CLINICAL VALIDATION OF THE APPLICATION PROTOCOL OF 6.78-MHz MONOPOLAR RADIOFREQUENCY TECHNOLOGY BASED ON THE GLOGAU CLASSIFICATION AND STRUCTURED FACIAL MAPPING FOR REJUVENATION

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ABSTRACT

Monopolar radiofrequency (RF) is a well-established technology used to treat tissue laxity, promote skin rejuvenation, and redefine facial contours. It generates controlled thermal energy that stimulates fibroblast activity, neocollagenesis, and neoelastogenesis, resulting in progressive improvement of skin firmness and quality. Rejera® technology, based on the emission of 6.78-MHz monopolar radiofrequency, operates through capacitive coupling with deep dermal heating while preserving epidermal integrity.

The development of a clinical protocol based on the Glogau classification allows treatment individualization according to the degree of photoaging and skin laxity.
Objective: To validate a clinical application protocol using the Glogau classification as a guide for determining the number of shots per facial region, ensuring treatment standardization and safety.
Methods: A prospective clinical study was conducted with 20 women aged 35–65 years, classified as Glogau grades II, III, and IV. A single session of monopolar RF was performed with thermal monitoring, standardized anatomical facial marking, and clinical evaluation using photographic documentation and a 5-point Likert satisfaction scale.
Results: Visible improvement in skin firmness and tone was observed within 30 days after treatment, with an overall satisfaction rate of 92%. The protocol proved to be safe, effective, and reproducible, particularly for mild to moderate skin laxity.
Conclusion: Standardization based on the Glogau classification enables precise and personalized application of monopolar radiofrequency, reinforcing the importance of evidence-based aesthetic practice. Further studies with larger sample sizes and longer follow-up periods are recommended.

Keywords: Rejuvenation; Radiofrequency; Rejera®; Glogau Classification; Skin Laxity; Aesthetics; Aesthetic Medicine.

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1. INTRODUCTION

Monopolar radiofrequency (RF) is a consolidated technology in medical aesthetics and is widely used for the treatment of tissue laxity, skin rejuvenation, and facial contour redefinition. Its clinical effectiveness is associated with the generation of controlled heat in the deeper dermal layers, leading to collagen denaturation and stimulation of neocollagenesis and neoelastogenesis. These biological responses result in progressive improvement in skin firmness and overall quality (Elsaie, 2009; Weiss, 2013).

Rejera® technology, based on the emission of monopolar radiofrequency at a frequency of 6.78 MHz, presents biophysical characteristics comparable to platforms such as Volnewmer®, CoolFace®, and OligoX®. These systems operate through capacitive coupling, enabling deep dermal heating while preserving epidermal integrity. This frequency range allows a favorable safety profile, adequate thermal comfort, and measurable clinical efficacy in facial and periocular treatments.

The development of a clinical protocol based on the Glogau classification allows therapeutic individualization according to the degree of photoaging and skin laxity. Proposed by Richard Glogau, this classification system divides skin aging into four stages based on the presence of dynamic and static wrinkles, pigmentary changes, and skin texture alterations (Glogau, 1996). Such clinical standardization is essential to align treatment intensity with the patient's actual anatomical needs, promoting predictable outcomes and procedural safety.

The objective of the present study was to validate a clinical protocol for the application of Rejera® technology by considering:

- the Glogau classification as a criterion for skin aging grading;
- standardized facial and periocular anatomical mapping to control regional shot distribution;
- adjustment of the number of applications according to clinical severity, allowing a standardized, safe, and effective technical approach.

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2. MATERIALS AND METHODS

This prospective clinical study aimed to validate an application protocol for Rejera® technology, based on 6.78-MHz monopolar radiofrequency, using two applicators (Derma 2.5 × 2.5 cm and Fine 0.5 × 0.5 cm). The protocol was structured according to the Glogau classification (grades I–IV) and standardized facial and periocular anatomical mapping. A neutral conductive gel was used to ensure adequate coupling.

2.1 Study Population

Twenty women aged between 35 and 65 years were included and classified as Glogau grades II, III, or IV (Glogau, 1996). Inclusion criteria comprised the presence of mild to moderate facial skin laxity, absence of active dermatological diseases, and no contraindications to radiofrequency therapy. Exclusion criteria included recent dermal fillers (<6 months), pregnancy, breastfeeding, active skin disorders, and the presence of cardiac pacemakers.

2.2 Equipment

The Rejera® platform (DNA Med, Brazil) is a monopolar radiofrequency device operating at a fixed frequency of 6.78 MHz, featuring automatic temperature control and contact-based applicators.

2.3 Development of the Clinical Protocol

The protocol was designed based on the correlation between the degree of skin aging (Glogau I–IV) and the number of radiofrequency shots applied per facial anatomical region. The face was divided into the upper, middle, and lower thirds, as well as the periocular area. Anatomical markings followed standardized surface anatomy techniques described by Trevidic et al. (2018), respecting muscular and

osseous boundaries to ensure safety.

2.3.1 Clinical Protocol Parameters

- standardized facial and periocular anatomical marking;
- adjustment of shot number according to Glogau grade;
- thermal monitoring (37–42 °C) using an infrared thermometer;
- standardized photographic documentation (frontal, 45°, and profile views) before treatment and at 30-day follow-up;
- patient satisfaction assessed using a 5-point Likert scale.

2.3.2 Technical Sequence

Clinical evaluation, skin cleansing, photographic documentation, placement of the return electrode, selection of the appropriate applicator, parameter adjustment, application with conductive gel, post-procedure cleansing, and cosmetic post-treatment protocol.

2.4 Marking of the Application Area

The anatomical marking of the treatment area was performed in a standardized manner, taking into account facial and cervical bony and muscular boundaries. This process was based on surface anatomical landmarks and protocols described by Trevidic et al. (2018). The procedure aimed to ensure uniform distribution of monopolar radiofrequency shots using the Rejera® system (6.78 MHz) and to enhance safety in anatomically high-risk regions.

The treatment area was delineated using a white dermatographic pencil, creating a geometric grid subdivided into quadrants across the upper, middle, and lower facial thirds, as well as the cervical region. The Derma (2.5 × 2.5 cm) and Fine (0.5 × 0.5 cm) applicator tips were assigned to specific areas according to the degree of skin laxity and regional sensitivity.

Contraindicated areas were highlighted in red and included:

- **Suborbital region** (immediately below the ocular globe), due to reduced dermal thickness and proximity to the orbital septum;
- **Anterior cervical region** (thyroid area), owing to the risk of glandular overheating;
- **Preauricular region** (near the tragus), because of the presence of critical anatomical structures, such as the facial nerve and superficial blood vessels.

This marking strategy was essential for ensuring procedural safety, standardization of the technique, minimization of thermal risks, and homogeneous coverage of the treated area.

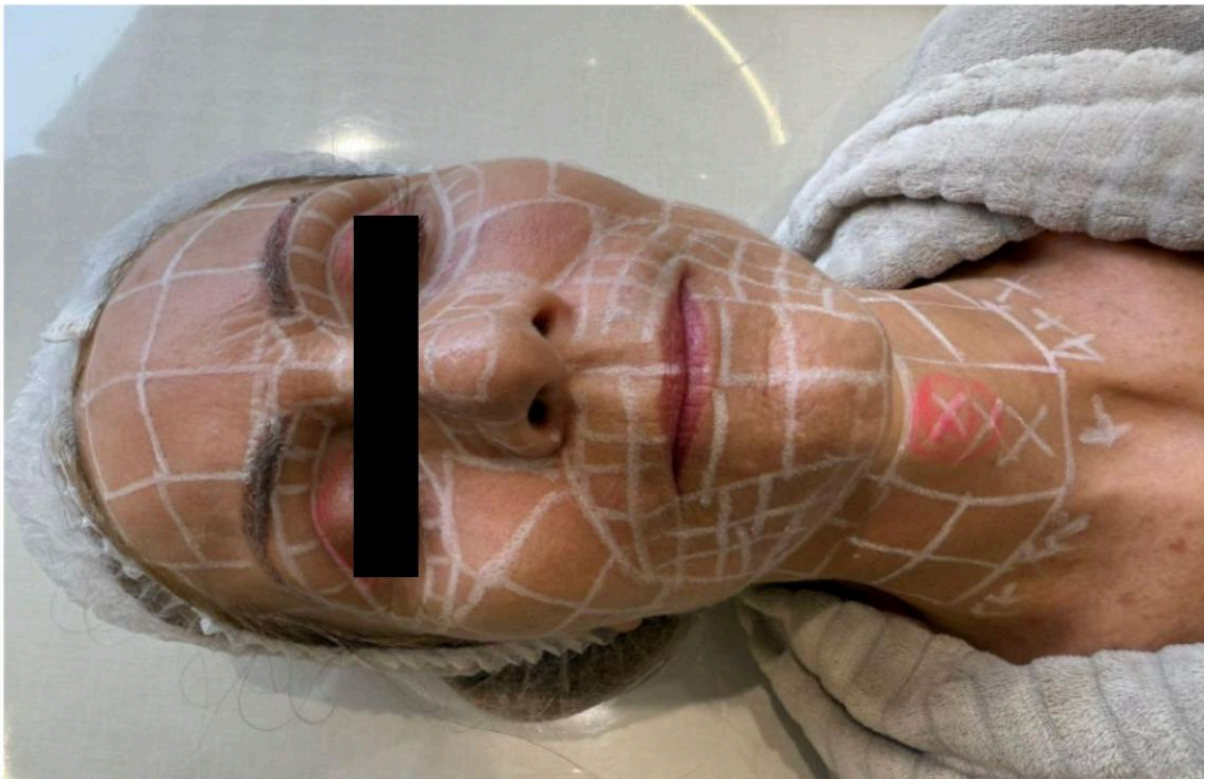

Figure 1. Frontal view of facial and cervical anatomical markings for monopolar radiofrequency application using Rejera® (6.78 MHz).

In Figure 1, precise delineation of shot distribution areas according to anatomical regions is shown. White lines indicate treatment fields distributed across the upper, middle, lower, and cervical thirds, following a protocol based on the Glogau classification. Areas highlighted in red represent technical exclusion zones where application is contraindicated for safety reasons.

