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INNOVATIVE APPROACHES TO ACNE TREATMENT: CLINICAL EFFICACY OF COMBINED APPLICATION OF PULSED-DYE LASER (PDL), FRACTIONAL THULIUM LASER, AND RETINOLIDS

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Abstract: Acne remains one of the most common chronic dermatological disorders, requiring a comprehensive therapeutic approach. This study presents the results of evaluating the effectiveness of combined use of a pulsed-dye laser (PDL), a fractional thulium laser, and retinoids in the treatment of acne of varying severity.

Relevance

Acne is a multifactorial disease involving sebaceous gland dysfunction, follicular hyperkeratosis, microbial inflammation, and immune reactions. In severe and treatment-resistant cases, standard therapy does not always provide satisfactory outcomes, which necessitates the implementation of innovative treatment modalities. Modern laser technologies allow for targeted impact on key pathogenic mechanisms of acne, enhancing therapeutic effectiveness and reducing the risk of complications.

Aim of the Study

To evaluate the clinical efficacy and tolerability of the combined application of a pulsed-dye laser (PDL), fractional thulium laser, and retinoids in acne treatment.

Materials and Methods

The study included 112 patients with acne of varying severity.

Control group (n=30): received standard therapy according to clinical guidelines.

Main group (n=82): underwent combination therapy consisting of:

Pulsed-dye laser (595 nm, 3-10 ms, 7-10 J/cm²);

Fractional thulium laser (1927 nm, 15 mJ, static mode, 20% coverage) followed by application of retinol serum;

Topical and/or systemic retinoids.

Therapeutic efficacy was assessed by the dynamics of the Dermatological Acne Index (DAI) at 12, and 24 weeks of treatment.

Results

By week 12, a significant improvement was observed in the main group: the mean DAI decreased 6.8-fold compared to 2.1-fold in the control group ($p < 0.05$). Stable clinical remission was achieved in 77.8% of patients in the main group. The first positive changes were noted as early as two weeks after the start of therapy. A notable reduction in post-acne manifestations and recurrence frequency was also recorded.

The combination of laser technologies with retinoid therapy provides a synergistic effect: laser exposure enhances skin permeability for active substances, reduces inflammation, and normalizes seborregulation, while retinoids help correct follicular hyperkeratosis and prevent the formation of new comedones.

Conclusions

The combined use of a pulsed-dye laser, fractional thulium laser, and retinoids demonstrates high clinical efficacy and good tolerability. This method accelerates remission

onset, reduces the risk of post-acne formation, and can be considered a promising direction in modern dermatological practice for the management of severe and treatment-resistant forms of acne.

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