Journal of Pakistan Association of Dermatologists.2023;**33(2)**:706-710.

Case Report

Combination of panthenol, madecassoside and niacinamide in multi-lamellar emulsion as postprocedural laser treatment

Adhika Ayu Lestari, Kara Adistri, Teguh Hopkop, Irma Bernadette S. Sitohang

Department of Dermatology and Venereology, Faculty of Medicine, Universitas Indonesia, Dr. Cipto Mangunkusumo General National Hospital, Central Jakarta, Jakarta, Indonesia.

Abstract Laser resurfacing procedure in dermatology involves creating superficial wound. Erythema, edema, and scaling are common and temporary side effects. We report three patients which were given topical combination cream containing panthenol, madecassoside, and niacinamide in multi-lamellar emulsion (MLE) following laser skin resurfacing procedure. The combination cream was given to two patients receiving Q-switched Nd:YAG (RevLite®, Cynosure®, Massachusetts, USA) laser treatment and one patient receiving fractional CO_2 (Bioxel®, AMI Inc®, Seoul, South Korea) laser treatment. Erythema and edema diminish gradually in 7 days after treatment. This may be due to the anti-inflammatory effects of panthenol, madecassoside, and niacinamide. MLE also may contribute to repairing the damaged skin barrier after procedure, thus supporting the superficial wound healing. Topical combination consisting of panthenol, madecassoside, and niacinamide in MLE may ameliorate various side effects following laser procedures in dermatology. However, further research with better methodology and greater sample size is needed

Key words
Panthenol; Madecassoside; Niacinamide; Postprocedure; Laser treatment.

Introduction

The increasing use of lasers in dermatology has expanded the armamentarium of therapeutic options for various dermatologic conditions. On the other hand, it also comes with a potential for complications. Laser skin resurfacing creates superficial wounds in order to stimulate the repair mechanism. At the same time, the thermal effect can cause side effects ranging from expected, minor, moderate, to severe side effects. Immediate side effects, although usually minor and transient, may contribute to prolonged social downtime and subsequent complication if not managed properly. Common complications of laser skin resurfacing are prolonged erythema, infection, acne, milia, hyperpigmentation or hypopigmentation, and worsening of existing melasma.[1] Postinflammatory hyperpigmentation (PIH) is a side effect most commonly seen among patient with darker skin types. Incidence of PIH following ablative fractional CO_2 ($FrCO_2$) laser in Thai patients with skin phototype IV were reported to be more than 90%.[2]

Currently, there are no universal standardized guidelines for postprocedural care.[1] Various agents and therapeutic modalities are currently available to support skin recovery and minimize the aforementioned side effects. In this serial case, we report 3 patients who received a combination of panthenol, madecassoside, niacinamide in MLE after laser procedure.

Address for correspondence
Dr. Irma Bernadette S. Sitohang
Department of Dermatology and Venereology
Faculty of Medicine, Universitas Indonesia,
Dr. Cipto Mangunkusumo General National Hospital Jalan Pangeran Diponegoro No. 71
Central Jakarta, Jakarta 10430, Indonesia.
Ph: (+62 21) 319 35383
Email: irma_bernadette@yahoo.com

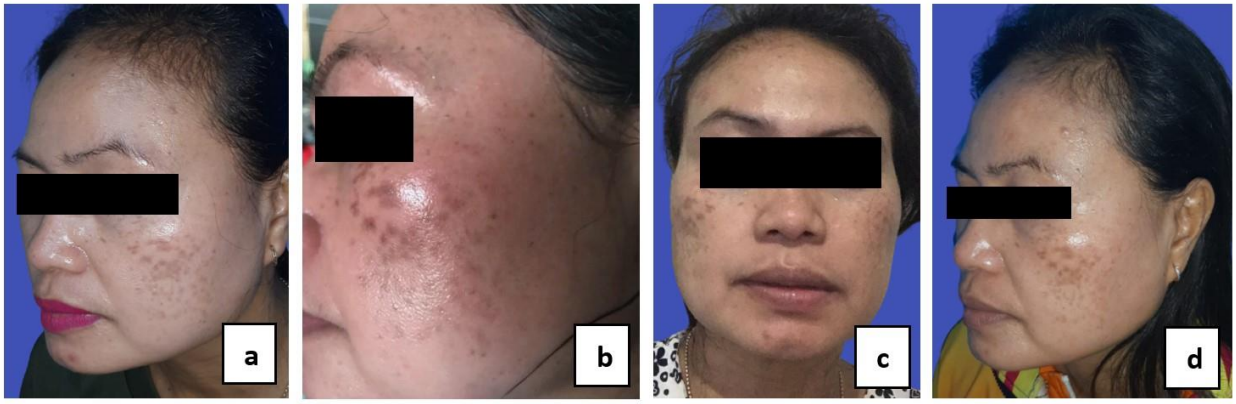

Figure 1 Patient with Hori's nevus (a) before procedure, (b) immediately after procedure, (c) 3 days, and (d) 7 days after treatment.

