techniques are now an integral part of dermatology and are extending to interventional dermatology too.

The last decade has seen dermoscopy thriving as if offers added dimension to non-invasive diagnostic capabilities of a dermatologist by enabling subsurface microscopy. Various types of dermoscopy are available, and incorporation of these into daily practice offers value addition to not only evaluation but also gauging response to therapies.

Use of dermoscopy before, during, and after laser therapies is an invaluable non-invasive tool to assess the right indication, initiate appropriate priming, achieve good end point, gauge untoward side effects, achieve good results, and engage patient confidentiality. Comparison of high-magnification digital images is also enabled by digital videodermoscopy.

Setting algorithms for dermoscopy with integration of artificial intelligence into

How to cite this article: Arsiwala SZ, Arsiwala N. Role of dermoscopy in laser therapy. Indian Dermatol Online J 2023;14:585-93.

Received: 03-Jun-2022. **Revised:** 21-Sep-2022. **Accepted:** 22-Sep-2022. **Published:** 29-Aug-2023.

Address for correspondence:
Dr. Shehnaz Z. Arsiwala, 332 Sir J. J. Road, Honda Mansion ¼, Byculla, Mumbai - 400 008, Maharashtra, India.
E-mail: drshenaz@gmail.com

Access this article online

Website: https://journals.lww.com/idoj

DOI: 10.4103/idoj.idoj_325_22

Quick Response Code:

laser-based practice seems to be the future, and a laser physician should be well updated on the same.

Applications for Dermoscopy with Lasers

Dermoscopes that can be used as follows:[1]

- A polarized contact dermoscope without immersion,
- Sterilized contact on non-contact polarized is best if used during procedure for end point evaluation,
- A dermoscope with attached software that stores and tracks serial images,
- Digital videodermoscopy that enables the physician to click live video during procedure.

Before dermoscopic examination, the contact plate is removed and the internal lens is cleaned using 70% alcohol and allowed to dry. It is recommended to maintain 1 inch distance from the treated area to prevent contamination during the dermoscopic examination.

Dermoscopy before Lasers

Assessing the skin with subsurface illumination before laser therapy is important. Laser physicians generally depend on clinical end point or histopathology to assess laser responses; however, clinical examination may not be enough to accurately study end point, and skin biopsies cannot be done practically for every case and at every point of treatment as they scar. Dermoscopy is often possible at bedside and on multiple points to assess laser end points, thus forming a bridging gap between clinical end point and histological evaluation. Dermoscopy can be used to identify degree of melanin, hydration, untoward erythema, or pigmentation; this helps to choose an appropriate time frame for conducting lasers, especially in Fitzpatrick skin types 4–6, where pigmentary side effects are more predisposed. In addition, dermoscopy is crucial in predicting potential adverse effects after lasers.[2-5]

Dermoscopy During or Immediately after Lasers

This is an invaluable tool, as successful outcome of laser therapy depends on optimum end point achieved out of appropriate lasertissue interaction. It is difficult to evaluate perfect predictive dose after 1 to 2 sessions, but serial tracking through and in between sessions helps one to gauge response over time and correlate it with clinical improvement; in addition, dermoscopy will pick up subtle changes not seen by naked eye clinically.[6]

Dermoscopy is used to assess various skin conditions like moles and skin cancers, and its role in correlation between findings at dermoscopy examination and histopathology for cancerous skin conditions like melanoma, basal cell carcinoma, etc., has already been established.[7,8] Hence, evaluation during or immediately after sessions enables one to conduct perfect patch test before lasers and also see the end point after session and is very useful for end points in laser hair reduction, post-resurfacing, post-tattoo, vascular lesions, freckles, lentigines, birth marks, etc. Table 1 shows end points. In subsequent sessions, this also helps to adjust parameters to optimize results or prevent complications.

Dermoscopy for post-laser follow-up in between sessions is very crucial to study complete effect at multiple frames in treatment zone and identify shortcomings. See Table 2 for studies of use of dermoscopy with lasers.

Scars: Acne and Non-Acne

Dermoscopy before lasers for scars has been studied,[9] and for acne scars, it helps to identify the degree of erythema or pigmentation at base of scars as well as degree of photodamage; this enables adequate priming with appropriate agents and helps to track the right indication to start laser when priming is achieved. Also, the images recorded can be serially visualized at follow-up [Figures 1-3].

Dermoscopy for lasers before resurfacing predicts pigmentary sequelae while resurfacing with fractional ablative lasers and ensures adequate priming [Figure 2].

Pigmentary Conditions

Dermoscopy for lasers before pigmentary conditions, congenital or acquired, helps to establish melanin pigment network, areas of excess or abnormal pigment, and also photodamaged skin, and enables tracking for right priming before laser. For melasma, dermoscopy helps to identify the vascular stage and differentiate between epidermal and dermal.[1,10-12]

In melasma, the pattern of pigment deposition and epidermal, dermal, and vascular component evaluation by high-resolution dermoscopic visualization is already established. Pigmentation patterns which are seen at dermoscopy in melasma are reticuloglobular pigment, perifollicular brown black globules, telangiectasias, granular, unpatterned patchy brown-black pigmentation, and obvious capillary dilation. Advent of dermoscopy is

Table 1: Dermoscopy of end points after laser irradiation

Laser hair reduction	Perifollicular edema, erythema, hair shaft extrusion dermoscopically seen as perifollicular whitening and black dots
Tattoo	Erythema, hair bleaching, blistering of epidermis dermoscopically depicted by decrease in tattoo pigment globules, white lines corresponding to bleached hair
Fractional carbon dioxide	Dermoscopic end point white opaque dots corresponding to microthermal zones and black uniform dots corresponding to micro crust formation, uniform red dots depict inflammation in subsequent days after laser
Microneedle radiofrequency	Uniform areas of black dots corresponding to areas of micro coagulation
Freckles, lentigines, nevi	White dots corresponding to degree of frosting

