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Review

Laser treatment of medical skin disease in women

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ABSTRACT

Laser treatment is a relatively new and increasingly popular modality for the treatment of many dermatologic conditions. A number of conditions that predominantly occur in women and that have a paucity of effective treatments include rosacea, connective tissue disease, melasma, nevus of Ota, lichen sclerosus (LS), notalgia paresthetica and macular amyloidosis, and syringomas. Laser therapy is an important option for the treatment of patients with these conditions. This article will review the body of literature that exists for the laser treatment of women with these medical conditions.

Introduction

Dermatology is a unique area of medicine because diseases that affect the integumentary system manifest externally and are constantly on public display. In addition to providing medical therapy, dermatologists are consulted for the improvement in appearance of many of these disfiguring conditions. New research is being conducted on the use of laser alone and in conjunction with standard medical therapy in the treatment of patients with skin disease. In general, women are more likely to seek laser therapy for the treatment of their disease. This article reviews laser therapy for dermatoses that disproportionally affect women including rosacea, connective tissue disease, melasma, nevus of Ota, lichen sclerosis, notalgia paresthetica and macular amyloidosis, and syringomas.

Rosacea

Rosacea is a common, chronic condition that primarily affects the skin of the central face and eyes. Women and patients with lighter skin types are more likely to be affected. There are four types of rosacea: erythematotelangiectatic, papulopustular, phymatous, and ocular. Patients may have one or any combination of these types (Wilkin et al., 2002). Because there is no cure for rosacea, treatment is directed at symptom management. In the arsenal of treatment for dermatologists, lasers offer a safe and efficacious way to treat some forms of rosacea.

Erythematotelangiectatic rosacea

Erythematotelangiectatic rosacea is the most common form of rosacea and characterized by central facial flushing, background erythema, and persistent telangiectasias (Iyer and Fitzpatrick, 2005). This form of rosacea has the most abundant and highest quality evidence for improvement with laser therapy. Pulsed dye laser (PDL; 585nm; 595nm) is the laser of choice for most cases of erythematotelangiectatic rosacea. PDL has been reported to improve background erythema and telangiectasias in case reports, case series, and randomized controlled trials (RCTs). A range of improvements have been reported including improvement of 39 to 58% of background erythema on the cheeks (Iyer and Fitzpatrick, 2005; Rohrer et al., 2004). A study of 40 patients reported an average between moderate and marked improvement (Tan et al., 2004). There are a variety of settings that can be used to treat vascular lesions. Generally, spot sizes of 7-10 mm are used. Pulse durations in the range of 6-20ms are well tolerated and approximate the thermal relaxation time of vascular ectasias of erythematotelangiectatic rosacea (Alam et al., 2003; Tan et al., 2004). Pulse durations that are shorter than 6 ms carry a higher risk of inducing purpura. Although treatments that induce purpura offer a more rapid and effective treatment of erythematotelangiectatic rosacea (Alam et al., 2003; Iyer and Fitzpatrick, 2005), most patients prefer to avoid purpura. Pulse stacking with a lower fluence is one method to reduce the risk of purpura while maintaining high efficacy (Rohrer et al., 2004).

Intense pulsed light (IPL) has been used for the treatment of background erythema of rosacea with filters (Mark et al., 2003; Papageorgiou et al., 2008) and with exposure to the full spectrum of light (Schroeter et al., 2005). One study using a 515 nm filter

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showed a 30% reduction in blood flow and a 21% decrease of background erythema in four patients (Mark et al., 2003). Another study with a 560 nm filter showed that 83% of 34 patients had at least a 50% overall improvement (Papageorgiou et al., 2008). IPL that ranged from 515-1200 nm had a mean clearance of 77.8% that was maintained on average for 51 months in 60 patients (Schroeter et al., 2005). A single-blinded RCT showed that there was no significant difference between non-purpuragenic 595 nm PDL and IPL with a 560 nm filter (Neuhaus et al., 2009).

The potassium titanyl phosphate (KTP) 532 nm laser has also been shown to improve the erythema of rosacea in 11 patients who had a 47% improvement compared with the untreated side (Maxwell et al., 2010). A large review of KTP laser showed that 49 of 66 patients had at least a marked improvement (Becher et al., 2014).

Treatment with the neodymium-doped yttrium aluminum garnet (Nd:YAG) laser (1064 nm) is less effective than PDL for background erythema of erythematotelangiectatic rosacea. Nd:YAG has more value in the treatment of refractory nasal vessels and larger facial vessels but should be used with caution because it carries a higher risk of scarring. One report demonstrated that 24 of 39 patients had an excellent response after treatment with long-pulsed Nd:YAG laser (Say et al., 2015). One double-blind RCT compared treatment with 595 nm PDL and 1064 nm Nd:YAG for patients with diffuse facial erythema. The results showed that the PDL treatment reduced facial redness 6.4% more than Nd:YAG and patients noticed a 52% improvement with PDL compared with a 34% improvement with Nd:YAG. Of note, the Nd:YAG treatment was associated with less pain (Alam et al., 2013).

