IJHS

Original Article

Efficacy and safety of short-pulse erbium: Yttrium aluminum garnet laser treatment of Becker's nevus in Saudi patients: A pilot study

Fahad Al-Saif, E. Al-Mekhadab, H. Al-Saif

Department of Dermatology, College of Medicine, King Saud University, Riyadh, Saudi Arabia

Address for correspondence:
Dr. Fahad Al-Saif, Department of Dermatology, College of Medicine, King Saud University, P.O. Box 7805, Riyadh 11472, Saudi Arabia. Phone: +966-11-4691426. Fax: +966-11-4691432.
E-mail: fsaif1000@hotmail.com

WEBSITE: ijhs.org.sa
ISSN: 1658-3639
PUBLISHER: Qassim University

ABSTRACT

Objective: Becker's nevus (BN) is a benign cutaneous hamartoma. Although different types of lasers have been used to treat the pigmentary part of BN, to date, no definite treatment modality has been determined. The objective of this study is to evaluate the efficacy and safety of erbium: yttrium aluminum garnet (Er: YAG) laser treatment among Saudi patients with BN.

Patients and Methods: A series of 10 patients (skin phototypes III-V) with BN underwent treatment with an Er: YAG laser. Biopsies were taken from all patients to confirm the diagnosis. Treatment consisted of using a 2940 nm Er: YAG laser (fluence 700 mj/cm^2, short pulse, 3 mm spot size). Each patient underwent one session with three to five passes (the endpoint of passes was pinpoint bleeding). Clinical outcome was assessed using digital photographic method, before each treatment session and after the final visit. Clinical assessment scores were determined at each follow-up visit.

Results: Seven patients completed the study. All patients noticed a significant reduction in pigmentation. Five of the patients had good improvement, and the remaining two had moderate improvement. The mean reepithelialization time was 7 days, and post-treatment erythema was seen in all patients (mean follow-up of 6 weeks). Post-inflammatory hypopigmentation was observed in all patients. No untoward sequelae were observed during the study or follow-up period.

Conclusion: Er: YAG laser therapy can be an efficient modality for reducing the pigmentary part of BN. No scar formation, significant dyspigmentation, or recurrences were observed after 1 year.

Keywords: Becker nevus, erbium: yttrium aluminum garnet laser, Saudi

Introduction

Becker's nevus (BN) is a benign cutaneous hamartoma, first described by Becker in 1949.[1] BN is characterized by unilateral hyperpigmented patches distributed mostly on the proximal upper extremities, with or without hypertrichosis.[2] BN can be a symptom of the broader BN Syndrome (BNS), in which there is an association with unilateral hypoplasia of the breast or other cutaneous, muscular, or skeletal defects.[3] BN has a higher incidence rate in men, and its presentation in women and children tends to be less conspicuous (milder, less pigmentation, and less hypertrichosis).[3,4] Increased androgen sensitivity and stimulation have been postulated, and this may explain the higher incidence in male patients and other clinical manifestations of BN.[5] BN is generally considered a benign hamartoma but may represent a distressing cosmetic problem, and treatment can be challenging because therapeutic modalities are currently limited. Laser hair removal has been used to treat hypertrichotic BN with high success rate and safety treatment,[6] while the lipofilling is an effective treatment for thoracic anomalies in BNS having a major impact on patients' quality of life.[7] Hyperpigmentation is the most difficult part to treat in BN. Various lasers (694 nm) have been used but with different reported levels of success;[8] erbium: yttrium aluminum garnet (Er: YAG) and Q-switched neodymium-doped yttrium aluminum garnet (Nd: YAG) lasers were previously used in a prospective comparative study that demonstrated the superiority of the Er: YAG laser.[9] Ablative fractional laser therapy was shown to be moderately effective in BN with post-inflammatory hyperpigmentation and relatively negative patient-reported outcomes.[10] Studies on intense pulsed light and Q-switched ruby laser showed disappointing results, whereas frequency-doubled Q-switched Nd: YAG is more effective than intense pulsed light in the treatment of BN.[11,12] Recently, picosecond 755 nm alexandrite laser therapy for BN was used

to treat BN hyperpigmentation, with variable success.[13] BN is a major cosmetic issue in Saudi patients, especially females, with no Saudi BN studies having been reported to date. Here, we aimed to evaluate the effect of Er: YAG laser treatment of BN in Saudi patients.