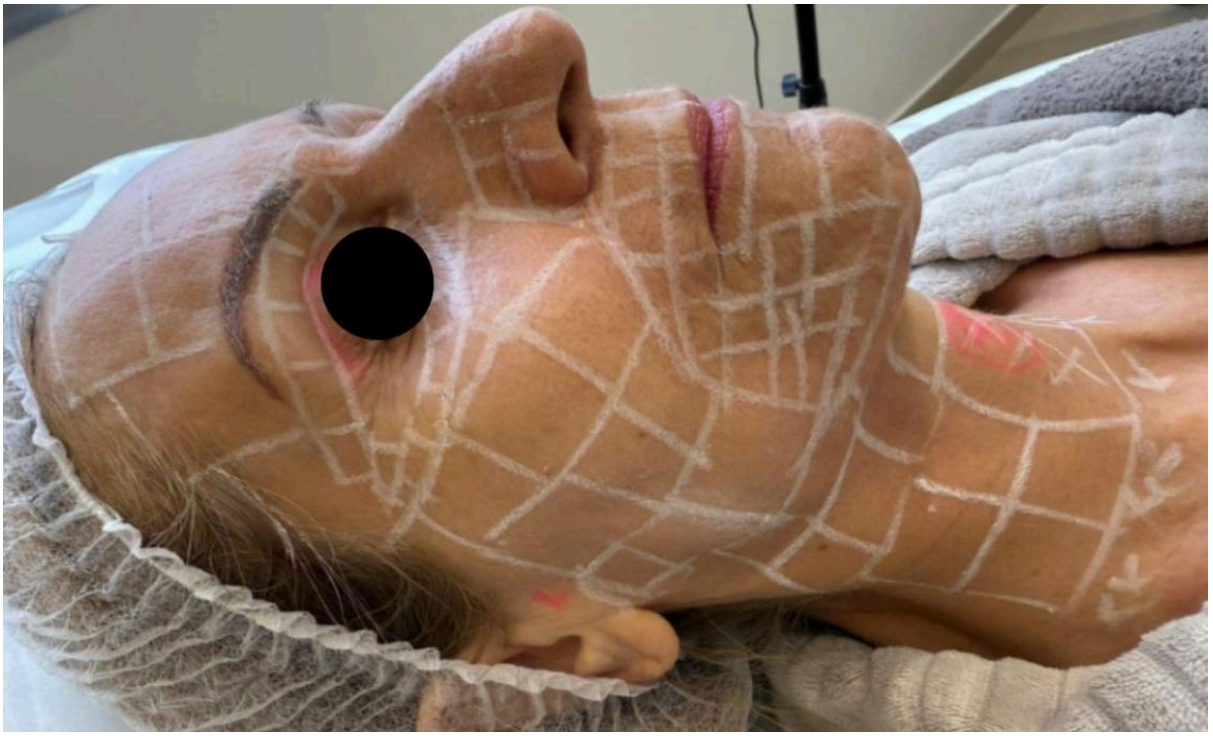

Figure 2. Lateral view of facial and cervical anatomical markings for monopolar radiofrequency

application using Rejera® (6.78 MHz).

Figure 2 illustrates the lateral anatomical markings with precise delineation of shot distribution areas by region. White lines indicate treatment fields across the upper, middle, lower, and cervical regions, according to the Glogau-based protocol. Red-highlighted areas correspond to exclusion zones where application is contraindicated due to safety concerns.

2.5 Application Protocol Sequence

Table 1. Application Protocol Steps

Step	Description
1. Pre-treatment Evaluation	Review the evaluation form and clinical history. Assess contraindications and aesthetic concerns.
2. Equipment Preparation	Connect the adapter and power on the device. Select the appropriate applicator tip. Check the deionized water level and turn on the system at least 10 minutes in advance to allow cooling.
3. Cleansing and Photodocumentation	Remove makeup and metallic accessories near the treatment area. Cleanse the skin using makeup remover, neutral soap, and light exfoliation (optional). Perform photographic documentation (frontal, 45°, and 90° views). Mark treatment areas with a white pencil (Derma: 2.5 cm^2; Fine: 1.0 × 1.2 cm).
4. Return Electrode and Final Preparation	Properly position the return electrode. Clean the applicator tip thoroughly and wear gloves. Apply contact gel. Attach the applicator tip and begin energy delivery.
5. Parameter Selection	Assess patient sensitivity or follow the protocols suggested in the device guide. Adjust radiofrequency intensity and vibration according to region, skin thickness, and patient tolerance.
6. Application	Ensure full contact between the applicator tip and skin, verify adequate contact gel coverage, and deliver each shot.
7. Completion	Remove all conductive gel. Finish with the preferred post-treatment cosmetic protocol.
8. Post-treatment and Follow-up	Capture post-procedure photographs. Schedule follow-up imaging at 10, 20, and 30 days. Sessions may be repeated after 30 days, based on clinical evaluation.

2.6 Sequential Protocol Tables

- **Table 2.** Full Face Protocol

Glogau Grade	Passes	Energy	Vibration	Shots
Glogau I	1 pass	10–20%	Medium	220 shots – Derma
Glogau II	2 passes	10–20%	Medium	440 shots – Derma
Glogau III	3 passes	10–30%	High	660 shots – Derma
Glogau IV	3 passes	10–30%	High	780 shots – Derma

- **Table 3.** Mandibular Contour Protocol

Glogau Grade	Passes	Energy	Vibration	Shots
Glogau I	1 pass	10–20%	Medium	40 shots – Derma
Glogau II	2 passes	10–20%	Medium	60 shots – Derma
Glogau III	3 passes	10–30%	High	120 shots – Derma
Glogau IV	3 passes	10–40%	High	160 shots – Derma

- **Table 4.** Submental Lift Protocol

Glogau Grade	Passes	Energy	Vibration	Shots
Glogau I	1 pass	10–20%	Medium	40 shots – Derma
Glogau II	2 passes	10–20%	Medium	60 shots – Derma
Glogau III	3 passes	10–30%	High	80 shots – Derma
Glogau IV	3 passes	10–40%	High	100 shots – Derma

- **Table 5.** Fox Eyes (Periorbital Region) Protocol

Glogau Grade	Passes	Energy	Vibration	Shots
Glogau I	1 pass	10–20%	Medium	40 shots – Fine
Glogau II	2 passes	10–20%	Medium	60 shots – Fine
Glogau III	3 passes	10–30%	Medium	80 shots – Fine
Glogau IV	3 passes	10–30%	Medium	100 shots – Fine

During treatment, skin surface temperature was continuously monitored using an infrared

thermometer and maintained between 37 °C and 42 °C, in accordance with safety recommendations for radiofrequency procedures (Jacobson et al., 2012). Application was performed using slow, continuous movements, avoiding excessive overlap to prevent heat accumulation and to ensure uniform thermal stimulation.

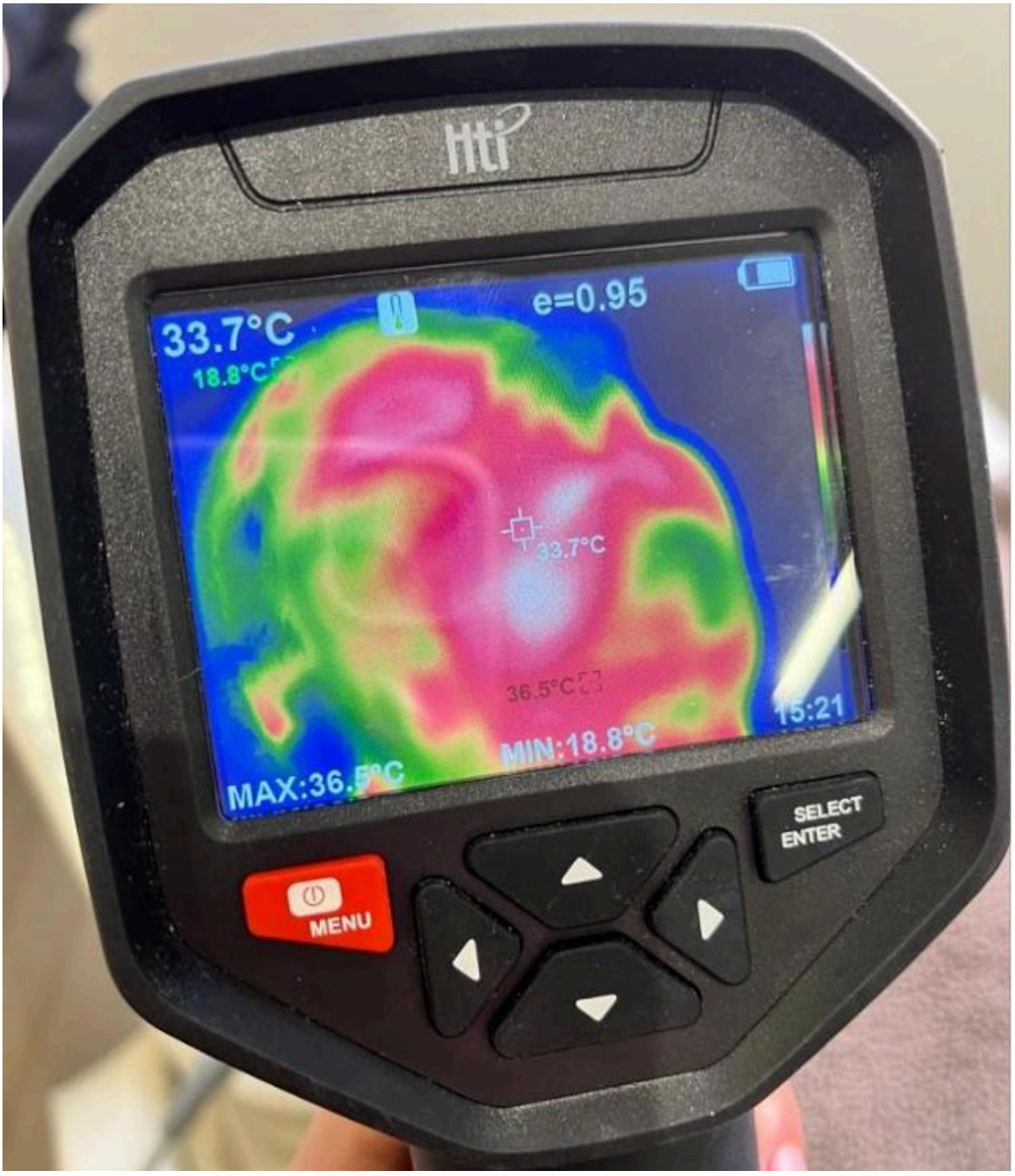

Figure 3. Thermographic image after the first monopolar radiofrequency pass (Rejera® 6.78 MHz).

