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NEWS, VIEWS, AND REVIEWS

Current Considerations for Laser and Energy-Based Devices in Transgender Patient Care

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INTRODUCTION

Physical characteristics that can contribute to gender dysphoria in transgender patients, including facial and body hair, hormonal acne, and post-surgical scarring, can be addressed through dermatologic interventions.[1,2] While perceived gender-incongruence has been associated with an increased risk for suicide, anxiety, and depression, current literature suggests that gender-affirming care can markedly improve mental health outcomes in transgender individuals.[3] As advances in laser therapy and energy-based devices show promise in the achievement of gender-congruent physical features, dermatologists are uniquely positioned to support transgender patients.[1,4] This review explores the emerging applications of laser therapy and energy-based devices (EBDs) in the dermatologic care of transgender patients.

Laser Hair Removal

Laser hair removal (LHR) serves as a valuable tool for both cosmetic and medical approaches to gender-affirming care. LHR can effectively target hair follicles through the process of photothermolysis, in which absorption of laser wavelength transmissions through melanin results in follicular destruction and subsequent reduction in hair growth.[4,5] LHR therapy often utilizes long-pulse alexandrite, diode, or Nd: YAG lasers, operating at 755 nm, 810 nm, and 1064 nm, respectively.[1,4,5] It is important to note that LHR may be less effective for lighter-haired individuals, given that its mechanism targets the follicular melanin.[4] In addition to hair pigmentation, skin pigmentation is also an important consideration when selecting lasers for LHR. Compared to lasers with shorter wavelengths, the Nd:YAG laser is less readily absorbed by epidermal melanin, making this laser more suitable for patients with darker complexions.[4]

From a surgical perspective, LHR is useful in both pre- and post-operative settings in gender-affirming care. In transmasculine patients undergoing phalloplasty, hair removal is recommended from autografted donor tissue, often from the patient's forearm or thigh, prior to the procedure to prevent intraurethral hair growth and infection.[4] Similarly, pre-operative hair removal is recommended for transfeminine patients undergoing vaginoplasty to avoid post-operative complications such as folliculitis and calculus formation at the follicle.[4] Careful monitoring for hair regrowth following surgery may be warranted, particularly in the context of concurrent testosterone therapy, given the association between testosterone therapy and increased hair growth.[4,6]

From a cosmesis perspective, LHR can further support efforts to mitigate gender-incongruent features. Hair on exposed body regions, such as the face, can contribute to gender dysphoria, anxiety, and depression.[1,4] Consequently, LHR of visible body regions to achieve gender-congruence highlights a valuable role of this technology in caring for transgender patients.

Hormonal Acne Management

Acne has been associated with detrimental impacts on psychosocial wellbeing and self-esteem, and these effects may be further compounded in transgender patients.[1] A survey study on the experiences of acne in transgender patients revealed heightened feelings of anxiety, depression, dysphoria, and concerns for rejection.[7] In particular, transmasculine patients undergoing hormonal therapy with testosterone may be at increased risk of hormonal acne development due to an associated increase in sebum production.[6,7] Recent evidence suggests that transfeminine patients may also experience acne following estradiol treatment, broadening the traditional focus of hormonal acne beyond testosterone therapy.[8] Guidelines recommend standard acne management for transgender patients, with laser therapy and EBDs showing additional promise.[1]

EBDs can directly target sebaceous glands, thereby addressing a key component in acne pathogenesis.[9,10] Current evidence suggests that a 30% to 50% reduction in sebum is necessary to achieve a 50% reduction in acne severity.[9] A systematic review found that EBDs, including radiofrequency devices and photodynamic therapy, can achieve up to a 35% and 40% reduction in sebum production, respectively.[9] For lasers, the 1450-nm diode laser achieved up to a 48% reduction of sebum.[9] Recent evidence suggests that 1726-nm laser devices can also substantially improve acne, with one study achieving a 91.5% treatment success rate (n = 104) following 52 weeks of therapy.[10] Of note, more research is needed to specifically study these therapies in transgender patient populations.

Scar Management

Surgical procedures function as a core tenet of gender-affirming care, but may carry a risk of postoperative cutaneous complications.[11] For transmasculine patients, top surgery can allow for masculinization of the breasts via bilateral subcutaneous mastectomy, while transfeminine patients may opt for breast augmentation procedures.[11,12,13] A cross-sectional study of transgender patients revealed that hypertrophic scarring, keloid formation, and

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postinflammatory hyperpigmentation were among the most commonly observed postoperative dermatologic findings.[11,13] Scars can have an impact on patient well-being, as scars have been linked to physical discomfort, embarrassment, and frustration from an aesthetic standpoint.[14]

Current evidence supports combining pulsed dye laser (PDL) with intralesional steroids for the treatment of hypertrophic scars and keloids.[11,12] Using the Vancouver Scar Scale, transgender patients with postoperative scarring and keloids saw significant improvement at three and six months following four applications across four months of a 595-nm pulsed dye laser with 10 mg/mL intralesional triamcinolone acetonide injections, as opposed to intralesional triamcinolone monotherapy (P=0.001). Similarly significant improvements in scar pigmentation at three- and six-month follow-ups were observed with combination PDL and intralesional steroid therapy as opposed to intralesional steroid monotherapy, as reflected by the melanin index (P=0.048).[11] Further research supports the use of a 1064-nm FxPico Nd:YAG laser in the management of post-mastectomy scarring in transmasculine patients, with significant improvement at six months following four monthly applications as compared to no intervention (P<0.001).[12] In both studies, patients reported higher satisfaction with laser-based therapy as opposed to intralesional steroids or lack of intervention. Adverse effects of laser therapy were minimal, including post-laser erythema and, less frequently, purpura.[11,12]

Skin Contouring

Laser therapy and EBDs also play a role in skin contouring, serving as another component of gender-affirming care. Sex-related differences in body fat distribution can contribute to perceptions of gender-incongruence.[15] While its exact mechanism remains unclear, low-level laser therapy has been shown to achieve lipolysis in both animal and human subjects without adverse impact on cholesterol and liver function markers.[16] Radiofrequency devices function by using thermal energy to alter adipocyte metabolism, ultimately resulting in targeted cell death.[16] Radiofrequency in conjunction with microneedling has also shown promise for decreasing skin laxity.[16] Further research is needed to better understand the mechanisms and broader applications of these therapies in transgender patients.

Future Directions and Considerations

Overall, laser therapy and EBDs show great potential for a variety of procedures in gender-affirming dermatologic care. Evidence supports the safety profile of these technologies, with the most common adverse effects including temporary erythema and edema.[10,12] However, accessing this form of care can be challenging given its high cost, limited insurance coverage, and need for multiple treatment sessions.[4,5] Despite these barriers, the positive outcomes and versatile applications of laser therapy and EBDs underscore the importance of continued efforts and research in expanding access to gender-affirming care.

CONCLUSION

The use of laser therapy and EBDs in the care of transgender patients highlights the opportunity for dermatologists to play a pivotal role in gender-affirming care. With continued expansion of evidence and advocacy, laser therapy and EBDs show strong potential for promoting gender congruence, quality of life, and well-being for transgender patients.

DISCLOSURES

AZ's work is funded through an independent research grant from Galderma. AK's work is funded through independent research grants from Incyte and Johnson & Johnson. MF, NZ, DN, AF, and PS have no conflicts to disclose.

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