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Efficacy of combination light-emitting diode (635 and 830 nm) therapy in treating local injection-site reactions after filler

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Over the past decade, the use of injectable cosmetic fillers has steadily increased, with hyaluronic acid (HA) preparations being the most frequently utilized. Complication rates with injections of HA fillers have been reported to be up to 5%. The most common reaction to HA is a local injection-site reaction, which consists of swelling, erythema and induration at the implant site.[1] Although these reactions are predominantly mild or moderate in intensity, and do not result in severe sequelae, new treatment methods promoting rapid healing with high patient compliance are highly desirable because of safety concerns regarding the use of topical steroid agents as anti-inflammatory agents.[1] Consequently, researchers have sought other treatment options. Light and laser therapies have attracted attention as promising new treatment methods for this condition.[2]

Light-emitting diode (LED) photomodulation is a nonthermal technology used to modulate cellular activity with light. Photomodulation refers to a photorejuvenation effect using nonthermal cellular stimulation at specific pulse sequences and durations.[3] Previous animal and human studies have demonstrated that LED treatment induces reduction in wound size and protects against skin inflammation. LED therapy using a variety of red, blue, and yellow wavelengths has been reported to accelerate cutaneous wound healing after various injuries, including inflammatory situations.[4] To date, no studies have been published on the specific evaluation of the efficacy of LED for the treatment of local injection site reactions after filler. In the present study, we utilized a combination LED (635 and 830 nm) therapy for treatmen.

A 32-year-old woman received an injection of cross-linked HA filler (Restylane Perlane®; Q-MED, Uppsala, Sweden) into the glabellar area in an attempt to plump up this area. The HA concentration in the filler was 20 mg/mL, and the total volume used was 1 mL. Two days after the injection, the patient returned with an inflammatory reaction in the injection area with an itching sensation without pain or tenderness (Fig. 1a,b). The patient was worried about the cosmetic appearance of her forehead.

We diagnosed the patient as having a local injection-site reaction to the filler, and we decided on prompt treatment using combination LED (Smartlux FX®; Medmix, Seoul, Korea), because she did not want to be treated with anti-inflammatory agents such as topical steroids. During treatment, the LED device delivered 635 and 830 nm light with a concomitant power density of 75 mW/cm^2. The recommended distance between the lesion and LED device was 150–200 mm. The patient was treated for 15 min with continuous (not pulsed) light every day for 7 days. Both the patient and operator wore safety goggles during treatment to protect their eyes. No pain or discomfort was reported by the patient during the treatment period. The inflammatory reaction gradually disappeared over the next 7 days (Fig. 1c,d).

Low-intensity light therapy using light in the far-red to near-infrared region of the spectrum (630–1000 nm) can modulate numerous cellular functions. Several recent studies have demonstrated the anti-inflammatory effects of LED therapy.[3,4] A study conducted with human gingival fibroblasts treated with arachidonic acid showed that 635 nm irradiation inhibits prostaglandin 2 synthesis in a manner similar to inhibition by cyclooxygenase inhibitors. Another study demonstrated that LED therapy has beneficial effects on the prevention of postinflammatory hyperpigmentation and scarring.[3] A further recent study found that LED inhibits several inflammatory cells, improves skin barrier function, and may potentially contribute to the treatment of patients with atopic dermatitis.[5] Furthermore, at the cellular level, LED can upregulate procollagen and collagen synthesis in human fibroblast cultures. Irradiation at 830 nm accelerates fibroblast transformation, downregulation of matrix metalloproteinases and mast cell degranulation.[3] In addition, the chemotaxis and phagocytic activity of leucocytes and macrophages was shown to be enhanced with cellular stimulation at this wavelength.[3]

The Smartlux FX® is a new LED device, which has 1200 output lamps (635 nm red: 700; 830 nm infrared: 500) and an dual-wavelength output light that produces concomitant red light at 635 nm (58%)and infrared light at 830 nm (42%). This dual-wavelength