Table 2: Studies for dermoscopy with lasers

Literature Evidence For Use Of Dermoscopy With Lasers	Title Of Paper	Conclusion
Shirakawa, *et al*., 2012[6]	Utility of dermoscopy before and after laser irradiation in port wine stains.	Dermoscopy immediately after irradiation allows the laser surgeon to predict the minimal effective fluence and prevent adverse effects in the skin.
Guida, *et al*., 2017[10]	Recurrence of melanocytic lesions after laser treatment: benign vs. malignant upon dermoscopy.	Nevi tracked for recurrence by use of serial dermoscopy before, during, and after laser helps identify an appropriate treatment approach
Wang *et al*., 2018[20]	Utility of dermoscopy for evaluating the therapeutic efficacy of tacrolimus ointment plus 308-nm excimer laser combination therapy in localized vitiligo patients.	Assessment by dermoscopy was superior to visual observation at 8 or 12 weeks of treatment. Marked differences in residual perifollicular pigmentation were identified between the progressive- and stable-stage patients
Kwiek *et al*., 2019[15]	Predictive value of dermoscopy for the treatment of port-wine stains with large spot 532 nm laser.	Response to pulsed dye laser therapy of port-wine stain lesions: the dotted and globule patterns have been considered as superficial patterns that are predictive of a good response to lasers
Shah *et al*., 2019[19]	Efficacy of 308-nm monochromatic excimer light in the management of halo nevi: An open-label, pilot study.	After treatment, faint pigment network was well appreciated in the white structureless area and also increased melanin amount in the pigment network accurately detected by dermoscopy
An *et al*., 2019[16]	Unilateral nevoid telangiectasia treated with pulsed dye lase: Use of dermoscopy to monitor the response.	Dotted and globule vascular patterns of the lesion on dermoscopy and superficial location of unilateral nevoid telangiectasia are good predictors for pulsed dye laser treatment.
Piccolo *et al*., 2020[12]	Lasers in Dermatology: Basic Principles. In: Quick Guide to Dermoscopy in Laser and IPL Treatments.	This quick guide demonstrates the value of dermoscopy before, during, and after the treatment of a wide variety of vascular and other skin lesions with laser and/or intense pulsed light (IPL).
Abdel Hay *et al*., 2020[13]	Dermoscopy as a useful tool for evaluating melasma and assessing the response to 1064-nm Q-switched Nd: YAG laser.	The "dermoscopic score of pigmentary and vascular elements" displayed significant change and confirmed the improvement; dermoscopy is superior to other methods for melasma evaluation
Cheng CY. 2020[1]	Intratherapeutic dermoscopy assists nevus removal by laser therapy.	Intratherapeutic dermoscopy can help to detect and map the location of residual nevus during laser therapy, facilitating accurate removal and prevent damage of nearby tissue, thereby reducing the risk of scar formation.
Bhat *et al*., 2021[9]	Dermoscopic evaluation of CO2 laser treatment in the scar of lupus vulgaris.	Dermoscopy offers a good tool for the assessment of treatment response. It may be utilized for scarring left after other granulomatous diseases.
Sohng *et al*., 2021[21]	A calculating method for nail growth using CO2 laser drilling and dermoscopy.	A ruler placed in the dermoscopy window parallel to the direction of nail growth makes it easy to detect fine changes in nail growth
Kołt-Kamińska *et al*., 2021[22]	Treatment of mild to moderate plaque psoriasis with a new 650 microsecond 1064 nm Nd: YAG laser: Clinical and dermoscopic assessment.	Microsecond Nd: YAG laser therapy is indicated in patients with dotted vessels and/or hemorrhagic spots under dermoscopy
Qu *et al*., 2021[14]	Clinical observation and dermoscopy evaluation of fractional CO_2 laser combined with topical tranexamic acid in melasma treatments.	Dermoscopy revealed the pigmentation area displayed lighter chroma, the follicle pore uniformity was completely improved, and the capillary dilation was significantly reduced.

beneficial as the vascular pattern of melasma has come into focus and can be detected by dermoscopy, especially in dark skin types where in presence of melanin in epidermis and dermis obscures clinical visibility of vascular component [Figures 4 and 5].

Abdel *et al*.[13] have demonstrated the "dermoscopic score of pigmentary and vascular elements" and displayed significant change and confirmed the improvement and concluded dermoscopy is superior to other methods for melasma evaluation.

As per authors' experience, laser application can be determined by pattern of pigmentation seen by dermoscopy, e.g., if vascular component is present, predominating a wavelength of QSNY (Q-switched Nd:YAG) 585 nm is applicable, and if epidermal or dermal pattern 1064 QSNY wavelength in low-fluence mode is applied [Figures 4 and 5].

Dermoscopy helps to track the pigment improvement at onset and following subsequent sessions of low-fluence laser toning. After comprehensive treatments, the pigmentation area displayed lighter chroma, the follicle pore uniformity was completely improved, and the capillary dilation was significantly reduced in a study by Qu *et al*.[14]

