Effectiveness of Low-Voltage Radiofrequency in the Treatment of Xanthelasma Palpebrarum: A Pilot Study of 15 Cases

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BACKGROUND Xanthelasma palpebrarum (XP) is the most common form of xanthoma, which is mostly located on the eyelids. Various treatment options are available, with certain limitations, and none of them is satisfactory.

OBJECTIVES To offer another treatment option (low-voltage radiofrequency (RF)) and to evaluate its efficacy in XP.

METHODS Fifteen patients were included in the study. The patients were examined before treatment, at the end of treatment, and 5 months later at a follow-up visit. Improvement was judged according to clinical examination by comparing before and after photographs. Electrodes from a dual-frequency 4.0-MHz RF machine were applied superficially to the lesions. The clinical scores were calculated using a 5-point scale (0 = no result, 0–25% = mild, 26–50% = moderate, 51–75% = good, 76–100% = excellent).

RESULTS All participants completed the study. Of these, scores of nine patients were excellent, scores of five were good, and the score of one was moderate. Statistically significant percentage improvement of the clinical scores from baseline was seen at the end ($p < .05$).

CONCLUSION Low-voltage RF treatment of XP is effective. If the lesions are too close to the eyes or are multiple or patched with indistinct borders, low-voltage RF can be used.

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Xanthelasma palpebrarum (XP) is the most common form of xanthoma, which is characterized by the presence of fibroproliferative connective tissue. The lesions are commonly located at the medial angle of the eyelids and appear as soft, velvety, yellow–orange papules or plaques.[1–5] The diagnosis can be made on clinical grounds alone.[1]

Many diverse treatments can be chosen for XP, such as surgical excision, laser ablation (carbon dioxide (CO_2), argon, erbium-doped yttrium aluminum garnet (Er:YAG), pulsed dye), trichloroacetic acid (TCA) peeling, bichloracetic acid peeling, and cryosurgery,[1–3,6–9] but all these treatment options have certain limitations. When we searched for the management of XP in the English language literature, we could not find any studies of low-voltage radiofrequency (RF) in the treatment of XP, although we found a pilot study which shows the efficacy of low-voltage electrocoagulation on periorbital syringomas.[10] The objective of the current study was to offer another treatment option (low-voltage RF) and evaluate its efficacy in XP.

Materials and Methods

Patients

Fifteen patients (12 female, 3 male) aged 31 to 59 (mean age ± standard deviation 46.8 ± 8.7) applying to our dermatology outpatient clinic and diagnosed with XP according to clinical characteristics were included in the study. All patients provided written informed consent before study enrollment. Exclusion criteria were active herpetic lesions in the periorbital area, scars, keloids, use of medicines for anticoagulation, history of pacemaker, skin phototype IV or V, diabetes mellitus, and any history of

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allergy. Patients who had been treated with any topical or surgical treatments in the previous month were also excluded. Before treatment, location and number of periorbital skin lesions were recorded. Serum cholesterol levels were measured. During and after the treatment, patients were asked to grade their level of discomfort as none, mild, moderate, or marked. All adverse effects that might have occurred, such as pain, swelling, pruritus, burning sensation, and erythema, were asked about, and complications such as hypopigmentation or hyperpigmentation were noted. The research protocol was approved by the local ethics committee (1491-339-07).

Efficacy Assessment

The patients were examined before treatment, at the end of treatment, and 5 months later at a follow-up visit. At the initial sessions, the size and number of the lesions were graded numerically. The same investigator (DD) evaluated all patients. Digital photographs were taken using the same camera settings and lighting conditions (Cyber-Shot, Sony, Japan). The investigator calculated the clinical scores using a 5-point scale (0 = no results; 1 = mild results (<25% clearing); 2 = moderate results (25–50% clearing); 3 = good results (50–75% clearing); and 4 = excellent result (>75% clearing)) with photographic assessments for each session. This method of assessment was taken from Al Aradi's study.[10]