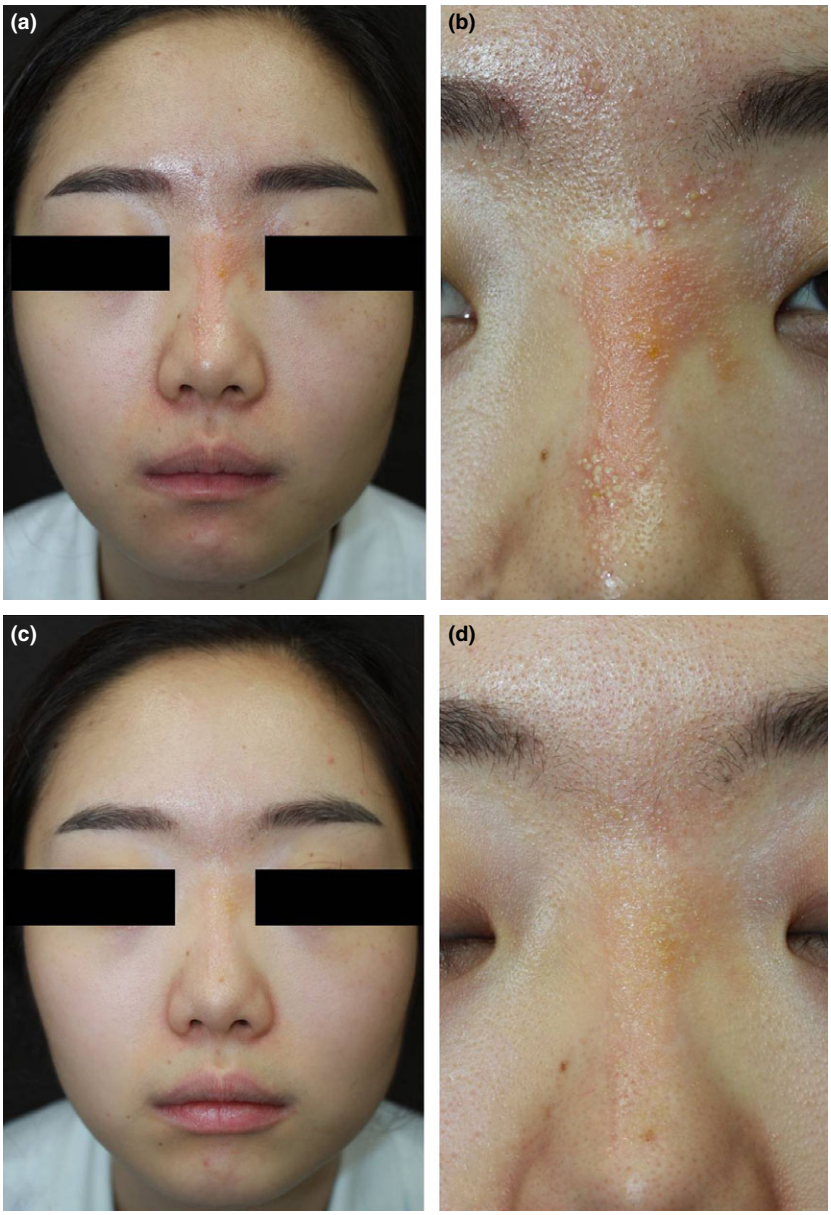

Figure 1 (a,b) Before and (c,d) after treatment with light-emitting diode therapy.

effect may be the reason why more rapid wound healing and decreased inflammation occur without side effects and patient discomfort. Although we could not histologically confirm inflammatory reaction of the injection area as the patient refused permission for a biopsy, we believe the present study supports the clinical application of LED (635 and 830 nm) as a new treatment option for local injection site reactions after HA filler. We consider that it is likely this LED technique could also be applied for various inflammatory conditions with excellent clearance in a safe manner with high patient compliance.

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