

Precision Dermal Remodeling with Monopolar RF for Periorbital Wrinkles

By Renata Violato, MD

Periorbital wrinkles are among the earliest and most noticeable signs of facial aging and represent a persistent clinical challenge in aesthetic practice. The periocular region is anatomically distinct, with thin dermal layers, minimal subcutaneous fat, dense vascular networks and constant dynamic movement generated by the orbicularis oculi muscle. These factors predispose the area to early wrinkle formation while simultaneously limiting its tolerance to aggressive aesthetic interventions. As a result, clinicians must operate within a narrow therapeutic window, balancing efficacy with safety when treating periorbital aging.

Patient demand for non-invasive periorbital rejuvenation continues to increase, driven by the desire for natural-looking results and minimal downtime. However, not all energy-based technologies are equally suited for this region. Devices that rely on chromophore-dependent absorption or focal thermal injury may increase the risk of prolonged erythema, edema, or post-inflammatory pigmentary changes, particularly in thin periocular skin. Consequently, there is growing interest in treatment modalities capable of delivering controlled, uniform dermal remodeling while preserving epidermal integrity and minimizing procedure-related risk.¹

Rationale for Monopolar Radiofrequency in the Periorbital Region

Monopolar radiofrequency (RF) offers a chromophore-independent mechanism of tissue heating, generating thermal energy through tissue resistance rather than optical absorption. This allows RF energy to uniformly penetrate the dermis, regardless of skin type or pigmentation. Uniform dermal heating is critical in the periorbital area, where uneven energy distribution may lead to inconsistent outcomes or increased adverse effects.

Volnewmer (Classys, Seoul, South Korea) is a monopolar RF device specifically designed to optimize the balance between clinical efficacy and safety. The system incorporates a continuous water-cooling mechanism that actively regulates epidermal temperature throughout energy delivery. At the same time, the handpiece features a gold-coated tip with high electrical conductivity, ensuring predictable, homogeneous and efficient

RF energy transmission to the tissue. This design minimizes superficial overheating while enabling effective dermal heating in a continuous 1000 ms pulse, a feature essential in the delicate periocular region. By maintaining epidermal protection, Volnewmer allows for sufficient thermal stimulation to the dermis without compromising surface safety.^{2,3}

Clinical Observations

The clinical images presented demonstrate representative outcomes following Volnewmer treatment in the periorbital area. Standardized pre- and post-treatment photographs reveal visible improvement in fine lines across the entire periorbital area, including the infraorbital, lateral canthal and supraorbital regions. Compared with baseline images, post-treatment assessment shows smoothing of static wrinkles at rest, reduced dynamic creasing during facial expressions and enhanced upper eyelid opening. The findings are consistent with previously reported clinical outcomes associated with monopolar RF treatments.

Beyond wrinkle reduction, improvements in overall skin texture and dermal compactness are evident. The treated skin appears more uniform, with enhanced surface reflectance and reduced textural irregularity. Importantly, these changes persist beyond the immediate post-treatment period, suggesting true dermal remodeling rather than transient edema-related effects. No clinically significant adverse events, including blistering, prolonged erythema or post-inflammatory hyperpigmentation, were observed, supporting the favorable safety profile of monopolar RF in the periocular area.

Biological Basis of RF-Induced Dermal Remodeling

From a histological perspective, periorbital aging is associated with progressive structural changes within the dermis, including collagen fragmentation, elastin fiber disorganization, and depletion of extracellular matrix (ECM) components such as glycosaminoglycans and proteoglycans. These alterations lead to dermal thinning, reduced elasticity and the formation of fine rhytides characteristic of periocular aging.^{3,4}

Monopolar RF induces controlled thermal stress within the dermis, resulting in immediate

collagen fiber contraction and initiation of a wound-healing cascade. This cascade involves fibroblast activation and upregulation of key signaling pathways, including transforming growth factor- β (TGF- β). Activation of TGF- β signaling promotes synthesis of new collagen fibers, elastin reorganization, and the restoration of ECM components, ultimately increasing dermal density and tensile strength.⁵

Unlike focal thermal coagulation techniques using high-intensity focused ultrasound (HIFU), volumetric RF produces diffuse, non-ablative and gradual tissue remodeling. This mechanism is particularly advantageous in the periorbital region, where subtle improvements are preferred over abrupt tissue contraction or surface injury. Gradual remodeling also contributes to natural-looking outcomes and sustained improvement in skin quality.^{3,5}

Device Design and Treatment Control

A key differentiating feature of Volnewmer is its continuous water-cooling system, which actively protects the epidermal layer during energy delivery. This enables clinicians to deliver stable treatment parameters without frequent interruptions for surface cooling, improving efficiency and consistency. Uniform energy coverage is essential in the periocular region and avoids the risk of asymmetry.²

Effective epidermal protection also enhances patient comfort during treatment, allowing clinicians to maintain optimal energy levels. Consistent dermal heating supports improved tolerability, which is critical for achieving reliable clinical outcomes. Precise device-level control of thermal delivery plays an important role in translating the biological advantages of monopolar RF into predictable real-world results.

Safety and Tolerability

The Volnewmer treatment was well tolerated. Patients typically experienced mild, transient erythema that resolved within several hours. Significant edema, bruising or extended downtime was not observed, allowing immediate return to daily activities. The absence of prolonged recovery is particularly relevant for periorbital treatments, where patient expectations are high.

The favorable tolerability profile observed aligns with previously published safety data for monopolar RF treatments and underscores the importance of controlled energy delivery and effective epidermal cooling in minimizing adverse events.

Clinical Positioning

Based on the observed clinical outcomes and established biological mechanisms, Volnewmer



Before and after periorbital wrinkle treatment with Volnewmer monopolar radiofrequency
Photos courtesy of Renata Violato, MD

may be effectively positioned within both prejuvenation and rejuvenation treatment strategies. In younger patients with early signs of periorbital aging, monopolar RF may serve as a preventative approach to preserve dermal integrity and delay wrinkle progression. In patients with established fine wrinkles and mild skin laxity, Volnewmer offers a non-invasive option to improve skin texture and quality, either as a standalone treatment or as part of a multimodal aesthetic treatment approach.

Conclusion

The clinical evidence presented supports the use of Volnewmer as a safe and effective monopolar radiofrequency device for the treatment of periorbital wrinkles. Through controlled volumetric dermal heating and continuous epidermal cooling, Volnewmer facilitates collagen remodeling and enhancement of skin quality while maintaining a favorable safety profile. These characteristics make it a valuable non-invasive modality for clinicians seeking reliable solutions for periorbital rejuvenation.

References:

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