The thermographic image obtained immediately after the first pass with the Derma applicator demonstrates controlled elevation of skin surface temperature to 33.7 °C, with homogeneous thermal distribution. Red and pink color tones indicate activation of a controlled inflammatory process associated with heat shock protein 47 (HSP47) activation and initiation of the desired thermal response for type I and type III collagen bio-stimulation. The maximum recorded temperature was 36.5 °C, remaining within the recommended safety range (37–42 °C). This thermal response

represents a key indicator of protocol efficacy and of safe, homogeneous energy delivery achieved by monopolar radiofrequency.

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3. ACTIVATION OF HEAT SHOCK PROTEINS (Hsps) INDUCED BY CONTROLLED TEMPERATURE

Monopolar radiofrequency, when applied at a frequency of 6.78 MHz, promotes controlled heating of deep tissues through the conversion of electromagnetic energy into heat. This thermal increase, which may reach temperatures ranging from 42 °C to 70 °C in the reticular dermis without causing tissue damage, generates sublethal cellular stress capable of triggering a physiological response mediated by heat shock proteins (HSPs).

Among the activated proteins, HSP47 stands out as a collagen-specific molecular chaperone involved in the folding and stabilization of type I collagen, playing a fundamental role in the proper organization of the extracellular matrix during tissue regeneration (Nakai et al., 1992). In addition, significant activation of HSP70 is observed; this protein is well known for its cytoprotective, anti-apoptotic, and anti-inflammatory functions, contributing to the maintenance of cellular homeostasis and stimulation of neocollagenesis (Calderwood et al., 2007). HSP90, although less specific, also participates in the thermal stress response by stabilizing proteins involved in cellular signaling and tissue remodeling.

This thermally induced response generated by radiofrequency is directly related to the desired clinical effect of dermal biostimulation, including increased skin firmness, elasticity, and overall quality through the reorganization and synthesis of new collagen fibers. The presence of these proteins is also associated with improved resistance of the skin to oxidative stress and cellular senescence.

Understanding these molecular mechanisms allows optimization of clinical radiofrequency protocols, reinforcing the importance of safe parameters that ensure therapeutic efficacy with patient comfort—particularly when combined with cooling systems such as cryogeny integrated into the applicator, which enhances tolerance to thermal accumulation during prolonged sessions.

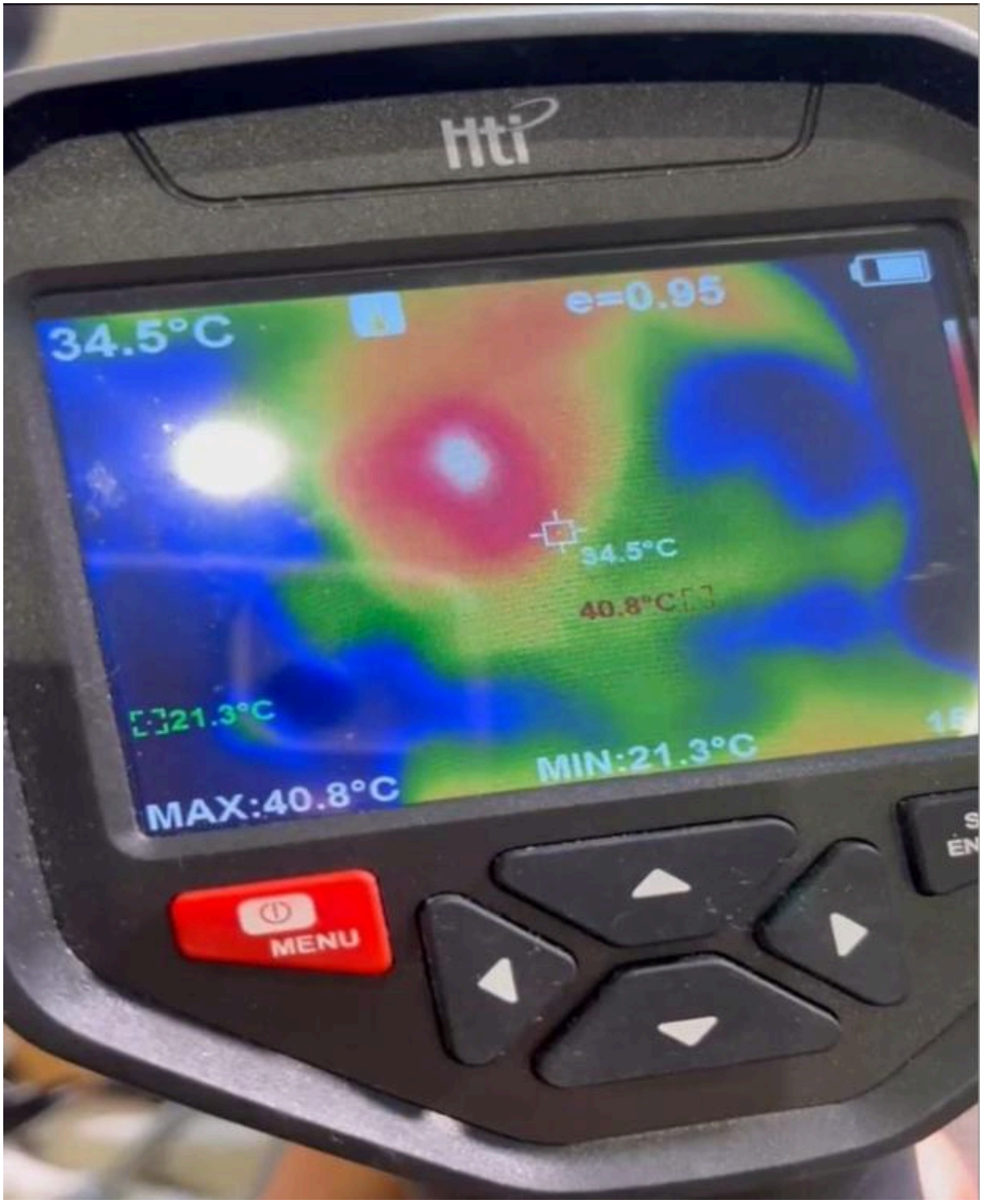

Figure 4 – Real-time thermographic evaluation of skin temperature using a thermal imaging camera during the third pass, with targeted shots applied to the face for Glogau grade III assessment.

A progressive increase in cutaneous temperature following repeated passes with 6.78 MHz monopolar radiofrequency technology is demonstrated by thermographic imaging. The intense thermal elevation, visible as warm color tones, is directly associated with the effectiveness of deep tissue heating—essential for skin biostimulation and regeneration.

However, this thermal accumulation may also intensify patient discomfort, particularly in more sensitive areas. Therefore, the cryogenically cooled applicator plays a fundamental role by providing

immediate thermal relief, enhanced safety, and improved treatment tolerance, enabling more effective sessions with greater patient comfort.

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4. EVALUATION OF RESULTS

The evaluation parameters included:

- Standardized photographic documentation (baseline and up to 30 days after the first session);
- Clinical assessment of skin laxity using a quartile-based laxity scale;
- Patient satisfaction level assessed using a 5-point Likert Satisfaction Scale.

To evaluate patients' subjective perception of the effectiveness of 6.78 MHz monopolar radiofrequency treatment, a 5-point Likert scale was applied. This instrument is widely used in clinical research to measure the degree of agreement with statements related to treatment experience.

The scale was administered after the final session of the therapeutic protocol in a controlled environment, with verbal guidance provided by the responsible professional to ensure proper understanding of the statements. The questionnaire consisted of five items addressing different dimensions of perceived clinical response:

1. Perceived improvement in skin firmness
2. Visible reduction of laxity in the treated area
3. Overall satisfaction with the obtained results
4. Comfort during technology application
5. Likelihood of recommending or repeating the treatment

Each statement was rated according to the following response scale:

- 1: Strongly disagree
- 2: Partially disagree
- 3: Neutral / Indifferent
- 4: Partially agree
- 5: Strongly agree

The data were compiled and analyzed using descriptive statistics, calculating the mean satisfaction score per item and the overall satisfaction score per patient for interpretative purposes.

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5. EXPECTED RESULTS

A single application of Rejera® technology, based on 6.78 MHz monopolar radiofrequency, is designed to induce perceptible clinical effects within the first weeks following the procedure. When applied with precise parameters and adequate thermal control, monopolar radiofrequency selectively heats deep dermal layers, triggering a sequence of physiological responses that culminate in improved skin firmness and facial contour redefinition (Elsaie, 2009; Laubach et al., 2010).

Even with a single session, previous studies have demonstrated that immediate collagen fiber contraction combined with progressive neocollagenesis may result in visible improvement of mild to moderate laxity, particularly in patients classified as Glogau grades II and III (Gold, 2007; Weiss,

2013).

The expected biological response includes:

- Thermal contraction of existing collagen fibers (immediate effect);
- Induction of cytokines and growth factors promoting extracellular matrix remodeling (progressive effect);
- Stimulation of fibroblasts for synthesis of type I and III collagen over 21–30 days (Sadick et al., 2004; Laubach et al., 2010).

Clinical outcome evaluation will be performed through standardized photographic documentation obtained before treatment and 30 days after application, with qualitative analysis of treated regions—particularly the midface, mandibular line, and periorbital area. These records will be accompanied by descriptive clinical charts and a subjective satisfaction scale assessing parameters such as skin texture, tonicity, and firmness (Alexiades et al., 2011).

Based on radiofrequency physiological mechanisms and available literature, the following clinical outcomes are expected:

- Noticeable improvement of mild to moderate facial laxity, especially in the malar, mandibular, and periocular regions;
- Attenuation of fine lines, particularly on the forehead and lateral canthal areas;
- High patient satisfaction rates even after a single session, with cumulative effects observed over the following 30 days (Fitzpatrick et al., 2003).