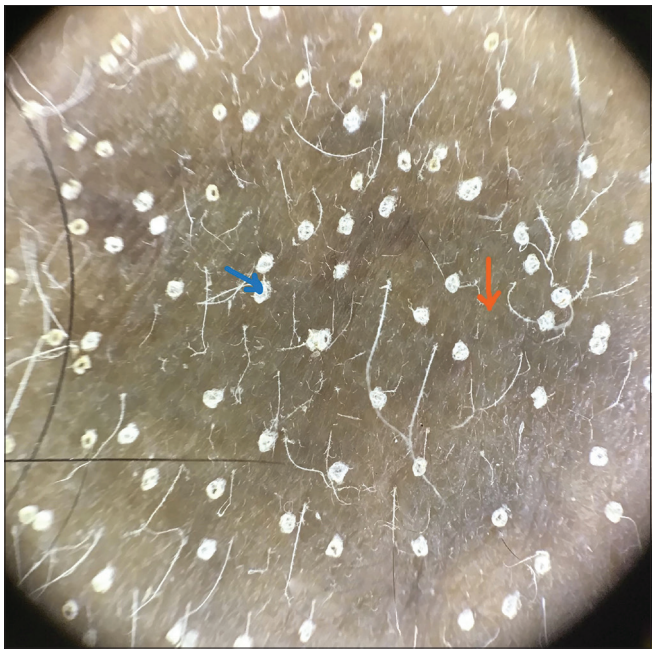

Figure 1: Residual tattoo seen as bluish homogenous hyperpigmentation (orange arrow) immediately after treatment with Q-switched Nd:YAG seen by bleached hair and fractional carbon dioxide laser for fast pigment elimination seen as opaque white dots (blue arrow) equally spaced after fractional photothermolysis. (Fotofinder handyscope, non-polarised,10x)

As per authors' experience, in cases of melasma with steroid abuse or suspected ochronosis, dermoscopy is handy to evaluate rebound pigmentation after steroid withdrawal and subsequent response for both melasma pigmentation and rebound post-inflammatory hyperpigmentation (PIH) to QSNY laser toning [Figure 5].

In suspected ochronosis, dermoscopic findings can prevent need for biopsy from facial site if patient is unwilling for the same.

Dermoscopy-guided skin biopsy is of value addition to choose site for biopsy.

Lichen Planus Pigmentosus

The dermal melanosis in lichen planus pigmentosus (LPP) is amenable to QSNY laser to eliminate the dermal pigmentation after the active disease has settled. The dermoscopic evaluation during treatment process helps to identify decreased vascularity and stability in disease progress, and choose an appropriate time to initiate QSNY lasers, and during and after laser sessions, it helps to assess satisfactory response to therapy [Figure 6].

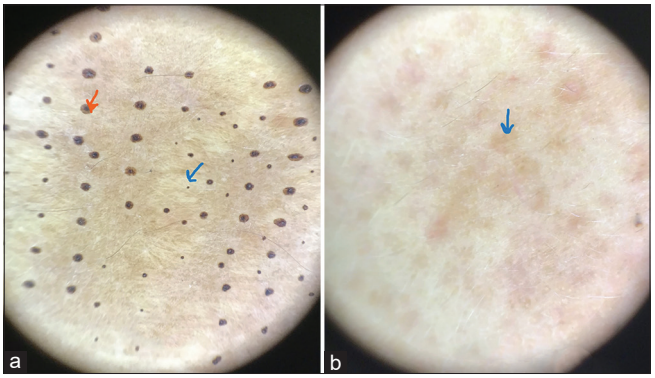

Figure 2: (a) Acne scars after MNRF on day 5: microcrusts as black dots (red arrow) uniformly spaced correlating to coagulated areas, whitish linear area corresponds to atrophic acne scars (blue arrow). (b) Post-treatment after 2 weeks of MNRF: post-inflammatory erythema and pigmentation seen as uniform reddish-brown globules (blue arrow) indicate high energy and degree of heating, improvement in underlying scar and texture as well as pigment dilution seen. (Fotofinder handyscope, non-polarised,10x)

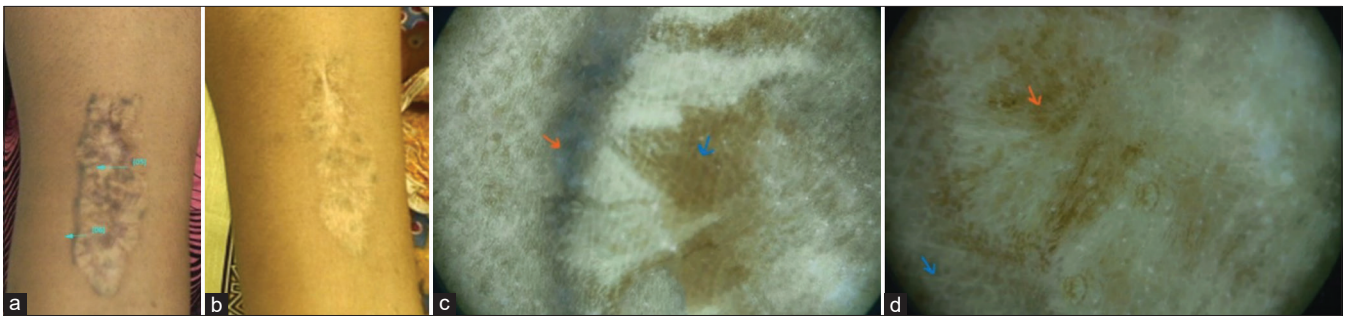

Figure 3: (a) Tattoo on forearm scarred with hypopigmentation and atrophy with residual tattoo after trichloroacetic acid application. (b) Clinical image after single session of Q-switched Nd:YAG (QSNY) combined with fractional carbon dioxide laser showing tattoo elimination with residual PIH. (c) Dermoscopic image of tattoo with hyperpigmented scar before treatment shows sharp linear globular bluish pigment band (blue arrow) corresponding to tattoo ink with brown pigment in reticular triangular pattern (orange arrow) corresponding to PIH with residual ghost shadow. (d) Dermoscopic image after single session of QSNY combined with fractional carbon dioxide laser showing clearance of bluish pigment band of tattoo ink (blue arrow) and decrease in brown pigment in reticular triangular pattern (orange arrow) compared to Figure 3c. (Fotofinder handyscope, non-polarised,10x)

It also helps to plan treatment options and ensure completion and adherence to therapies, and further studies with histopathological correlations are needed to correlate clinical response.