Appropriate patient counseling and selection is important before using lasers to treat patients with rosacea. Common adverse effects are pain, purpura, and transient edema (Alam et al., 2003; Iyer and Fitzpatrick, 2005). Less commonly postinflammatory hyperpigmentation (Tan et al., 2004) and scarring can occur (Say et al., 2015) Light-based therapies and especially PDL offer a safe and efficacious treatment option for patients with erythematotelangiectatic rosacea that can significantly improve the quality of life of patients (Bonsall and Rajpara, 2016).

Papulopustular rosacea

Papulopustular rosacea is characterized by inflammatory papules and pustules primarily on the central area of the face (Wilkin et al., 2002). Evidence is sparse for the application of lasers to treat this type of rosacea. One study noted that treatment with IPL showed an improvement in acneiform breakouts in 64% of treated patients (Taub, 2003) while another study on PDL showed that 50% of patients who were treated remained unchanged or worsened with regard to papulopustular lesions (Berg and Edström, 2004). Treatment with the long-pulsed 1064 nm Nd:YAG laser in rejuvenation mode was reported to improve papulopustular lesions in 22 patients (Lee et al., 2015a) and another study showed that 12 of 27 patients had an excellent improvement in their papulopustular lesions (Say et al., 2015). Although there is some anecdotal evidence of laser treatment for papulopustular lesions, it would not likely be a routine consideration.

Phymatous rosacea

Phymatous rosacea is more common in men and characterized by sebaceous hyperplasia of the nose (Wilkin et al., 2002). Surgical lasers offer an efficacious option to contour this hyperplasia back to the nose's normal size. A more historical approach involved treatment with an argon laser, which aimed to decrease capillary blood flow and shrink the hypertrophic tissue (Halsbergen Henning and Van Gemert, 1983). Today, it is not a favored approach because of the high risk of dermal necrosis and scarring due in part to the continuous-wave operation of this laser that makes depth difficult to control (Sadick et al., 2008). Currently, the more common approach is treatment with ablative carbon dioxide (CO_2) or erbium: yttrium aluminum garnet (Er:YAG) lasers.

CO_2 laser resurfacing offers precise sculpturing and control of tissue depth. The most serious disadvantages of this treatment are that it is time consuming and there is a risk of scar contraction with extensive vaporization. Permanent hypopigmentation is also a concern with the CO_2 laser and particularly when operated in continuous wave mode. Er:YAG laser resurfacing carries a lower risk of hypopigmentation but hemostasis is more challenging.

A cohort of 24 patients showed a more than 75% improvement in rhinophyma with 23 of 24 patients who noted a greater than 50% improvement when treated with a 10,600 nm CO_2 pulsed laser (Bassi et al., 2016). A fractionated ablative CO_2 laser that is set at 70 mJ and 70% density for 16-18 passes showed significant improvement after treatment in the shape, size, and texture of the nose and excellent cosmetic results in five patients with mild-to-moderate disease (Serowka et al., 2014). In summary, in experienced hands, the CO_2 or Er:YAG surgical lasers are an effective treatment option for the surgical reduction of rhinophyma.

Connective tissue disease

Connective tissue diseases such as lupus erythematosus (LE), dermatomyositis (DM), and systemic sclerosis present with a variety of dermatologic manifestations that are often resistant to conventional treatments. Laser therapy offers an additional treatment modality for patients with connective tissue diseases and especially the erythema that is seen in multiple disorders. Newer fractional laser approaches are also being investigated in the treatment of fibrosis that is seen in patients with connective tissue disorders.

Lupus erythematosus

Among the connective tissue diseases, LE has the greatest body of literature that documents outcomes of laser treatment. LE is a complex autoimmune condition with several distinct cutaneous forms including acute cutaneous LE, subacute cutaneous LE (SCLE), and chronic cutaneous LE including discoid LE (DLE), chilblain LE, tumid LE, and lupus panniculitis. Telangiectasias and dyspigmentation can occur as a result of several variants of LE (McCauliffe, 2001). PDL with a wavelength of 585-595 nm is the best-studied laser treatment for the management of telangiectasias of LE (Baniandres et al., 2003; Diez et al., 2011; Erceg et al., 2009; Raulin et al., 1999; Truchuelo et al., 2012). Treatment of LE telangiectasias is very similar to that of rosacea telangiectasias. In the author's (JF) experience, LE telangiectasias tend to comprise smaller diameter vessels than most telangiectasias of rosacea; therefore, they respond more readily to shorter pulse widths (Fig. 1). In all patients, a detailed examination is performed before initiating treatment. In some published studies, most patients experienced a complete resolution of their cutaneous disease (including the annular plaques of SCLE, scarring plaques of DLE, and urticarial-like plaques of tumid LE) with a reduction in clinical skin scores including the size, erythema, and edema (Diez et al., 2011; Truchuelo et al., 2012). No complications were noted. In another study, PDL resulted in a statistically significant decrease of the Cutaneous Lupus Erythematous Disease Area and Severity Index score from a mean of 4.4 to 1.3 after three treatment sessions (Erceg et al., 2009). The majority of studies that use PDL to treat cutaneous LE reported successful outcomes with no recurrence over follow-up times of 1-10 months (Baniandres et al., 2003; Diez et al., 2011; Erceg et al., 2009; Raulin et al., 1999; Truchuelo et al., 2012).