

Treatment of Patchy and Universalis Alopecia Areata With Fractional Laser

Alopecia areata (AA) is a chronic and relapsing autoimmune disorder characterized by patchy nonscarring hair loss. It is the second most common cause of alopecia affecting 1% to 2% of the population. Alopecia areata can cause serious psychosocial distress and impact on quality of life. Localized patchy hair loss may recover spontaneously. However, more severe forms such as alopecia totalis or universalis have poor prognosis; spontaneous remission is unlikely and are usually resistant to therapy.

Conventional medical treatments are usually unsatisfactory for extensive cases and relapse rates are high. Current first-line treatments include the following: intralesional or topical corticosteroids for mild cases and systemic steroids or topical immunotherapy with diphenylcyclopropenone in severe cases. Other therapies are topical calcineurin inhibitors, minoxidil, photochemotherapy, cyclosporine, and methotrexate among others.¹ Photodynamic therapy seems to be ineffective. These alternatives treatments have variable results and can produce adverse events. New directions include laser therapies. We report one case of universalis AA and 6 of resistant patchy AA treated with fractional laser.

We present 19 patches of AA (6 patients) and a patient with diffuse universalis AA. Patients ranged in age from 31 to 63 years (mean 47 years, median 41 years). The median disease duration was 7 months (range 4 months–22 years). Most of the cases reported were long-standing and resistant to systemic or/and topical treatment. Only 2 patients (no. 4 and 6) had not undergone any previous treatment, despite which they preferred laser treatment.

The patients' details are shown in Table 1.

Patients were treated with nonablative 1,550-nm erbium glass fractional laser (Fraxel, Solta Medical,

Pleasanton, CA). The parameters applied were as follows: fluences ranging from 30 to 45 mJ, 6 to 10 density, and 8 to 10 passes. Sessions were performed at 2 to 6 weeks intervals for a total of 1 to 9 sessions (median: 3). The treatment was performed with an anesthetic cream or/and an air cooling system. There was no need to shave hair for the treatment. Photographs were taken before and after treatment and were used to evaluate the effects of treatment. The results were evaluated by a dermatologist on a visual global improvement score scale: 0% to 25% improvement, 26% to 50%, 51% to 75%, and greater than 75%.

All patients showed overall remarkable clinical improvement. Hair growth was observed as early as at 2 weeks after 1 to 2 sessions. After 2 to 4 sessions, hair density showed a marked increase, and hair thickness also increased. At the end of the treatment, patches were covered (fully or almost fully) of mostly pigmented terminal hair in its original color (Figures 1 and 2). No recurrence of the same plaques was observed, but new plaques were developed in the patient with AA of 22 years of evolution. One patient relapsed with a new lesion during treatment but exhibited a good response after the treatment.

In the patient with AA universalis, the whole diffuse alopetic area of scalp and eyebrows was treated, but the beard, eyelashes, and areas of the body were not treated serving as control. In this patient, no regrowth was observed in the areas of control. In patient no. 5, a frontal patch of AA was treated with intralesional corticosteroids instead of laser. In this area, hair regrowth was 2 months later, the thickness of the hair was smaller and with less pigmentation compared with the areas treated with laser. In the rest of the patients, all areas of alopecia were treated.

TABLE 1. Description of Treated Patients

<i>Patient no.</i>	<i>Age/ Sex</i>	<i>Type AA</i>	<i>Duration AA</i>	<i>Localization</i>	<i>Size</i>	<i>Previous Treatments</i>	<i>No. of Sessions</i>	<i>Response</i>	<i>Relapse</i>
1	33M	AU	8 mo	Scalp, beard, eyebrows, eyelashes, and body hair	Diffuse	TC, TCI, and Mi	4	CR	No (11 mo)
2	44F	PA	9 mo	Occipital	2'5 × 2 cm	IC	3	>75%	No (15 mo)
3	31M	PA	7 mo	Occipital	4 × 3 cm	Mi	3	CR	No (12 mo)
4	41M	PA	4 mo	Temporal	5 × 4'5 cm	None	3	>75%	No (3 mo)
				Beard	3 × 2'5 cm 6 × 2'5 cm				
5	56M	PA	22 yrs	Temporal and occipital	Unknown	TC, IC, and Mi	1	>75%	Yes (annual outbreaks)
				Temporal, occipital, and eyebrow	Unknown		4		
				Frontal and parietal	1'5 × 1'5 cm; 1 × 1 cm		2		
6	62F	PA	13 mo	Occipital	3 × 2'5 cm; 2'5 × 2'5 cm	None	3	50%–75%	No (4 mo)
7	63F	PA	5 mo	Occipital and temporal	11 × 5'5 cm; 5 × 4 cm	TC, IC, SC, and Mi	9	>75%	No (4 mo)

AA, alopecia areata; AU: alopecia areata universalis; CR, complete response; IC, intralesional corticosteroids; MI, minoxidil; PA, patchy alopecia areata; PR, partial response; SC, systemic corticosteroids; TC, topical corticosteroids; TCI, topical calcineurin inhibitors.