Treatment

Treatment sites were first cleaned with sterile normal saline. Then we applied topical anesthetic cream (lidocaine with prilocaine) on the lesions 30 minutes before treatment. A dual-frequency 4.0-MHz RF machine (Surgitron, Ellman International, Inc., Hewlett, NY) was used, and a partially rectified waveform was selected. The power control dial (range 1–9) was set between 2 and 3 (lower power). We used saline solution to increase conductibility. The antenna endplate was positioned beneath the patient's hand, the machine's handpiece was attached to the triple-slot jack in the machine, and a disposable Ellman electrode was fixed to the handpiece and applied to the lesions. Electrodes were applied superficially to each lesion and not inserted into the lesions. A cold pack was used for reducing erythema and swelling for 10 minutes at the end of the treatment. Fucidic acid cream was used to diminish risk of infection twice daily for 1 week. Triticum vulgare plus ethylene glycol monophenol ether cream was also used to accelerate epithelization twice daily for 2 weeks. Control examinations were performed 1 month after each treatment. A second application was given if necessary.

Statistical Analysis

Statistical analysis was performed using the Wilcoxon signed rank test to compare baseline and after-treatment scores. SPSS 11.5 software (SPSS, Inc., Chicago, IL) was used for statistical analysis, and $p < .05$ was considered to indicate statistical significance.

Results

Patients

Fifteen patients were enrolled in the study, 12 female (80%) and three male (20%), aged 31 to 59 (mean age 46.8 $\pm$ 8.7). Eight patients had bilateral lesions, and the lesions were generally located on the medial canthus. Eleven of 15 patients had more than one lesion. Demographic data and characteristics of the patients are shown in Table 1. Summary of clinical presentations and results are shown in Table 2.

Treatment Efficacy

All patients were treated with low-voltage RF. At the end of the treatment, the results were scored on a 5-point scale. Nine patients had scores of excellent, five had good, and only one had moderate. All patients were satisfied with the results because of the improvement in their appearance. Clinical photographs of one of our patients are shown in Figure 1 (before treatment), Figure 2 (immediately after treatment), and Figure 3 (1 month after treatment).

TABLE 1. Demographic Data and Characteristics of the Patients

Sex	*Age*	*Skin Phototype*	*Family History*	*Duration, years*	*Serum Cholesterol Level*
Male	59	III	Yes	5	High
Female	46	III	No	6	Normal
Female	39	III	No	3	Normal
Female	54	II	No	2	Normal
Female	53	III	Yes	20	High
Female	31	II	No	11	Normal
Female	48	III	No	10	Normal
Female	38	III	No	2.5	Normal
Female	44	II	No	2.5	High
Female	34	III	No	1	Normal
Female	49	III	No	2	High
Female	51	III	No	4	High
Male	56	III	No	3	Normal
Female	42	III	No	4	Normal
Male	58	II	No	3	Normal

Generally, one session was enough to treat, but five patients needed a second session, because two had multiple lesions, and some of the lesions did not diminish.

Before treatment, the five of 15 patients who had high cholesterol levels started antihyperlipidemic medications after consultation with the internal medicine department. Five patients responded well to the treatment. The results of four of these were evaluated as excellent and the other as moderate. There was no relationship between cholesterol level and response to the treatment. Two of the patients with high cholesterol underwent the second session. Nevertheless, there were not enough patients with high cholesterol levels to speculate a relationship between the number of sessions required and cholesterol levels.

All of the patients were followed for 5 months, and no changes were seen. Statistically significant percentage improvement from baseline of the clinical scores was seen at the end of the treatment ($p < .05$).