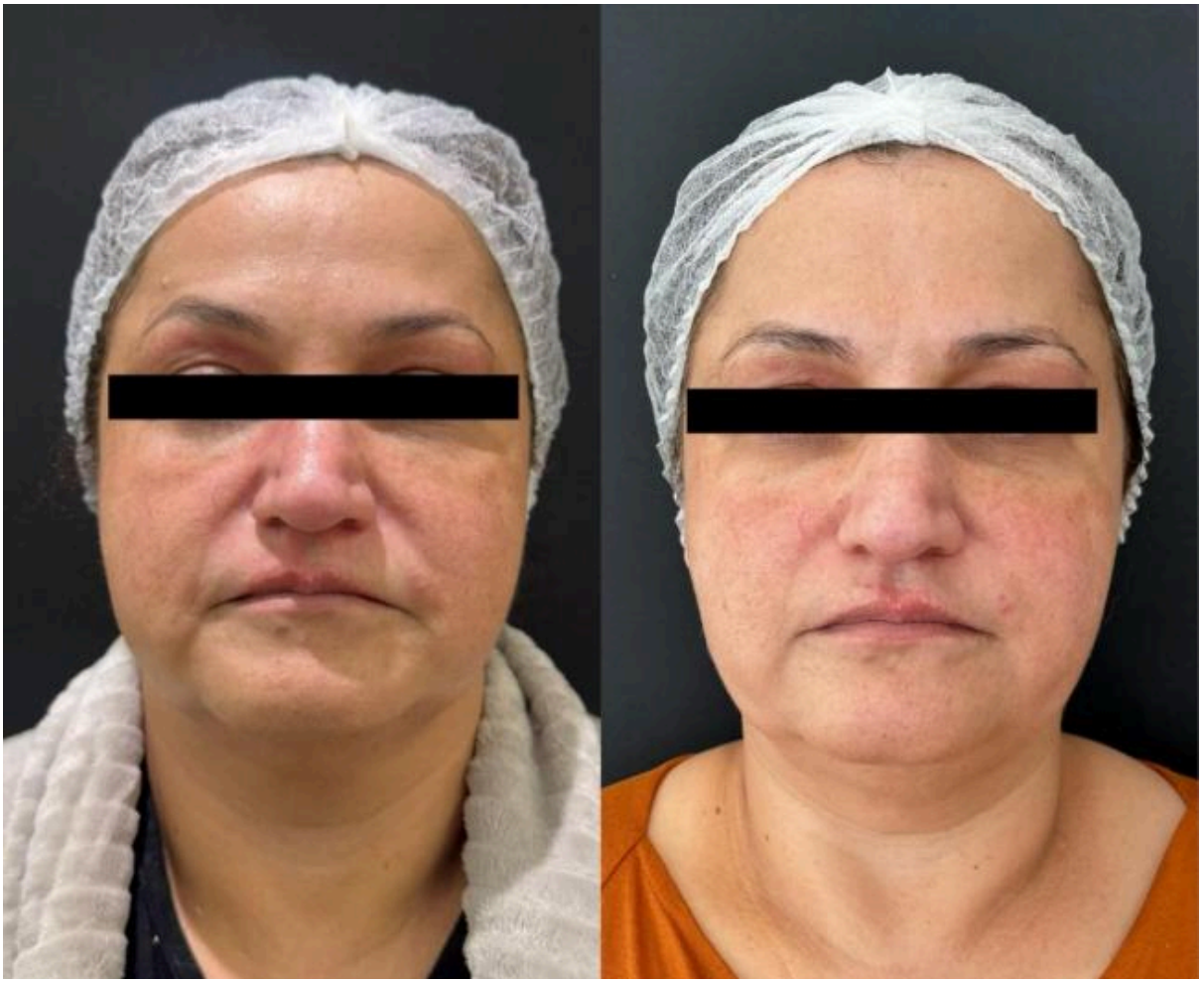


Figure 5 – Glogau grade III patient treated with full-face monopolar radiofrequency Rejera® (6.78 MHz). Pre-treatment image on the left and post-treatment image on the right, obtained 7 days after a single session, demonstrating improved firmness and facial contour.

Figure 6 – Glogau grade II patient treated with full-face monopolar radiofrequency Rejera® (6.78 MHz). Pre-treatment image on the left and immediate post-treatment image on the right after a single session, demonstrating improved firmness, facial contour, and tightening effect.

Figures 7 and 8 – Glogau grade III patient treated on the full face, submental region, and neck with monopolar radiofrequency Rejera® (6.78 MHz). Pre-treatment image on the left and immediate

post-treatment image on the right after a single session, showing improved firmness, facial contour, and reduction of fine wrinkles. Voluntary photographic documentation.

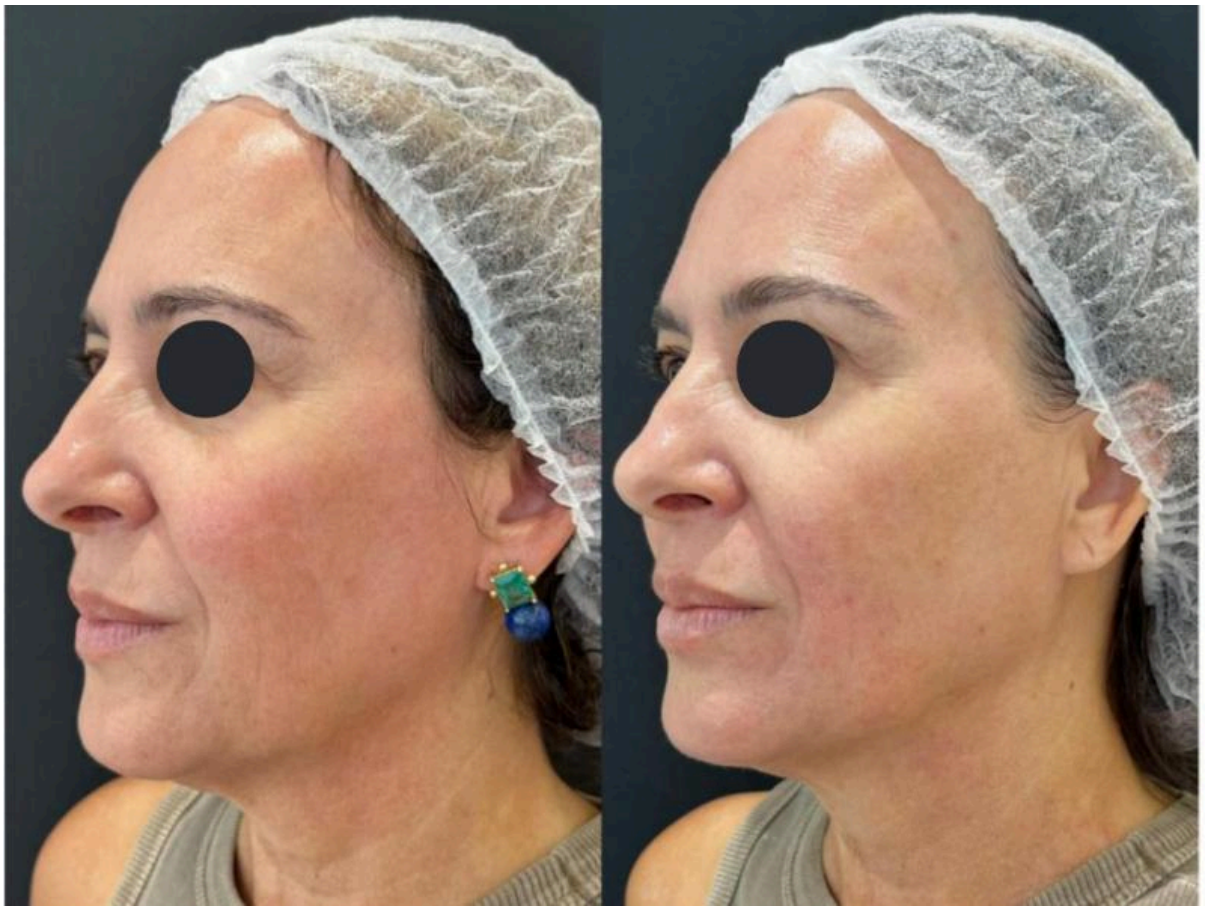


Figure 9 – Glogau grade II patient treated on the full face, submental region, and neck with monopolar radiofrequency Rejera® (6.78 MHz). Pre-treatment image on the left and immediate post-treatment image on the right after a single session, demonstrating improved firmness, facial contour, and reduction of fine wrinkles. Voluntary photographic documentation.