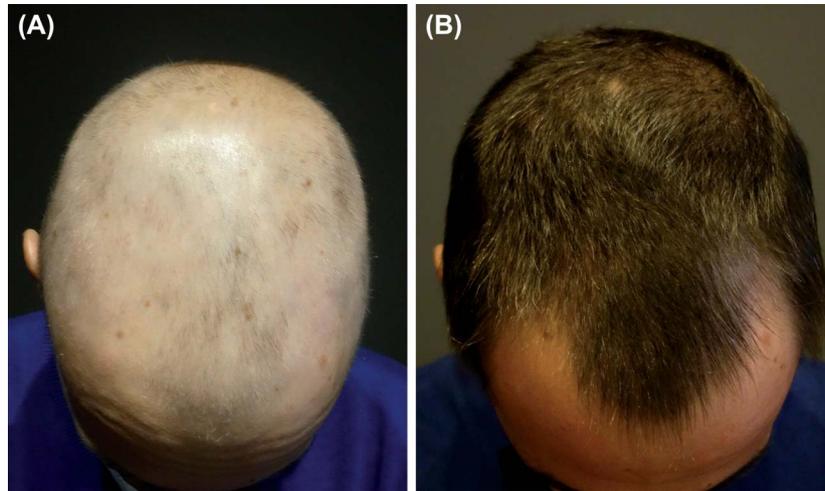


Figure 1. Patient no. 1: (A) before treatment; (B) after 4 sessions observing complete response.

Patients were in general satisfied with the treatment outcome, and in cases of new lesions, they requested laser treatment instead of conventional treatments.

No adverse effects were reported except burning sensation or pain during treatment that was well tolerated.

Discussion

Because a mouse model demonstrated stimulation of the hair follicles after wounding and the description of paradoxical hair growth after laser hair removal, many lasers have been proposed for hair loss treatment.^{2,3} Although the most frequently evaluated in the

treatment of AA is the 308-nm excimer laser, others such as fractional lasers have been introduced. Some of them also seem to be effective in other types of alopecia such as androgenetic alopecia.⁴

Fractional lasers produce numerous microscopic columns of thermal injury surrounded by a network of unaffected tissue allowing for a rapid repair. Besides, this type of lasers is safer because of sparing the stratum corneum and the network of unaffected skin.^{2,3}

Human and animal studies have suggested the effectiveness and safety of fractional laser on different types of hair loss. However, only the 1,550-nm fractional erbium glass and fractional CO₂ lasers have been evaluated in



Figure 2. Patient no. 3: (A) before treatment; (B) response complete after 3 sessions with increased pigmentation.

human clinical trials.² In addition, for AA, many isolated cases and series of cases treated with fractional lasers have been described.³ Among them, we published in 2016 a series of patchy AA with good results.⁵

Ablative fractional CO₂ lasers have been used for androgenic alopecia and AA with similar results.² We performed it for frontal fibrosing alopecia, but we discarded the treatment because it produced the breakage of the hair shaft.

According to reports, fractional lasers increase hair density, hair thickness, anagen:telogen ratio, and the rate of hair regrowth. However, the results are not always statistically significant.³ In our series, fractional laser treatment induced a significant increase of hair density and hair shaft thickness. Of particular interest was the rapid onset of response. Spontaneous remission in our patients was unlikely because of long lasting and refractory disease, especially in the case of universalis AA. In this patient, the beard and body hair, which was not treated, did not experience hair regrowth.

The mechanism by which they induce hair regrowth is unclear, but it seems it could be by inducing the wound-healing process and activating the wnt/ β -catenin pathway.^{2,3} In addition, the heat shock associated with low levels of thermal energy may upregulate heat shock proteins such as HSP-27, which have a role in follicular stem cell growth and differentiation. These changes of cytokines and growth factors might induce T-cell apoptosis and stimulate re-entry of telogen to anagen hair follicles. Besides, an improvement in microvascular circulation could promote the development of healthy follicles.

Optimum laser parameters for alopecia have not been established. However, fractional lasers require multiple treatment sessions, typically 4 to 6 sessions to fully treat clinical indication.

The main advantages of nonablative fractional lasers are that they not induce bleeding and are safer with less risk of discoloration and the faster healing.

The possible adverse effects with laser treatment could be persistent erythema, edema, hypopigmentation/hyperpigmentation, acne-like eruption, infections, or scarring. However, in the cases of AA described in the literature, only pruritus, burning, or pain were reported.

In conclusion, fractional lasers may be an effective and safe treatment option for AA. In particular, they are of interest in the cases resistant being a useful therapeutic option where other treatments can have serious adverse effects. They could be advantageous in preventing recurrent hair loss and have a synergistic effect when combined with conventional treatments.

References

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