Patients and Methods

The study was carried out in the dermatology clinic of King Saud University Medical City in Riyadh, Saudi Arabia, between October 2012 and September 2014. The study protocol was evaluated and approved by the Institutional Review Boards (IRBs) of the College of Medicine, King Saud University (Ref.No.16/0068/IRB). Before participation in the study, each participant provided written informed consent. Biopsies were taken from all patients to confirm the diagnosis. Inclusion criteria included generally good healthy controls, being at least 18 years of age and having documented histopathology of BN. Ten patients (5 females, 5 males, mean age 23.1, range 19-27) were treated with a 2940 nm Er: YAG laser (fluence 700 mj/cm^2, short pulse, 3 mm spot size), with 3 to 5 passes (the end point of passes was pinpoint bleeding). For participants who met the inclusion criteria, at the baseline visit, spot tests were performed, and if the patient accepted the results, split-lesion treatment was performed, except for one female patient, who insisted on having the whole lesion treated because of social issues. All participants were asked to return 1 week after the initial treatment for baseline assessment and at 1-, 3-, 6-, and 12-month post-laser therapy for the clinical evaluation. Photographs were taken from all patients at the spot test, before each treatment and at the end of the study period. Improvement of BN appearance was assessed by non-blinded reviewers and conducted by the treating physicians, using a percentage category scale (no improvement: 0%, slight improvement: 1-25%, moderate improvement: 26-50%, good improvement: 51-75%, excellent improvement: 76-100%). Collected data were analyzed using Predictive Analytics Software Version 18 (SPSS Inc., IBM and Chicago, Illinois, USA). Results are expressed as mean, standard deviation, and percentages.

Results

Three female patients dropped from the study due to unsatisfied spot test result. A total of 7 patients (5 males and 2 females) aged between 19 and 27 years old with Fitzpatrick skin Types III-V completed the study. The mean duration of illness for all patients was 8.9 ± 3.9 years (range: 4-15 years). All the lesions were over the upper extremities. Hypertrichosis was present in 4 patients. Figure 1 is a representative example of the spot test, which was performed in all patients. Exudation and superficial crusting were initially observed, which then peeled off at 2 weeks after treatment. During the post-operative assessment, all patients reported mild pain in the treated areas within first 24 h, which gradually decreased during the next 72 h to 1 week. All 7 patients noticed a significant reduction in the pigmentation compared to the untreated section. Five patients (71.4%) had good improvement, and 2 (28.6%) had moderate improvement. We observed no change in the hair density of those patients with hypertrichosis. Figures 2-5 show the end results of treatment. The mean time for reepithelialization was 7 days. Post-treatment erythema was seen in all patients. The mean average duration of post-treatment erythema was 6 weeks, while post-inflammatory hypopigmentation was observed in all patients and resolution of hypopigmentation

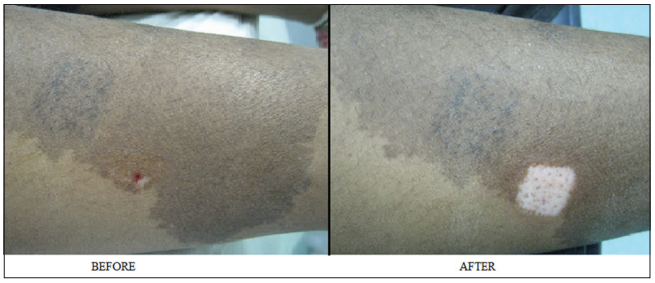

Figure 1: Spot test result on an erbium: yttrium aluminum garnet-treated patient

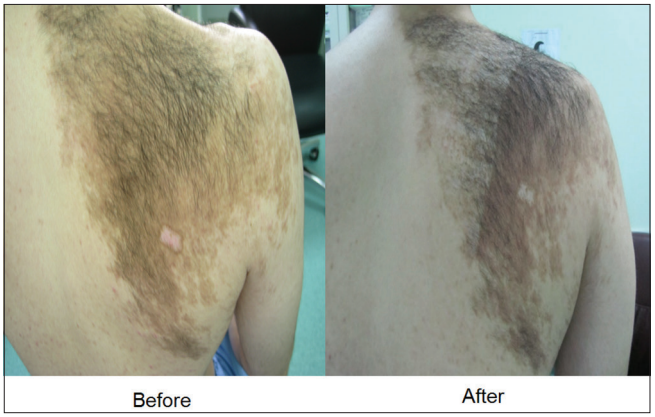

Figure 2: A male patient at 1-year erbium: yttrium aluminum garnet treatment follow-up