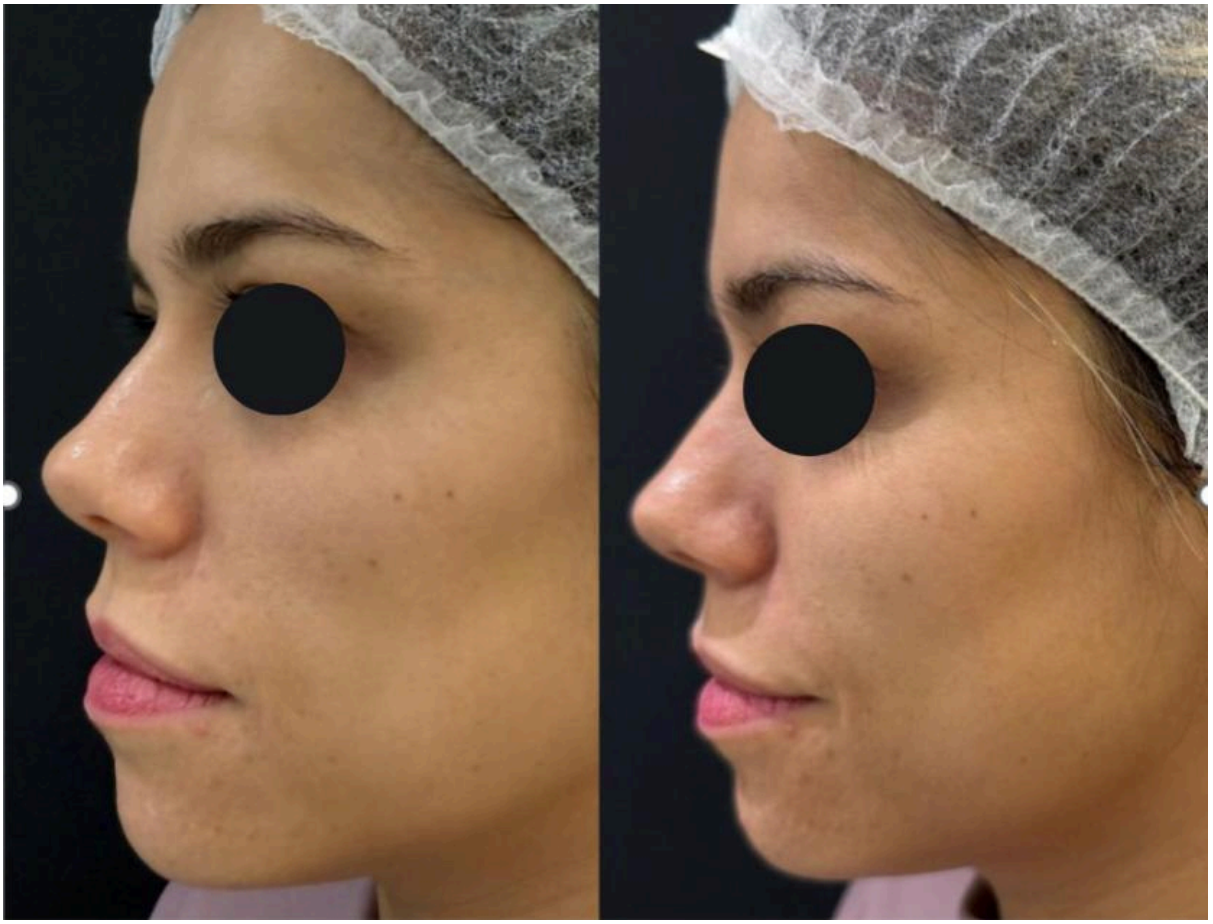
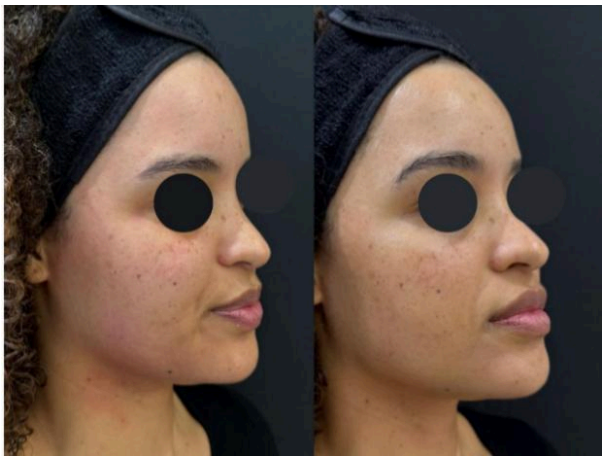
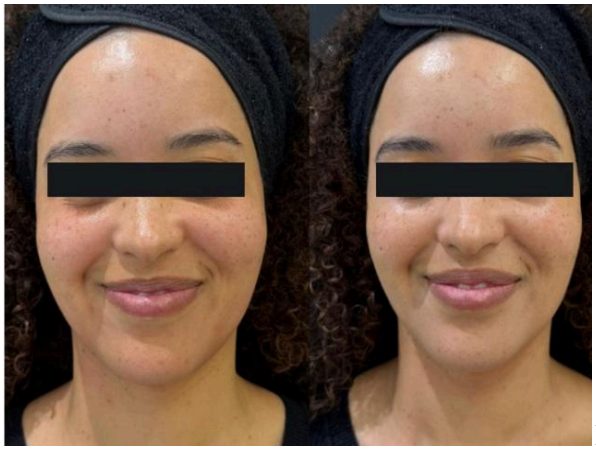


Figure 10 – Glogau grade II patient treated with full-face monopolar radiofrequency Rejera® (6.78 MHz). Pre-treatment image on the left and immediate post-treatment image on the right after a single session, demonstrating improved firmness, facial contour, and tightening effect.





Figures 11 and 12 – Glogau grade II patient treated with full-face monopolar radiofrequency Rejera® (6.78 MHz). Pre-treatment image on the left and immediate post-treatment image on the right after a single session, demonstrating improved firmness, facial contour, and tightening effect. Voluntary photographic documentation.

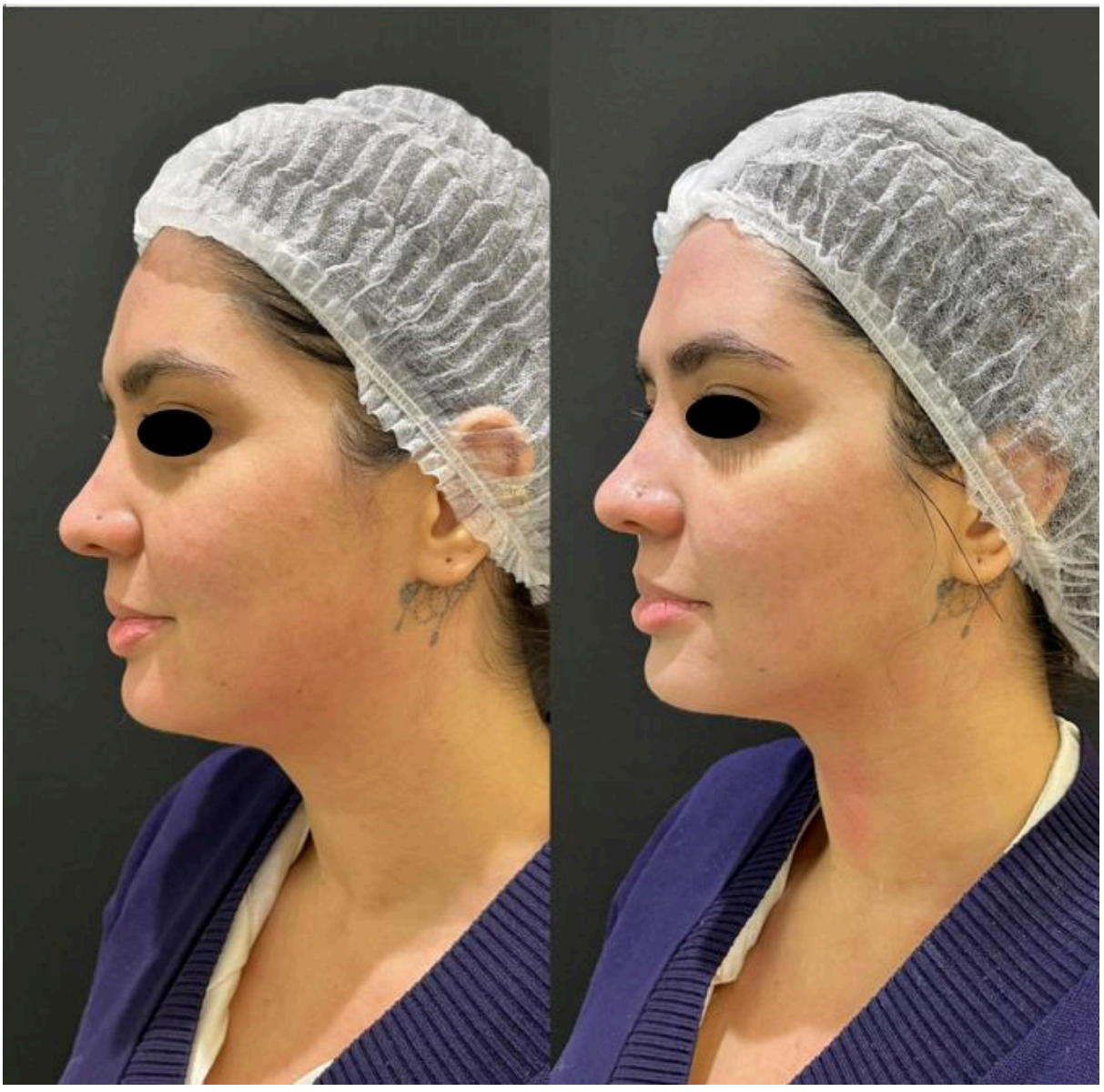


Figure 13 – Glogau grade II patient treated with full-face monopolar radiofrequency Rejera® (6.78

MHz). Pre-treatment image on the left and immediate post-treatment image on the right after a single session, demonstrating improved firmness, facial contour, and tightening effect. Voluntary photographic documentation.

The expectations are consistent with outcomes reported for similar technologies such as Volnewmer®, OligoX®, and CoolFace®, which have demonstrated clinical efficacy after a single application when performed with adequate thermal control, precise anatomical marking, and rigorous technical parameters (Alexiades-Armenakas et al., 2011; Sadick, 2004).

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6. DISCUSSION

Monopolar radiofrequency has been widely studied as a safe and effective strategy for the treatment of skin laxity, showing favorable results even after a single application, particularly in cases of mild, moderate, advanced, and even severe aging. Rejera® technology, a Brazilian-manufactured system operating at 6.78 MHz and incorporating hydric cryogeny for tissue temperature control, is comparable to high-performance platforms such as Volnewmer®, CoolFace®, and OligoX®, which operate within the same frequency spectrum and utilize capacitive applicators with automated thermal control (Alexiades-Armenakas et al., 2011; Weiss, 2013).

Previous studies with similar devices have demonstrated that monopolar radiofrequency promotes tissue remodeling through immediate contraction of existing collagen fibers followed by progressive stimulation of neocollagenesis, resulting in improved skin firmness and tonicity within 21–30 days (Sadick et al., 2004; Elsaie, 2009).