Case Report

Case 1 A 45-year-old female presented with progressive brown-grayish hyperpigmented spots on both cheeks since 10 years ago. She works as an outdoor gym instructor. The patient has stopped using oral contraception since 5 years ago. She has been applying 0.01% tretinoin and a combination of kojic acid and azelaic acid for 8 months as prescribed. Multiple brown-grayish, well-defined macules were observed on both cheeks. Dermoscopy examination showed irregular, scattered brown-grey dots. Clinical findings were consistent with Hori's Nevus. We performed Q-switched Nd:YAG 1064 nm (RevLite®, Cynosure®, Massachusetts, USA) with frequency settings of 2 Hz, fluence 10 J/cm^2, and spot size 3 mm. Postprocedure instructions were to avoid sun exposure, broad spectrum SPF 45 sunscreen lotion, and normal saline wet dressing twice a day 15 minutes for 3 days. Topical combination of panthenol, madecassoside, and niacinamide in MLE was given twice daily for 1 week. She was also instructed to stop tretinoin and also combination of kojic acid and azelaic acid for 3 days after the procedure. Erythema and edema had started to fade on the third day and completely subsided on the seventh day **(Figure 1)**. The patient was instructed to continue her previous regimen.

Case 2 A 48-year-old female with brownish patches on both cheeks since 1.5 years ago. The patient works as a nurse and her activities are mostly indoor. She has been applying 4% hydroquinone and 0.05% tretinoin for 2 months, since then her brownish patches have slightly faded. On left and right cheeks we found multiple brown-hyperpigmented, well-defined macules and patches. Wood's lamp examination showed patchy enhancement of light. Dermoscopy examination revealed irregular brown pseudoreticular network and telangiectasia. We assessed her as mixed type melasma and performed Q-switched Nd:YAG targeting both the dermal and epidermal lesion (1064 nm, 10 Hz, fluence 2.3 J/cm^2, spot size 6 and 8 mm and 532 nm, 10 Hz, fluence 0.7 J/cm^2, spot size 4 mm). The same postprocedure instructions were given, that is to avoid sun exposure, broad spectrum SPF 45 sunscreen lotion, and normal saline wet dressing twice a day 15 minutes for 3 days. The same topical combination as the previous patient was given twice daily for 1 week. She was also instructed to stop tretinoin and hydroquinone for 3 days after the laser procedure. There was minimal erythema observed after the procedure, but no edema. Erythema has completely subsided on the third and seventh day **(Figure 2)**. Patient was also instructed to continue her previous regimen.

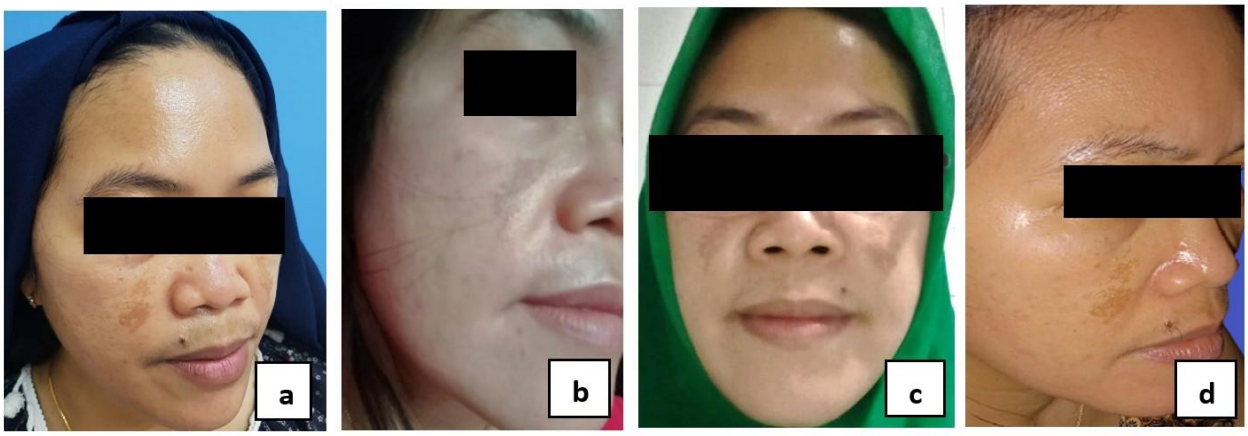

Figure 2 Patient presenting with mixed type melasma (a) before procedure, b) immediately after procedure, (c) 3 days, and (d) 7 days after treatment.