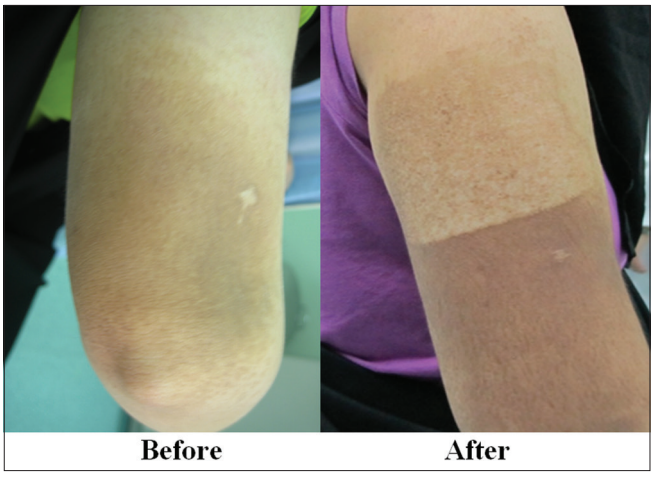

Figure 3: A female patient at 1-year erbium:yttrium aluminum garnet treatment follow-up

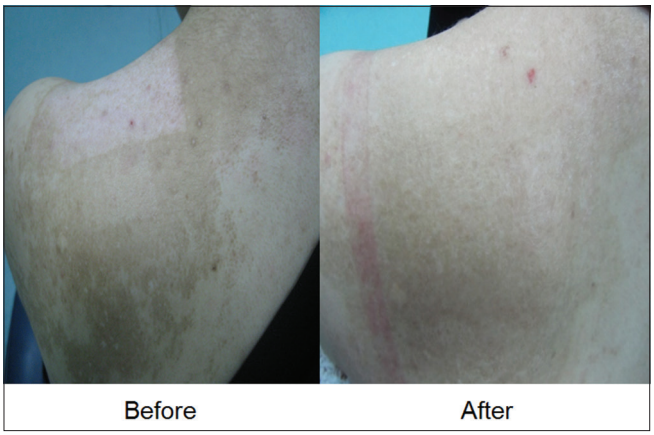

Figure 4: A patient who insisted on whole lesion treatment at 1-year erbium:yttrium aluminum garnet treatment follow-up

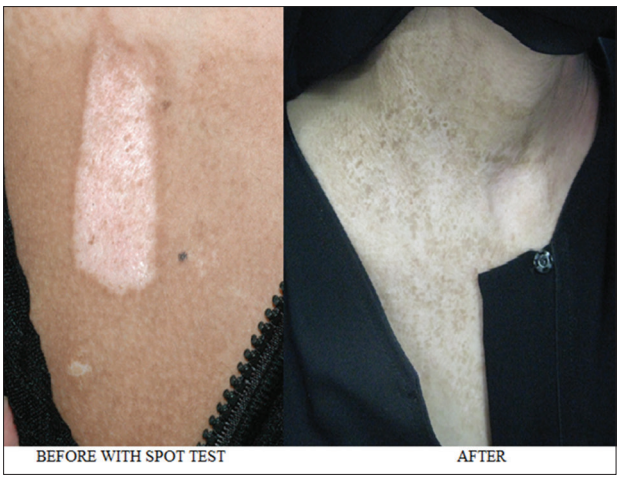

Figure 5: Female patient at 1-year erbium:yttrium aluminum garnet treatment follow-up

was noted within the first 6 months after treatment. Moreover, no infections, hypertrophic, or keloid scars were observed during the study period and after 1 year of follow-up.

Discussion

Successful treatment of the pigmentary part of BN is challenging. Although several laser treatment modalities have been proposed, no consistent modality is available. The 694 nm Q-switched ruby laser (QSRL) has been used to treat BN in several studies, reporting transient clinical improvement.[8,12] Since QSRL treatment results in BN have been largely inconsistent and can result in lesions, this approach cannot be routinely recommended.[8,14] The Q-switched Nd: YAG system has been evaluated in many studies addressing other benign epidermal pigmented lesions, reporting a minimum of 30% lightening.[15-17] A prospective study demonstrated the superiority of the Er: YAG laser over a Q-switched Nd: YAG system in the treatment of BN although none of the patients who received Nd: YAG laser treatments were completely cleared of the condition.[9] Ablative lasers (Nd: YAG) can be used to remove the entire epidermis of BN lesions and are clinically effective,[9] however, this approach is problematic because of significant side effects. At least two studies have applied a fractional ablative resurfacing laser to BN, with moderate effectiveness in some patients.[10,18] However, post-inflammatory hyperpigmentation and relatively negative patient-reported outcomes preclude ablative fractional laser therapy from being a standard therapy.[10] Studies using intense pulsed light and Q-switched ruby laser reported disappointing results, while a frequency-doubled Q-switched Nd: YAG approach was shown to be more effective than intense pulsed light in the treatment of BN.[11] A picosecond 755 nm alexandrite laser was recently applied to BN with variable results.[13]

All of the patients enrolled in this study had a typical distribution (e.g., on the shoulder, scapula, arms, and upper back). Four patients had hypertrichosis. Treatment side effects were limited to transient erythema, crust formation, and hypopigmentation, with most of the hypopigmentation improving spontaneously to some extent within 6 months. Healing was uneventful in all of our patients, and there were neither scars nor hyperpigmentation after 12 months of follow-up, despite most of the Saudi being dark-skinned. No significant hyperpigmentation or repigmentation in our patients in contrast with the findings of other reports.[10,18] We observed no change in the hair density in patients with hypertrichosis and these patients were advised to use laser hair removal.