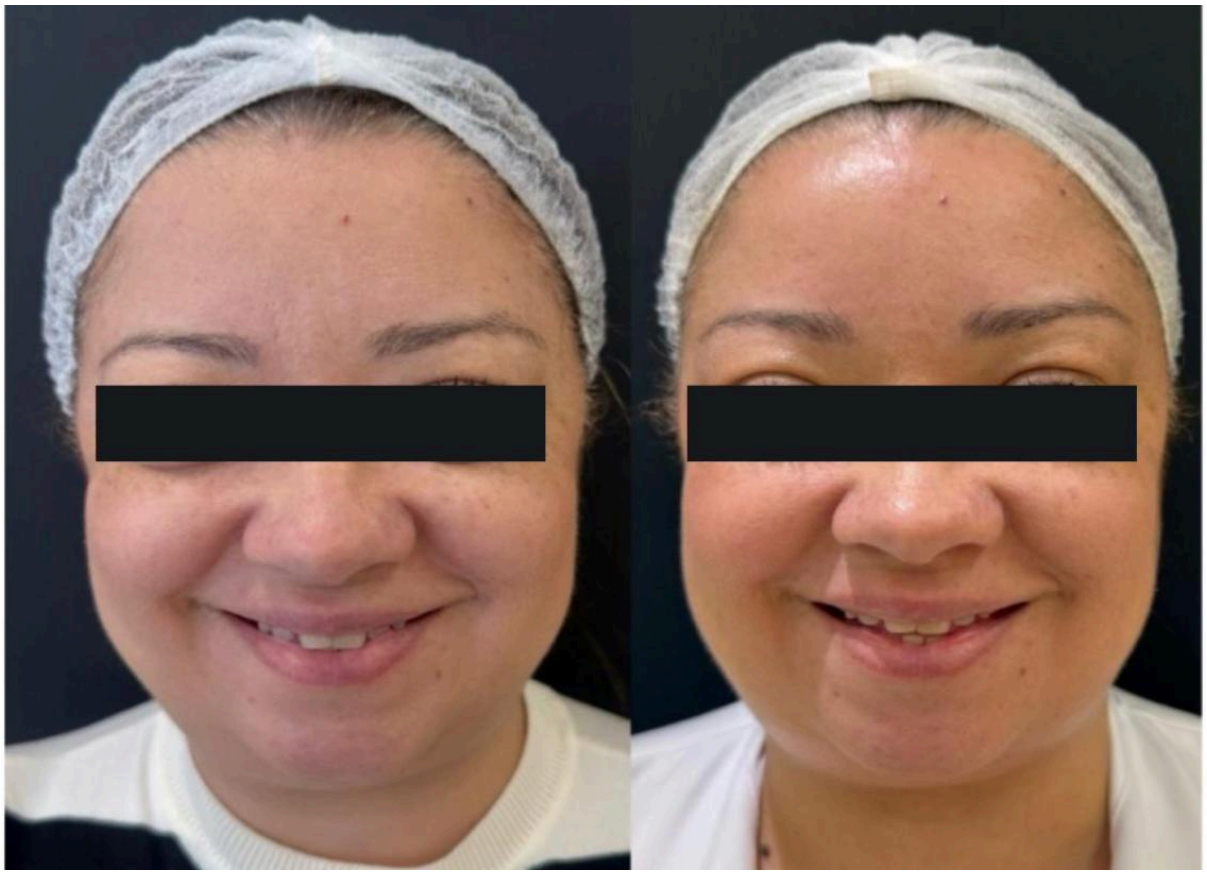

Figure 14 – Clinical outcome of a Glogau grade II patient submitted to a single session of monopolar radiofrequency Rejera® (6.78 MHz) with full-face application.
Images obtained under standardized lighting and framing conditions:
• Left: before treatment;

• Right: 30 days after application.

Improvement in skin texture and firmness, attenuation of the nasolabial fold, and subtle elevation of the eyebrow tail are observed, consistent with the tightening effect of radiofrequency in the frontal and temporal regions, as well as increased skin luminosity and firmness.

By employing the Glogau classification as a basis for therapeutic planning, the present protocol provides an objective clinical criterion to individualize treatment intensity, adjusting the number of shots per region according to the degree of skin aging. This approach aligns with international guidelines emphasizing the importance of parameter personalization based on the type and severity of laxity, thereby avoiding undertreatment or excessive tissue heating (Glogau, 1996; Gold, 2007).

The reduced size of one of the Rejera® monopolar radiofrequency applicators—Rejera® Fine (0.5 cm × 0.5 cm)—used in this protocol allowed precise and safe application in anatomically delicate areas such as the upper and lower eyelids, perioral region, nasolabial fold, and superior periocular region, favoring eyebrow arch elevation. This precision is attributed to the smaller spot diameter and surface cooling of the applicator, which enable greater control of thermal energy deposition and uniform coverage of the treated area.

Targeted treatment of anatomically challenging regions using applicators unsuitable for conventional devices allows a personalized, anatomy-respecting approach while promoting effective collagen stimulation.

Studies indicate that applicators with smaller contact areas deliver higher energy density per cm^2, increasing the effectiveness of thermal delivery in difficult-to-access regions (Glogau, 1996; Brightman et al., 2009). Furthermore, areas such as the eyelids and periocular region have reduced dermal thickness, requiring millimetric precision during application—an advantage provided by reduced-spot applicators such as Rejera® Fine.

Facial and periocular anatomical marking represents a technical differential aimed at ensuring safety, particularly in high-risk areas such as the nasolabial fold, deep malar region, and lower eyelid. The literature emphasizes that precise definition of shot placement is essential to avoid thermal accumulation in regions with reduced skin thickness, such as the lower eyelid, where the risk of overcorrection or residual edema is higher (Wanitphakdeedecha et al., 2020; Trevidic et al., 2018).

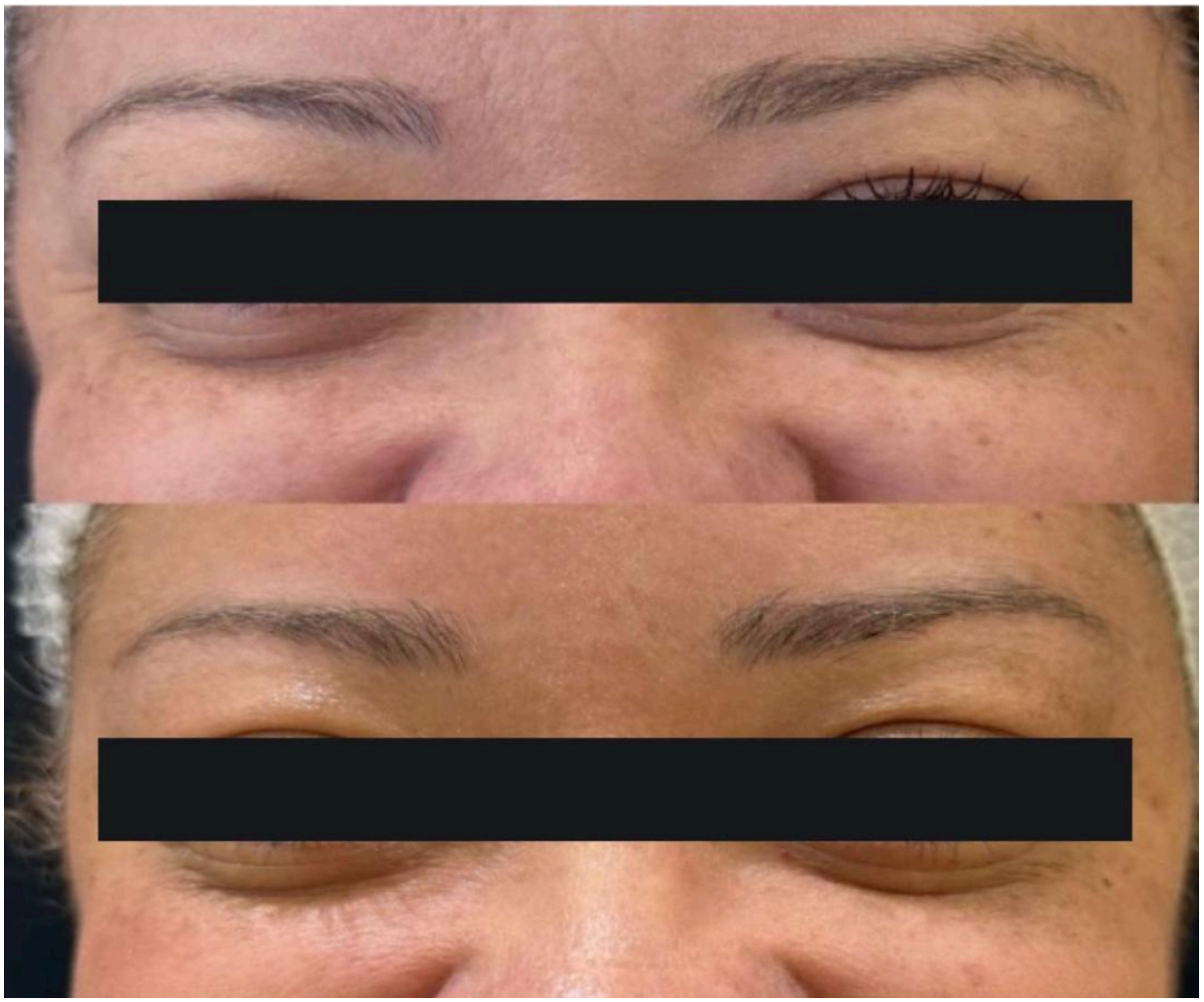

Figure 15 – Clinical outcome in the periocular region of a Glogau grade II patient treated with monopolar radiofrequency Rejera® (6.78 MHz) using a single application with the Fine applicator.
• Upper image: before treatment;
• Lower image: 30 days after the session.

Smoothing of periorbital lines, improvement in lower eyelid texture, and subtle elevation of the eyebrow tail are observed, consistent with dermal collagen contraction and localized thermal action promoted by the technology.