Case 3 A 36-year-old female with acne scars on both cheeks since 3 years ago. Patient works as a trade analyst, her activities are mostly indoor, but does outdoor field work occasionally. She has been applying 4% hydroquinone and 0.1% tretinoin for 2 months, but the scars are still visible. Physical examination showed multiple atrophic scars which are icepick and boxcar scars on her forehead and cheeks. We performed $FrCO_2$ 10600 nm (Bioxel®, AMI Inc®, Seoul, South Korea) with the frequency settings 10 Hz, fluence 36 mJ/dot, pulse 1,6 ms, density 12, and depth level 2/5. Patient was also instructed to avoid sun exposure, use broad spectrum SPF 45 sunscreen lotion, and normal saline wet dressing twice a day 15 minutes for 3 days. Topical combination of panthenol, madecassoside, niacinamide in MLE was given twice daily for 1 week. She was also instructed to stop tretinoin and hydroquinone for 3 days after the laser procedure. Erythema and edema persisted until the following day. On the seventh day, erythema had reduced, but no edema or erosion was found. There were minimal scaling on few spots and no worsening of hyperpigmentation **(Figure 3)**. Patient was instructed to continue her previous regimen.

Discussion

Three patients showed different results from the use of combination cream in MLE. In the first two cases, erythema had completely reduced 3 days after application of the combination cream.

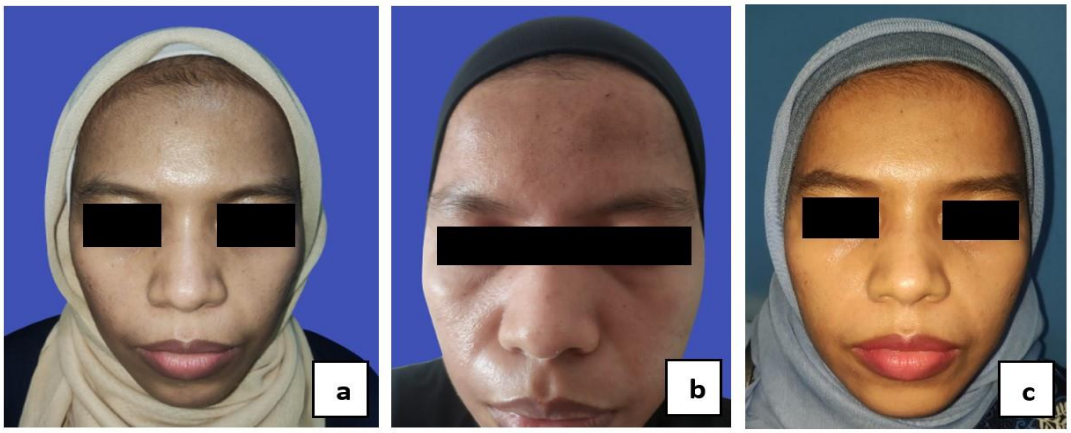

Figure 3 Patient with acne scars (a) before procedure, (b) immediately after procedure, and (c) 7 days after treatment.

Meanwhile, the third case also shows reduction of erythema on the seventh day, but still visible along with some crust formation. This might be due to the $FrCO_2$ laser which is more ablative. All patients applied the combination cream for a total of 1 week. There was no pruritus, stinging, or burning sensation reported upon application. Majority of laser procedure in dermatology produce mild transient side effect. Fortunately, long term complications are uncommon. Erythema and edema almost always present because of heat scattering and usually fades within 24 hours.[3,4] Prolonged erythema is associated with higher risk for PIH, especially in darker skin type. Hyperpigmentation usually occurs in patients with Fitzpatrick skin type III or higher.[1,5] Crusting and oozing may ensue as a result of a more ablative procedure and might last about 3-5 days in fractional mode.[3]

Precautions are often taken by ensuring good pre and postprocedure care, thus preventing infection and PIH. Our patient' has Fitzpatrick skin type III-IV, thus they are more prone to have PIH. Currently, there are no standardized guidelines regarding prophylaxis of PIH. Topical low potency corticosteroid is mainly used after treatment to reduce the risk of PIH. Combination with topical antibiotics, tretinoin, and hydroquinone are often used but still shows various results.[6]

The topical therapy given in this case is a combination of active ingredients with anti-inflammatory properties. Panthenol, in the form of D-panthenol, is rapidly absorbed and converted to pantothenic acid. Pantothenic acid is a coenzyme A constituent essential to enhance epidermal regeneration and wound healing in minor skin trauma. Furthermore, D-panthenol can act as a moisturizer and skin barrier enhancer.[7,8] Madecassoside is a bioactive compound in *Centella asiatica* known to decrease dermal inflammation.[9] Luengarun *et al*. reported a double blind, randomized clinical trial, split-face study in 20 patients with skin phototype III-V using combination of panthenol, madecassoside, and copper zinc manganese for 1 week after ablative $FrCO_2$. The trial group report that the combination effectively reduce post-laser swelling, redness, crusting and scaling compared to topical 0,02% triamcinolone acetonide. There were no significant difference of PIH between the trial and control group. No serious side effect reported.[10] This result is consistent with our patients which shows reduced postlaser erythema and edema after 7 days of using the topical combination.