TABLE 2. Summary of Clinical Presentation and Results

Location of Lesions	*Lesions,* n	*Complications*	*Sessions,* n	*Results*
Bilateral medial canthus + upper eyelids	Multiple	No	2	Excellent
Bilateral medial canthus	3	Mild hypopigmentation	1	Good
Left medial canthus	2	No	1	Good
Left medial canthus	1	No	1	Excellent
Bilateral upper and lower eyelids	Multiple	Mild hyperpigmentation	2	Moderate
Bilateral medial canthus	3	Mild hyperpigmentation	2	Good
Bilateral medial canthus + upper eyelids	3	No	1	Excellent
Bilateral medial canthus	2	No	1	Excellent
Right medial canthus	1	No	1	Excellent
Right medial canthus	2	No	2	Excellent
Bilateral medial canthus + lower eyelids	2	No	1	Excellent
Bilateral medial canthus	4	No	1	Excellent
Right medial canthus	1	No	1	Good
Bilateral medial canthus	2	No	2	Good
Left medial canthus	1	No	1	Excellent

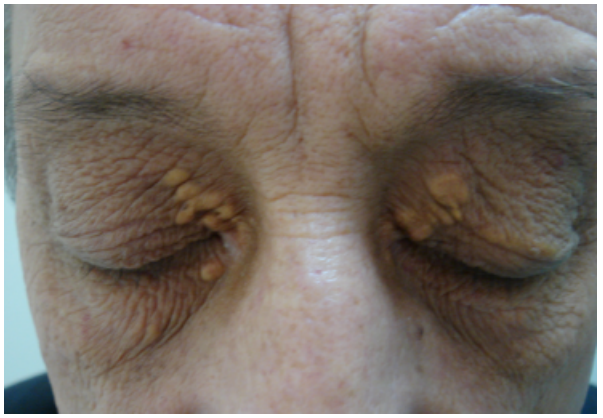

Figure 1. Before treatment.

Adverse Effects and Complications

During and after treatment, patients were asked to grade the level of their discomfort as none, mild, moderate, or marked. All adverse effects that might have occurred, such as pain, swelling, pruritus, burning sensation, and erythema, were asked about. Complications such as hypopigmentation, hyperpigmentation, and scars were also noted. All of the patients tolerated the treatment well with a local anesthetic cream. After the local anesthesia wore off, one patient (Patient 5) reported moderate pain, burning, and swelling for 2 days, which might have been related to the location of the lesions or individual pain threshold. Others reported mild pain and swelling for 1 day that responded to an anti-inflammatory drug. Two patients had hypopigmentation, and one had hyperpigmentation. These pigmentation disorders continued for 5 months, decreasing gradually.

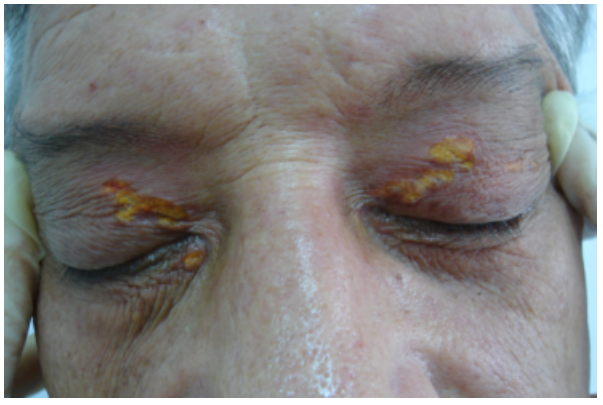

Figure 2. Immediately after treatment.

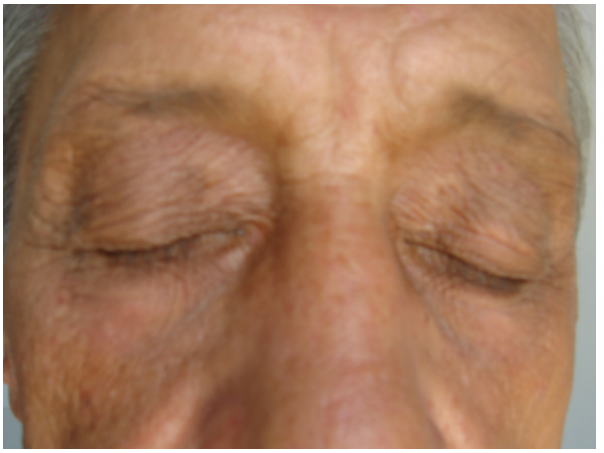

Figure 3. Five months after treatment.