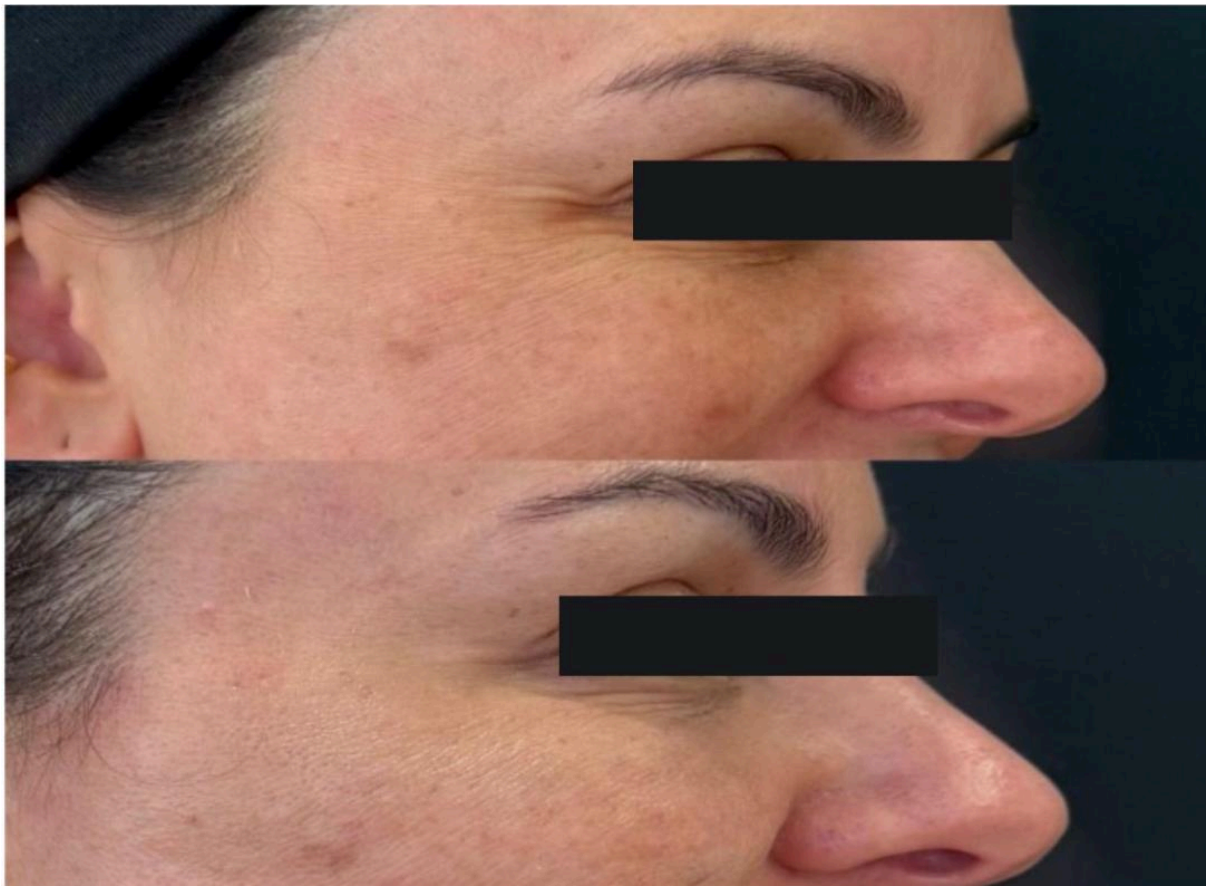

Figure 16 – Clinical outcome in the lateral periocular region of a Glogau grade III patient treated with a single session of monopolar radiofrequency Rejera® (6.78 MHz) using localized application with the Fine applicator.
• Upper image: before treatment;
• Lower image: 30 days after application.

A significant reduction in lateral expression lines (“crow’s feet”), improvement in skin texture, and smoothing of the temporal region are evident, consistent with the thermal effects of radiofrequency on the reticular dermis, promoting neocollagenesis and extracellular matrix reorganization.

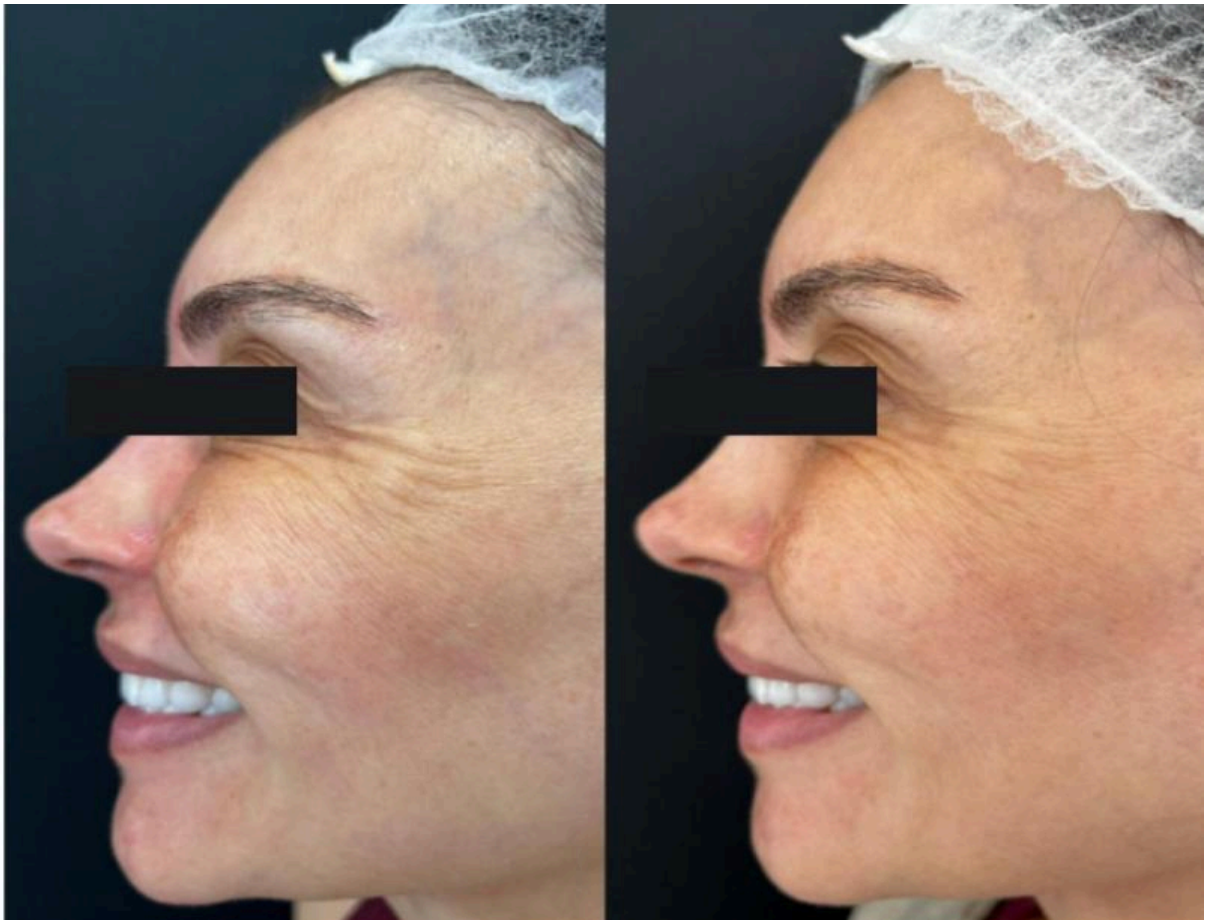

Figure 17 – Clinical outcome in the lateral periocular region of a Glogau grade III patient treated with a single session of monopolar radiofrequency Rejera® (6.78 MHz) using segmented application with the Fine applicator.
• Left image: before treatment;
• Right image: 30 days after application.

A noticeable attenuation of both static and dynamic expression lines ("crow's feet") was observed, accompanied by improvements in skin texture and homogenization of the dermal surface, indicating collagen remodeling and the controlled inflammatory response expected from the clinical protocol.

Comparatively, the Volnewmer® device has been described as highly effective in inducing immediate dermal contraction and progressive tissue remodeling, particularly in regions such as the lower third of the face and the submental area (Laubach et al., 2010). OligoX®, in turn, is distinguished by its real-time temperature control, with profiles similar to those adopted by the Rejera® platform. CoolFace® combines radiofrequency with superficial cryoregulatory technologies, promoting comfort and epidermal protection—concepts comparable to the conductive gel used during Rejera® application.

Although the present proposal employs a single session for initial protocol validation, the literature indicates that cumulative effects may be achieved with multiple applications, especially in more advanced Glogau grades. Nevertheless, even single-session interventions can generate clinically meaningful responses, with satisfaction rates exceeding 80% when properly applied (Fitzpatrick et al., 2003; Alexiades et al., 2011).

By integrating anatomical foundations, clinical aging classification, and precise technical control of the number of energy deliveries, this protocol contributes to the development of a safe, evidence-based aesthetic practice with potential for standardization and clinical reproducibility.

7. CHARACTERIZATION OF THE FINE AND DERMA HANDPIECES AND RETURN ELECTRODE OF THE REJERA® DEVICE

The Rejera® monopolar radiofrequency device (6.78 MHz) is equipped with different handpieces and accessories that allow treatment customization according to anatomical area and clinical needs. The technical characteristics, indications, and dimensions of the Fine and Derma handpieces and the return electrode are described below.

Figure 16. Fine handpiece, Derma handpiece, and return electrode.

Fine Handpiece:
A slim, high-precision handpiece specifically designed for applications in delicate anatomical areas, such as the periorbital, perioral, and frontal regions. It enables localized thermal control, promoting targeted bio-stimulation in areas that are difficult to access.

Derma Handpiece:
A medium-sized multipoint handpiece designed for treating larger areas of the face and body, such as the cheeks, neck, décolletage, and arms. It provides uniform energy delivery with moderate thermal penetration, making it ideal for skin laxity treatment and improvement of dermal texture.

Return Electrode:
An essential component of the monopolar system, responsible for safely closing the electrical circuit during the procedure. It must be positioned on a body area with adequate vascularization and muscle volume to ensure safety and effective current conduction.

Figure 17. Fine handpiece of the Rejera® system, indicated for delicate facial areas, focusing on precision and localized thermal control.

Description:
The Fine handpiece of the Rejera® device is a precision applicator with a slim design, intended for treatments in areas that are difficult to access or require high anatomical detail, such as the periorbital, perioral, frontal regions, and small skin folds. Its focused emission provides precise thermal stimulation, promoting dermal bio-stimulation and superficial rejuvenation.