There were no recurrences of the disease at 1-year post-treatment follow-up, suggesting that Er: YAG laser treatment was effective. All of the patients involved in this study were satisfied with their treatment outcome, with a satisfaction rate similar to the one reported by Trelles *et al.*[9] To enhance treatment efficacy and to minimize the side effects, further studies on larger group of patients should be conducted to establish the optimal parameters of Er: YAG laser treatment.

References

1. Becker SW. Concurrent melanosis and hypertrichosis in distribution of nevus unius lateris. Arch Derm Syphilol 1949;60:155-60.
2. Copeman PW, Jones EW. Pigmented hairy epidermal nevus (Becker). Arch Dermatol 1965;92:249-51.
3. Happle R, Koopman RJ. Becker nevus syndrome. Am J Med Genet 1997;68:357-61.
4. Patrizi A, Medri M, Raone B, Bianchi F, Aprile S, Neri I. Clinical characteristics of Becker's nevus in children: Report of 118 cases from Italy. Pediatr Dermatol 2012;29:571-4.
5. Person JR, Longcope C. Becker's nevus: An androgen-mediated hyperplasia with increased androgen receptors. J Am Acad Dermatol 1984;10:235-8.
6. Lapidoth M, Adatto M, Cohen S, Ben-Amitai D, Halachmi S. Hypertrichosis in Becker's nevus: Effective low-fluence laser hair removal. Lasers Med Sci 2014;29:191-3.
7. Ho Quoc C, Fakiha M, Meruta A, Dlimi C, Piat JM, Delay E. Breast lipofilling: A new treatment of Becker nevus syndrome. Ann Chir Plast Esthet 2015;60:336-9.
8. Raulin C, Schönermark MP, Greve B, Werner S. Q-switched ruby

laser treatment of tattoos and benign pigmented skin lesions: A critical review. Ann Plast Surg 1998;41:555-65.

9. Trelles MA, Allones I, Moreno-Arias GA, Vélez M. Becker's naevus: A comparative study between erbium: YAG and Q-switched neodymium: YAG; clinical and histopathological findings. Br J Dermatol 2005;152:308-13.
10. Meesters AA, Wind BS, Kroon MW, Wolkerstorfer A, Van Der Veen JP, Nieuweboer-Krobotová L, *et al.* Ablative fractional laser therapy as treatment for Becker nevus: A randomized controlled pilot study. J Am Acad Dermatol 2011;65:1173-9.
11. Chawvavanich P, Rojanamatin J. Treatment of becker's nevus. Comparison between intense pulsed light and frequency-double Q switch Nd: YAG laser. Thai J Dermatol 2008;24:177-84.
12. Nelson JS, Applebaum J. Treatment of superficial cutaneous pigmented lesions by melanin-specific selective photothermolysis using the Q-switched ruby laser. Ann Plast Surg 1992;29:231-7.
13. Chan JC, Shek SY, Kono T, Yeung CK, Chan HH. A retrospective analysis on the management of pigmented lesions using a picosecond 755-nm alexandrite laser in Asians. Lasers Surg Med 2016;48:23-9.
14. Michel S, Hohenleutner U, Bäumler W, Landthaler M. Q-switched ruby laser in dermatologic therapy. Use and indications. Hautarzt 1997;48:462-70.
15. Kilmer SL, Wheeland RG, Goldberg DJ, Anderson RR. Treatment of epidermal pigmented lesions with the frequency-doubled Q-switched Nd: YAG laser. A controlled, single-impact, dose-response, multicenter trial. Arch Dermatol 1994;130:1515-9.
16. Suh DH, Han KH, Chung JH. The use of Q-switched Nd: YAG laser in the treatment of superficial pigmented lesions in Koreans. J Dermatolog Treat 2001;12:91-6.
17. Tse Y, Levine VJ, McClain SA, Ashinoff R. The removal of cutaneous pigmented lesions with the Q-switched ruby laser and the Q-switched neodymium: Yttrium-aluminum-garnet laser. A comparative study. J Dermatol Surg Oncol 1994;20:795-800.
18. Glaich AS, Goldberg LH, Dai T, Kunishige JH, Friedman PM. Fractional resurfacing: A new therapeutic modality for Becker's nevus. Arch Dermatol 2007;143:1488-90.