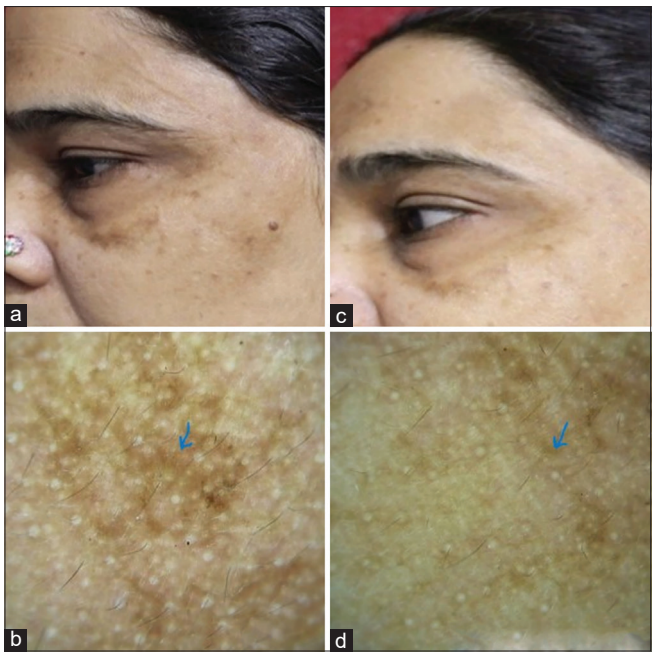

Figure 4: (a) Erythemato-telangiectatic melasma pattern. (b) Dermoscopic image before laser toning shows pigment globules in reticuloglobular pattern (blue arrow) with enhanced vascularity. (c) Clinical improvement of melasma after four sessions of laser toning. (d) Dermoscopic improvement at four sessions of laser toning, showing decrease in pigment globules (blue arrow), note marked reduction in vascular component. (Fotofinder handyscope, non-polarised,10x)

Tattoo

Dermoscopy before tattoo procedures helps to assess the degree and density of tattoo pigmentation and is very handy to document end point, final outcome, and tattoo dilution and ghost shadow subsequent to lasers.

See Figures 7 and 8 which highlight tattoo in between sessions tracked by dermoscopy, and tattoo pigment dilution and ghost shadow are seen.

Vascular Lesions

Corresponding changes on dermoscopy after laser treatment for vascular conditions correlate with clinical outcome. Multiple papers have discussed the predictive inference by dermoscopy for choosing cases which will respond better. Before and after test irradiation, patients underwent dermoscopy.

Morphology and patterns of vascularity, their depth and degree, can be determined with a better accuracy and also monitored for optimum end point and post-therapy to enable a predictable response and evaluation of the laser treatments. The dotted and globule patterns have been considered as superficial patterns that are predictive of a good response to lasers, and reticular vascular pattern has been regarded as a marker of a poor response to lasers.[6,15,16]