Approximate size: 6.5 × 8.5 mm

Application areas:
• Periorbital region
• Lip contour
• Fine facial lines
• Jawline contour
• Dark circles and eyelids
• Nasal dorsum

Figure 18. Derma handpiece of the Rejera®, used for large facial and body areas for skin laxity treatment and dermal regeneration.

Description:
The Derma handpiece is a multipoint applicator indicated for larger areas of the face and body, offering uniform coverage and moderate thermal penetration. Its design allows safe and efficient heating of dermal layers, favoring collagen stimulation in treatments addressing skin laxity, irregular texture, and contour definition.

Approximate size: 21.5 × 21.5 mm

Application areas:
• Full face
• Forehead
• Neck
• Submental area
• Décolletage
• Jawline contour
• Hands
• Arms
• Abdomen
• Knees
• Thighs
• Gluteal region
• Lumbar/flank area
• Intimate area (external—labia majora)

Figure 19. Rejera® return electrode, responsible for closing the monopolar radiofrequency circuit and ensuring safe current dissipation.

Description:
The return electrode is a fundamental accessory of the Rejera® monopolar radiofrequency system, responsible for closing the electrical circuit and ensuring patient safety. It should be positioned in full contact with the skin, preferably in a body region with good vascularization and muscle mass, such as the thigh or lumbar area.

Approximate size:
Dimensions: 10 cm × 15 cm
Thickness: 3 mm

Usage recommendations:
• Position opposite to the treatment field
• Avoid bony areas or regions with minimal tissue thickness
• Ensure full adhesion with conductive gel, if indicated

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8. REJERA® ULTRACOOL TECHNOLOGY – PROGRAMMED COOLING

8.1 Cryogenics: Principles, Benefits, and Safety Aspects

Cryogenics is the science that studies the behavior of materials and systems at extremely low temperatures, generally below −150 °C. This technology has been widely applied in medicine, biotechnology, aesthetics, the food industry, and materials engineering due to its ability to alter molecular structures and promote controlled effects in tissues and substances (Almeida et al., 2020).

In the medical and aesthetic context, cryogenics stands out for its therapeutic and regenerative potential. Procedures such as cryolipolysis and cryosurgery use very low temperatures to induce beneficial physiological responses, including adipocyte apoptosis, vasoconstriction followed by reactive vasodilation, local analgesia, and stimulation of tissue regeneration (Murad et al., 2019). These techniques are non-invasive, well tolerated, and present a low risk of complications when performed by trained professionals.

The main clinical benefits of cryogenics include:
• Reduction of localized fat through cryolipolysis;
• Improvement in skin tone and firmness due to circulatory stimulation;
• Reduction of inflammatory processes and edema via vasoconstriction;
• Muscle recovery and analgesia in physical therapy and sports rehabilitation;
• Preservation of cells, tissues, and biological samples in laboratory and research environments (Meyers & Liu, 2017).

Regarding safety, strict technical criteria must be observed, particularly concerning exposure time, applied temperature, and individualized patient assessment. Improper use of cryogenics may lead to adverse effects such as cold burns, tissue necrosis, and nerve injury. Therefore, this technology should be applied according to validated clinical protocols and by adequately trained professionals (Carvalho & Santos, 2021).

Standardization of cryogenics use in both clinical and industrial settings is supported by national and international guidelines, such as those from the Brazilian Association of Technical Standards (ABNT) and the International Organization for Standardization (ISO), which provide guidance on handling cryogenic gases, applicator devices, temperature control, and patient and operator protection (ABNT, 2018; ISO, 2019).

Thus, cryogenics represents a promising, safe, and effective technological tool when applied based on scientific evidence and in accordance with biosafety principles and responsible clinical practice.

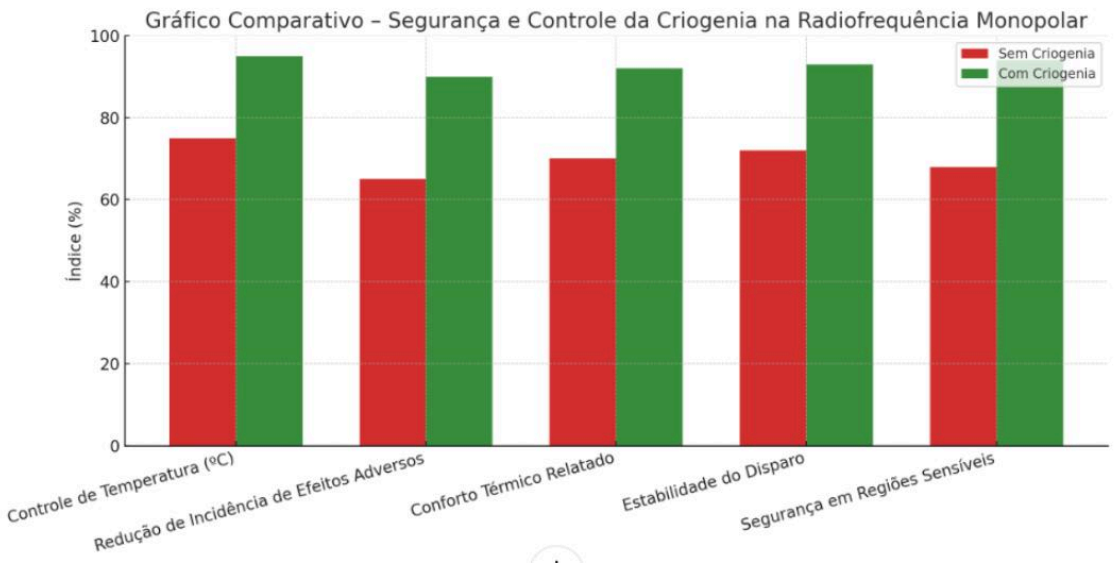

Figure 20. Statistical comparison between monopolar radiofrequency applications with and without cryogenics.
A dual-column graph illustrates percentage performance indices across five technical parameters: temperature control, reduction of adverse effects, reported thermal comfort, shot stability, and safety in sensitive regions. Applications with cryogenics demonstrated superior outcomes across all evaluated criteria, particularly in thermal control (95%) and anatomical safety (94%), indicating greater efficacy and protection compared with radiofrequency without an integrated cooling system.

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9. SATISFACTION STATISTICS FOLLOWING APPLICATION OF THE REJERA® PROTOCOL

Statistical analysis demonstrated high levels of clinical satisfaction associated with the application of the Rejera® protocol, structured according to the Glogau classification, standardized anatomical mapping, and thermal control based on the number of energy deliveries. As shown in Figure 21, 92% of participants reported overall satisfaction with the obtained results, even after a single session, highlighting the protocol's effectiveness in addressing mild to moderate skin laxity.

Perceived improvement in skin firmness and tonicity within 30 days was reported by 88% of participants, suggesting an early clinical response to induced bio-stimulation. Regarding procedural safety, standardized anatomical mapping and personalized application criteria were considered satisfactory by 95% of respondents, reinforcing the reliability of the method.

Additionally, 90% of patients approved the personalization of therapy according to the degree of cutaneous aging proposed by the Glogau classification. Finally, 85% reported perceptible clinical efficacy even in single-session protocols, emphasizing the therapeutic potential of 6.78 MHz monopolar radiofrequency as a non-invasive alternative for facial rejuvenation.

These data support the feasibility, safety, and applicability of the Rejera® protocol, positioning it as a standardized, effective, and evidence-based aesthetic strategy.

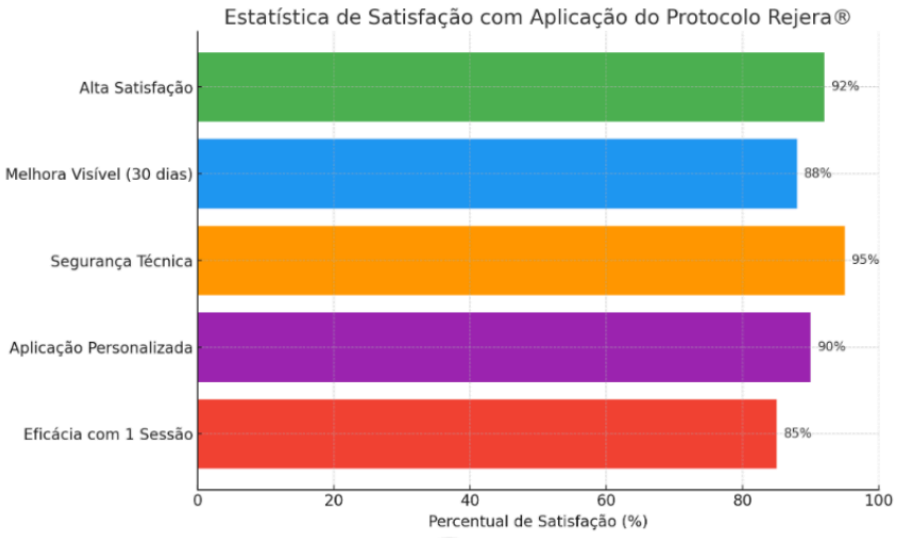

Figure 21. Graph illustrating the main clinical satisfaction indicators following application of the Rejera® protocol, highlighting high approval rates for efficacy, technical safety, and acceptance of personalized treatment.

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10. CONCLUSION

Clinical validation of the Rejera® technology application protocol—based on the Glogau classification, facial anatomical mapping, and regional control of the number of energy deliveries—demonstrated a promising and safe approach for the treatment of mild to moderate skin laxity.

Even with a single session, the physiological effects of 6.78 MHz monopolar radiofrequency are expected to produce visible improvements in skin firmness and tonicity within 30 days, with high patient satisfaction rates when applied with technical rigor and individualized assessment.

Using the Glogau classification as a guide for determining the number of energy deliveries reinforces the importance of evidence-based aesthetic practice, enabling precise, efficient application tailored to the degree of cutaneous aging. Furthermore, anatomical delineation of treated areas ensures procedural safety, particularly in sensitive regions such as the periorbital area.

Based on the technical, physiological, and comparative foundations presented, the Rejera® protocol offers a new opportunity for standardization among aesthetic and aesthetic medicine professionals, with potential for clinical replication and broad application in non-invasive facial rejuvenation.

Further studies with larger sample sizes and longer follow-up periods are warranted to better elucidate cumulative effects and the impact of this technology across different skin phototypes and degrees of aging.