Meanwhile, there has not been any study about the use of topical niacinamide as in combination or as monotherapy following dermatology laser procedure. Niacinamide itself is known for its anti-inflammatory, skin lightening, along with barrier and photoprotective effect.[11] MLE contains physiologic lipid which support skin barrier repair. Sul *et al*. reported combination of MLE with topical desonide showed good drug delivery while preventing barrier skin impairment. There has not been any study involving the use of MLE as post-laser care.[12] Despite various attempt of researches, standardized postprocedural care treatment remain elusive. Nevertheless, preventive measures such as protecting skin from sunlight, education about possible side effects, and avoiding skin-picking are essential to prevent complication.

Conclusion

Combination cream of panthenol, madecassoside, and niacinamide in a multilamellar emulsion has anti-inflammatory effect, thus can be advantageous following dermatology laser skin resurfacing procedure. Further research involving better methodology such as split-face comparative trial, greater

sample size, and longer period of follow up are needed to yield more reliable results.

Funding Sources This serial case has been presented and awarded as the first-place winner at the Dermavest Scientific Fair 2021 oral case competition held in Jakarta, Indonesia.

References

1. Li D, Lin SB, Cheng B. Complications and posttreatment care following invasive laser skin resurfacing: a review. *J Cosmet Laser Ther*. 2018;**20(3)**:168-78.
2. Eimpunth S, Wanitphadeedecha R, Manuskiatti W. A focused review on acne-induced and aesthetic procedure-related postinflammatory hyperpigmentation in Asians. *J Eur Acad Dermatol Venereol*. 2013;**27 Suppl 1**:7-18.
3. Al-niami F. Laser and energy-based devices' complications in dermatology. *J Cosmet Laser Ther*. 2016;**18(1)**:25-30.
4. Simbolon Sitohang IB, Sirait SAP, Safira FD. Fractional carbon dioxide laser for treating hypertrophic scars: a systematic review of randomised trials. *Australas J Dermatol*. 2022;**63(1)**:27-35.
5. McIlwee B, Aster TS. Laser skin resurfacing: cosmetic and medical applications. In: Kang S, Amagai M, Bruckner AL, Enk AH, Margolis DJ, McMichael AJ, editor. Fitzpatrick's dermatology. 9 ed. New York: McGraw-Hill; 2019. p. 3834-45.
6. Wong I, Richer V. Prophylaxis of post-inflammatory hyperpigmentation from energy-based device treatments: a review. *J Cutan Med Surg*. 2021;**25(1)**:77-86.
7. Proksch E, deBony R, Trapp S, Boudon S. Topical use of dexpanthenol: a 70th anniversary article. *J Dermatolog Treat*. 2017;**28(1)**:766-73.
8. Gorski J, Proksch E, Baron JM, Schmid D, Xhang L. Dexpanthenol in wound healing after medical and cosmetic interventions (postprocedure wound healing). *Pharmaceuticals*. 2020;**13(1)**:138.
9. Tan S, Bhattamisra SK, Chellappan DK, Candasamy M. Actions and therapeutic potential of madecassoside and other major constituents of centella asiatica: a review. *Appl Sci*. 2021;**11(1)**:8475.
10. Luengarun S, Srituravanit A, Tempark T. Efficacy and safety of moisturizer containing 5% panthenol, madecassoside, and copper-zinc-manganese versus 0.02% triamcinolone acetonide cream in decreasing adverse reaction and downtime after ablative fractional carbon dioxide laser resurfacing: A split-face, double-blinded, randomized, controlled trial. *J Cosmet Dermatol*. 2019;**18(6)**:1751-7.
11. Bains P, Kaur M, Kaur J, Sharma S. Nicotinamide: mechanism of action and indications in dermatology. *Indian J Dermatol Venereol Leprol*. 2018;**84(2)**:234-7.
12. Sul GD, Park HJ, Bae JH, Hong KD, Park BD, Chun J, *et al*. Preventive effects of multi-lamellar emulsion on low potency topical steroid induced local adverse effect. *Ann Dermatol*. 2013;**25(1)**:5-11.