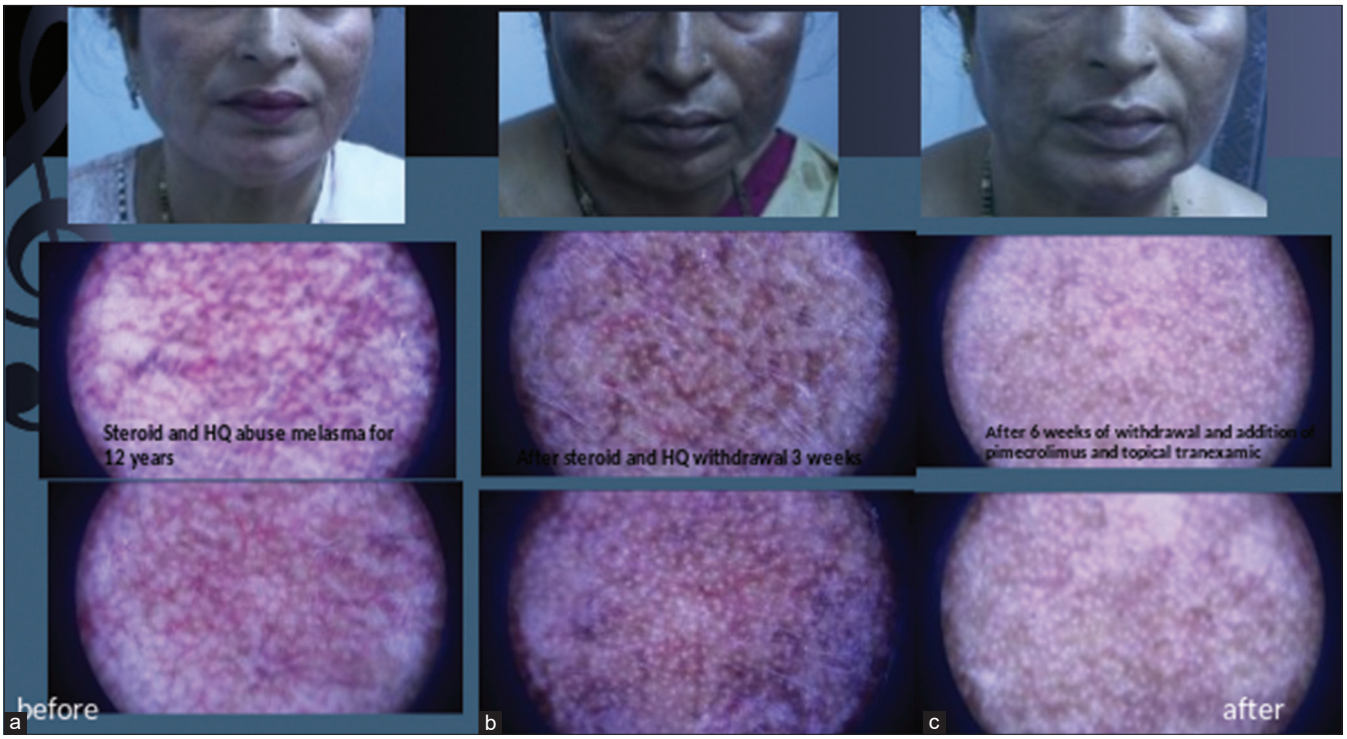

Figure 5: (a) Steroid abuse in melasma seen on dermoscopy as increased vascularity, reticular globular pigmentation, intermediate frame shows, (b) rebound pigmentation after steroid withdrawal and accentuation of melasma, (c) last frame shows improvement after fluence laser toning. (Fotofinder handyscope, non-polarised,10x)

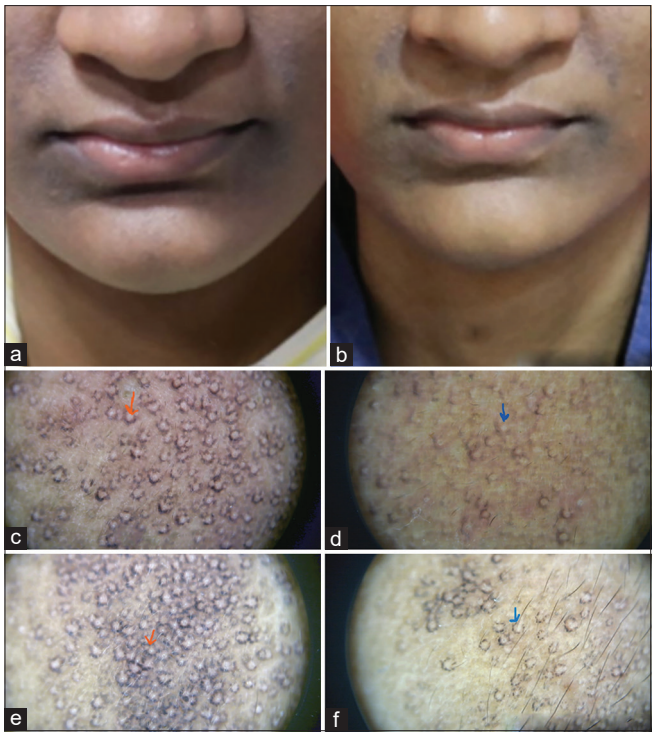

Figure 6: (a) Clinical image of lichen planus pigmentosus (LPP) before treatment. (b) Clinical image of LPP after treatment with QS: Nd YAG laser. (c) Dermoscopic image of LPP right cheek stable disease shows perifollicular and perieccrine bluish pigment globules (orange arrow) with follicular sparing. (d) Dermoscopic clearance after single laser session of 1064 QS laser spot size 6 mm, 2.4 mj, evaluated at 1 year after one session, shows marked decrease in pigment globules (blue arrow). (e) Dermoscopic image of left cheek LPP shows perifollicular and perieccrine bluish pigment globules (orange arrow) with follicular sparing. (f) Dermoscopic image of improvement left cheek after single session of 1064 QS laser spot size 6 mm, 2.4 mj, evaluated at 1 year after one session. Dermoscopy shows marked decrease in pigment globules (blue arrow). (Fotofinder handyscope, non-polarised,10x)

Laser therapies work best on superficial vessels and less as vessels get deeper, as seen by histopathological evaluation in studies.[3,4] Laser outcome is also influenced by the diameter of the vessels; smaller vessel diameter has lesser response compared to large caliber vessels which are often deeper.[17,18] Dermoscopy reflects this as color of lesions corresponding to vessels, i.e., pink lesions have small deep vessels, purple lesions have larger deep vessels, and red lesions have superficial vessels.[17]

The minimal effective fluence can be predicted by observing dermoscopic changes immediately after irradiation. We think that examining the dermoscopic findings immediately after irradiation allows the laser surgeon to predict the minimal effective fluence and prevent adverse effects in the skin.

Laser Hair Removal

Using device-based assessment with trichoscopy or even video dermoscopy helps laser hair reduction on multiple fronts. A trichoscale measures hair diameter and density as well as number of terminal vs vellus hairs which is a key factor for appropriate patient selection. As skin type and tan, as visualized by pigment network, is visible, it helps to choose ideal patient and also varied parameters.

For Fitzpatrick skin types 4–6, since potential fear of laser uptake by melanin in epidermis may end with a pigmentary adverse effect by burns on the skin, an immediate post-laser shot test patch dermoscopy gives preview of appropriate end point [Figure 9].

In between laser hair reduction sessions or at the end of sessions, dermoscopy of the lasered area indicates