Discussion

XP is the most common cutaneous xanthoma that presents in the periocular region.[1–6] The exact cause of XP is not known, but several factors, such as lipid abnormalities, hormonal factors, local factors, and macrophages, are thought to play a role in the etiopathogenesis.[4] It is known to present in middle-aged and older adults and to show a peak incidence at 30 to 50 years.[1,4,5] Women are affected more than men.[1,5] Depending on the size and location, several different treatment methods can be used to address this problem, ranging from simple excision to laser or chemical peeling.[1]

Surgery is a good choice for XP, although it is difficult when lesions are close to the eyes, are multiple in number, or have a patched pattern with indistinct borders.[2] In surgery, reconstruction with flap or full-thickness skin grafts may be necessary in the presence of large lesions or lesions involving the medial canthus. The possibilities of surgical resection appear to be more limited in the lower eyelids, because the lower skin laxity may induce a risk of ectropion.[5] Also, risk of recurrence of XP, wound-related complications with surgical excision, and transient hematomas can be seen.[5,11]

Laser surgery has increased in popularity.[12] Argon, pulsed dye, CO_2, Er:YAG, and Q-switched neodymium-doped (Nd):YAG lasers can be used to treat XP.[1,3,6,13–16] Despite the safety of these procedures in experienced hands, postoperative complications affecting the periocular region and the eye itself may follow laser surgery. Common complications are persistent erythema, hyper- and hypopigmentation, hypertrophic scarring, skin infections, severe burns, transitory or permanent lower lid ectropion, and corneal injuries or ocular perforation.[12] A high recurrence rate and frequent scarring have eliminated the argon laser as a therapeutic option for XP. Likewise, insufficient penetration depth limits dye lasers.[13] Argon, pulsed dye, and CO_2 lasers also have some disadvantages, including the risk of scarring and postoperative dyspigmentation.[6,14] Er:YAG and Q-switched Nd:YAG laser–induced swelling, bleeding, and crusting can be seen.[13,16]

TCA can be used for small lesions, but if the lesion is large, common side effects such as atrophy, scarring, and hypo- or hyperpigmentation can be seen.[2] A Koebner-like phenomenon was also reported with treatment of TCA.[17]

To the best of our knowledge, this is the first study of the efficacy of low-voltage RF for removal of XP. The objective of this study was to offer low-voltage RF treatment of XP and to evaluate its efficacy. The goal was also to find an easy way to treat XP. We found some complications, such as hypo- and hyperpigmentation, like with other treatment methods. Hyperpigmentation occurred in two patients with skin phototype II and III and hypopigmentation in one patient with skin phototype III.

All patients tolerated RF well in XP, with insignificant side effects. These side effects were not important when compared with those of other treatment modalities. None of the patients commented about intolerability of procedure. Topical anesthesia was sufficient for all patients. This can be related to low voltage. During the treatment session, we used saline solution in the treated areas to increase conductibility, so we did not need to increase voltage. The power dial was set on 2 and 3 in electrocoagulation mode, which was enough to treat all patients.

Although use of RF in XP is well known, we could not find any previous studies of low-voltage RF for the treatment of XP. RF works on the principle of increasing the frequency and voltage while simultaneously decreasing the amperage of alternating current so as to generate oscillating radio waves.[18] The unit we used produces a bipolar current at 1.7 mHz that is used for bipolar coagulation. We selected a partially rectified waveform (electrocoagulation). Electrocoagulation ensures instant hemostasis and is used for the treatment of vascular lesions, in which coagulation is primarily required.

In conclusion, low-voltage RF is an effective method of treatment of XP. If the lesions are too close to the eyes or multiple or patched with indistinct borders, low-voltage RF can be chosen. It is an easy, quick, safe, inexpensive treatment for XP. After treatment, wound healing is quick and successful. Cosmetic results are gratifying. Low-voltage RF should be considered when treating this difficult condition and can therefore be an alternative treatment for XP. Larger studies with one-to-one comparisons of the RF method with other treatment methods, and particularly with laser therapies, are required for XP, including analyses for efficacy, side effects, and cost effectiveness.

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