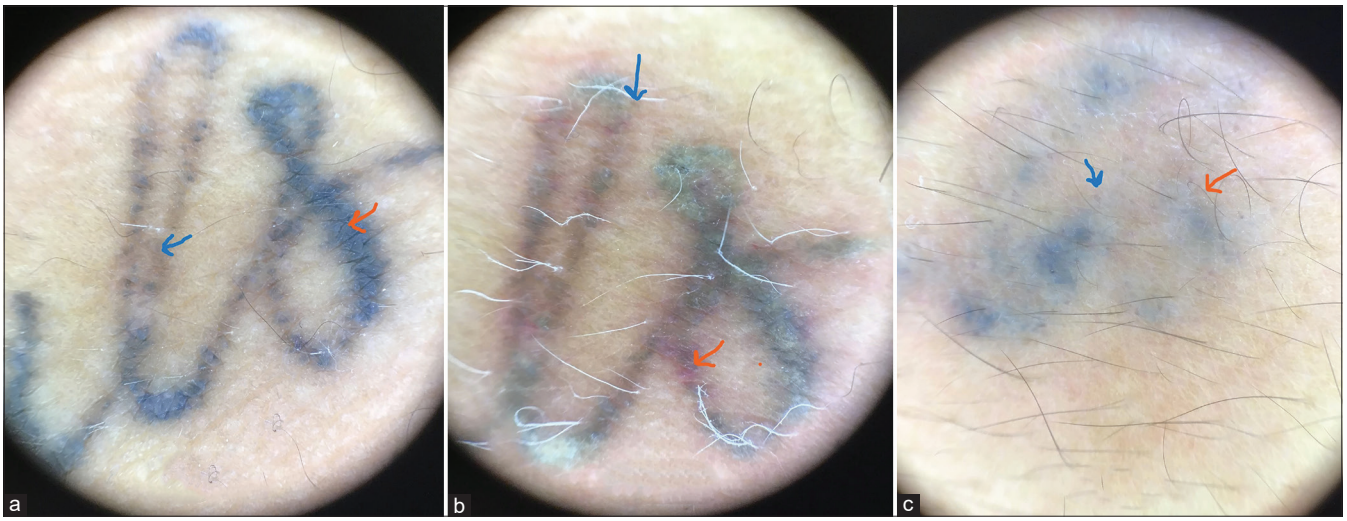

Figure 7: (a) Tattoo before QSNY laser, dermoscopy shows linear conglomerate of bluish pigment globules (orange arrow) in heterogenous pattern with few regression areas (blue arrow) corresponding to tattoo design. (b) Tattoo immediately after QSNY laser, dermoscopy shows bleaching of hair, erythema, and purpura over lasered area seen as solid white linear lines (bleached hair-blue arrow), red areas (purpura/erythema-orange arrow), and areas of blanching (c) Tattoo post 8 weeks of one session seen as tattoo pigment reduction, fading of tattoo shape with residual tattoo pigmentation after 1064 QSNY, dermoscopy highlights residual pigment globules with loss of sharp border (blue arrow). Fotofinder non poralized handyscope used at 10x magnification

decrease in hair density, reduction of hair diameter from terminal to vellus, identifies paradoxical hypertrichosis, and also ensures patient adherence [Figure 9a-d].

Dermoscopy before laser hair reduction helps to assess the zone of treatment per cm2 and also gauge hair diameter on trichoscale. Hair less than 30 micrometers is not amenable to laser hair reduction due to less chromophore, and digital trichoscale analysis helps a physician to choose appropriate indication pertaining to hair diameter as well as establish plateau phase during sessions. Also, some hairs which turn white are not responsive to laser hair reduction and can be visualized by dermoscopy if missed by naked eye examination.

Lasers for Vitiligo

Patterns for dermoscopy in progressive and stable vitiligo are already established. The 308nm excimer system is a very time-tested technology for UVB-mediated repimentation. Sessions are often multiple, and repimentation can be well evaluated by using handheld dermoscopy or video digital dermoscopy to assess response to therapies [Figure 10].

Leukotrichia on vitiligo can be detected and tracked by dermoscopy, and halo nevus has already been reported by dermoscopic evaluation by Shah *et al*.[19,20]

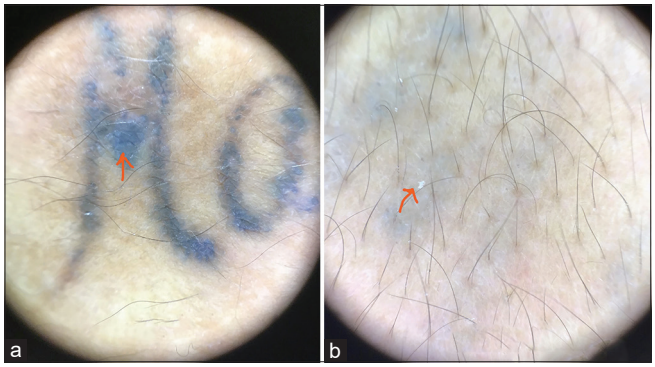

Figure 8: (a) Tattoo before Q-switched Nd:YAG (QSNY) laser. Dermoscopy shows linear conglomerate of bluish pigment globules (orange arrow) in heterogenous pattern corresponding to tattoo design. (b) Tattoo clearance with ghost shadow after QSNY laser. Dermoscopy highlights residual pigment globules with loss of sharp border (orange arrow). (Fotofinder handyscope, non-polarised,10x)

Nail Disorders, Nail Growth and Onychomycosis

Nail visualization is best done by dermoscopy, not only diagnostic accuracy but also simple and easy application of nail growth rate measurement and response to therapies can be assessed by dermoscopic comparisons.[21] Use of the CO2 laser drilling has been proposed to create laser holes on the nail plate and track and calculate the growth rate of nail plate dermoscopically unparalleled by any other previous temporary methods for the same. The holes naturally resolve without treatment and are unlikely to have any sequelae.

See Figure 11 documented by author for onychomycosis resolution post-QSNY laser.

Onychomycosis is often amenable to treatment by QSNY lasers, and trans nail plate deposition by CO_2 laser holes drilled in nail plate are well established by Sohng *et al*.[21] Use of simple dermoscopy or nail scope is handy to evaluate outcomes.

Psoriasis

Psoriatic lesions show vessel prominence, hemorrhage, and scaling. Focal psoriatic plaques resolved with excimer lamp can be tracked by dermoscopy in between sessions. A study

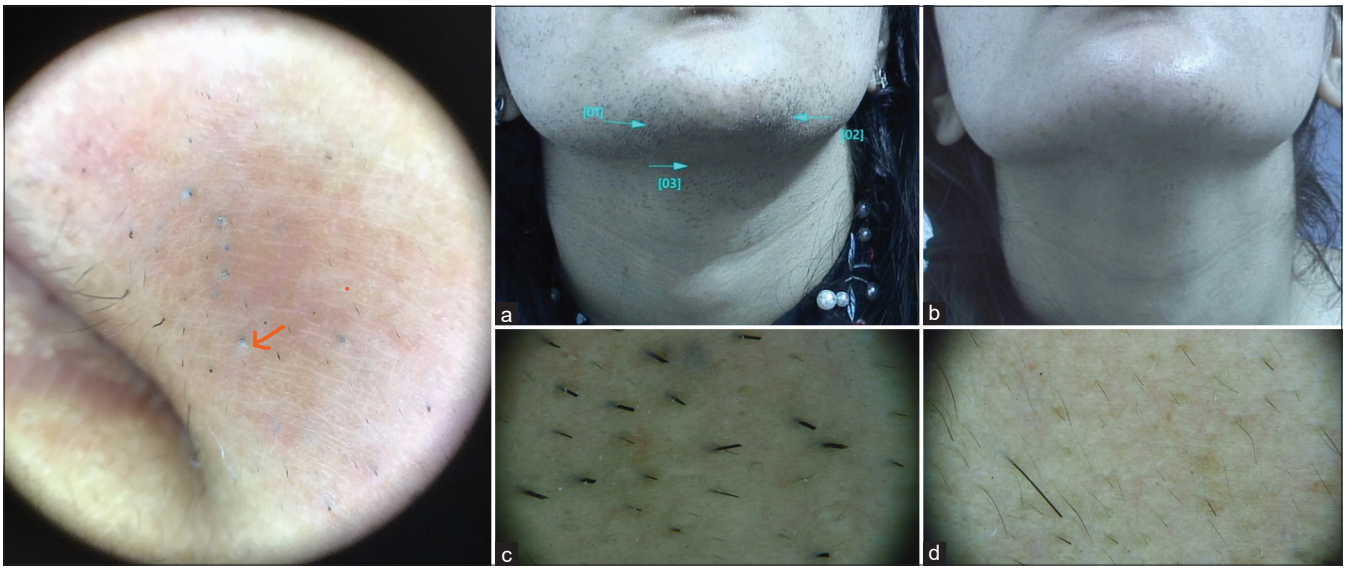

Figure 9: Dermoscopy immediately after laser hair reduction shows perifollicular edema, hair ejection seen as perifollicular whitening and black dots (orange arrow) corresponding to charred hair stubs. (a) Clinical image of chin hirsutism before laser hair reduction. (b) Clinical image after six sessions of laser hair reduction. (c) Corresponding dermoscopic image before and (d) after six sessions of laser showing hair number reduction and terminal to vellus conversion and hair reduction. (Fotofinder handyscope, non-polarised,10x)

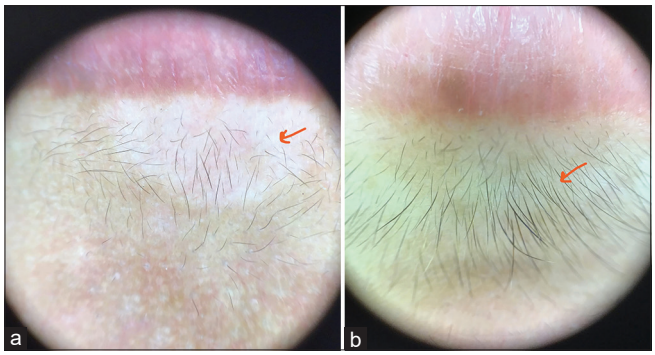

Figure 10: (a) Vitiligo lower lip before 308nm excimer lamp treatment. Dermoscopy shows homogenous areas of white areas seen as a glow (orange arrow) with sparing of hair. (b) Vitiligo lower lip after 30 sessions of 308nm excimer system with topical mometasone. Dermoscopy shows partial repigmented network (orange arrow) and hypertrichosis compared to Figure 10a. (Fotofinder handyscope, non-polarised,10x)

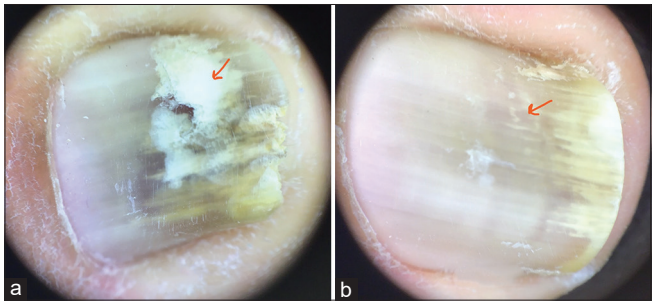

Figure 11: (a) Onychomycosis of great toe, dermoscopic image before laser shows opalescent white areas representing fungal colony (orange arrow). (b) Substantial clearance of distal onychomycosis of great toe by quasi-pulse Q-switched Nd:YAG laser in 3 sessions. Onychoscopy shows clearance of white opalescent areas and presence of whitish-yellowish areas (orange arrow) that are progressing towards distal nail unit

of QS laser in psoriasis showed that dotted vessels, linear vessels, or hemorrhagic spots under dermoscopy at baseline reported some improvement after laser therapy.[22] Three out of six patients with globular vessels were unresponsive to Nd: YAG laser. This can be used as a predictive guide for patient selection for laser therapy.

Dermoscopy may be of help in initial identification of psoriatic plaques that may respond to microsecond Nd:YAG laser treatment.

See Table 3 regarding tips for dermoscopy with lasers.

Conclusion

Dermoscopy is an integral part of clinical dermatology and should be utilized and incorporated into laser therapeutics which enables enhanced and precise selection and predictable optimization criteria while conducting various laser procedures. While dermoscopic criteria in clinical dermatology are mature, the concept of dermoscopy in lasers is relatively new and thus more studies, algorithms, and standardizations for the same are needed which will add a new easy non-invasive digital dimension to the field.

Table 3: Tips for dermoscopy with lasers

Sound knowledge of dermoscopic patterns is essential
Keen clinical observation for correlation is required
Proper documentation of dermoscopic images with markings helps necessary tracking
Utilising dermoscopy for lasers improves patient adherence
Dermoscopy is an invaluable non-invasive tool for gauging appropriate clinical end point, predicting response and optimizing results.

Acknowledgements

We are thankful to Dr Balchandra Ankad for guiding us on dermoscopic descriptions of the images.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Cheng CY. Intratherapeutic dermoscopy assists nevus removal by laser therapy. Indian J Dermatol Venereol Leprol 2020;86:604-5.
2. Schneider SL, Kohli I, Hamzavi IH, Council ML, Rossi AM, Ozog DM. Emerging imaging technologies in dermatology: Part 2: Applications and limitations. J Am Acad Derm 2019;80:1114-20.
3. Liu WC, Tey HL, Lee JS, Goh BK. Exogenous ochronosis in a Chinese patient: Use of dermoscopy aids early diagnosis and selection of biopsy site. Singapore Med J 2014;55:e1-3.
4. FotoFinder Systems, Inc. Available from: http://www.fotofinder-systems.com/company/about-us/. [Last accessed on 2017 Dec 17].
5. Hibler BP, Qi Q, Rossi AM. Current state of imaging in dermatology. Semin Cutan Med Surg 2016;35:2-8.
6. Shirakawa M, Ozawa T, Wakami S, Ishii M, Harada T. Utility of dermoscopy before and after laser irradiation in port wine stains. Ann Dermatol 2012;24:7-10.
7. Errichetti E. Dermoscopy in monitoring and predicting therapeutic response in general dermatology (non-tumoral dermatoses): An up-to-date overview. Dermatol Ther 2020;10:1199-214.
8. Sardana K, Chakravarty P, Goel K. Optimal management of common acquired melanocytic nevi (moles): current perspectives. Clin Cosmet Investig Dermatol 2014;7:89-103.
9. Bhat YJ, Nabi N, Daing A. Dermoscopic evaluation of CO_2 laser treatment in the scar of lupus vulgaris. J Cutan Aesthet Surg 2021;14:458-61.
10. Guida S, Bencini PL, Manganoni AM, Gianotti R, Lospalluti L, Greco P, *et al*. Recurrence of melanocytic lesions after laser treatment: Benign vs. malignant upon dermoscopy. J Eur Acad Dermatol Venereol 2017;31:e526-8.
11. Margolis RJ, Dover JS, Polla LL, Watanabe S, Shea CR, Hruza GJ, *et al*. Visible action spectrum for melanin-specific selective photo thermolysis. Lasers Surg Med 1989;9:389-97.
12. Piccolo D, Kostaki D, Crisman G. Lasers in dermatology: Basic principles. Quick Guide to Dermoscopy in Laser and IPL Treatments. Cham: Springer; 2020. p. 319-416.
13. Abdel Hay R, Mohammed FN, Sayed KS, Abd El Fattah NA, Ibrahim S. Dermoscopy as a useful tool for evaluating melasma

and assessing the response to 1064-nm Q-switched Nd: YAG laser. Dermatol Ther 2020;33:e13629.
14. Qu Y, Wang F, Liu J, Xia X. Clinical observation and dermoscopy evaluation of fractional CO_2 laser combined with topical tranexamic acid in melasma treatments. J Cosmet Dermatol 2021;20:1110-6.
15. Kwiek B, Rozalski M, Sieczych J, Paluch Ł, Kowalewski C, Ambroziak M. Predictive value of dermoscopy for the treatment of port-wine stains with large spot 532 nm laser. Lasers Surg Med 2019;3:1-15.
16. An XJ, Yang J, Gao YY, Li Y, Tao J. Unilateral nevoid telangiectasia treated with pulsed dye lase: Use of dermoscopy to monitor the response. Chin Med J 2019;132:2125-6.
17. Fiskerstrand EJ, Svaasand LO, Kopstad G, Dalaker M, Norvang LT, Volden G. Laser treatment of port wine stains: therapeutic outcome in relation to morphological parameters. Br J Dermatol 1996;134:1039-43.
18. Onizuka K, Tsuneda K, Shibata Y, Ito M, Sekine I. Efficacy of flashlamp-pumped pulsed dye laser therapy for port wine stains: Clinical assessment and histopathological characteristics. Br J Plast Surg 1995;48:271-9.
19. Shah SD, Shah A, Ankad B, Mutalik S. Efficacy of 308-nm monochromatic excimer light in the management of halo nevi: An open-label, pilot study. J Cutan Aesthet Surg 2019;12:17-24.
20. Wang LM, Lu WJ, Yuan JT, Zeng BB, Li D, Zhang F, *et al*. Utility of dermoscopy for evaluating the therapeutic efficacy of tacrolimus ointment plus 308-nm excimer laser combination therapy in localized vitiligo patients. Exp Ther Med 2018;15:3981-8.
21. Sohng C, Kim JY. A calculating method for nail growth using CO_2 laser drilling and dermoscopy. Ann dermatol 2021;33:472-3.
22. Kołt-Kamińska M, Żychowska M, Reich A. Treatment of mild-to-moderate plaque psoriasis with a new 650-microsecond 1064-nm Nd: YAG laser: Clinical and dermoscopic assessment. Dermatol Ther (Heidelb) 2021;11:449-64.