



Timedsurgical Mixed Peelings: Standardized High Frequency and Resorcinol Protocol for Rejuvenation and Pigmentation Correction (Video 1, Video 2-3)

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Abstract

Background: Facial rejuvenation implies eliminating or reducing wrinkles and skin blemishes, if present. Lasers and chemical peels are used. These techniques are not standardized and can lead to incomplete outcomes: Recurrence of pigmentation, hypopigmentation, dark spots and unsatisfactory results

Objective: After testing various acids, phenols and lasers, we developed and perfected mixed peeling. This standardized technique combines a physical approach with resorcinol in an aqueous solution, aiming to achieve consistent and safe aesthetic outcomes.

Materials and Methods: Mixed peeling combines a single chemical agent, resorcinol, dissolved in water or in 3% hydrogen peroxide, with the physical action delivered via the TIMED TD 50 micropulse apparatus (Korpo), which delivers specific high frequency currents producing three effects: de epithelialization, epidermal permeabilization and Electroporo Cosmesis. Resorcinol, inactive on intact skin, becomes highly effective when applied after these physical actions.

Results: In 1334 patients treated between 2020 and 2025, mixed peeling improved skin texture and corrected lip wrinkles including deep ones in a single session. eliminated pigmentations, depigmented normal skin and even giant congenital melanocytic nevi of the scalp. No significant adverse events were observed. The same saturated or 50% solution produces strong, medium or light peels depending on the electrosurgical settings.

Conclusions: Timedsurgical mixed peelings represent a standardized, cost-efficient approach for facial rejuvenation and pigment correction. The combination of controlled physical action and targeted chemical action offers reproducible results with minimal downtime. In cases of hyperpigmentation, their ability to reduce melanocyte density contributes to long-lasting outcomes. Resorcinol, in contact with the dermis, has shown previously undocumented properties, which we have described in this report.

Keywords: Timedsurgical mixed peeling; Resorcinol peeling; High frequency electrosurgery; De-epithelialization; Electroporo cosmesis; Hyperpigmentation correction; Facial rejuvenation; Physical-chemical synergy; Standardized peeling protocol; Lip wrinkles; Dark circle; Skin depigmentation; Erythrosis treatment; Giant scalp nevi treatment

Introduction

Facial rejuvenation requires the correction of pigmentary alterations and wrinkles affecting the lips and eyelids. Conventional approaches primarily laser treatments and chemical peels present intrinsic limitations related to the lack of standardized protocols, interindividual variability in cutaneous response and the frequent occurrence of adverse effects, including pigmentary relapse, hypo- or hyperpigmentation, infection, cutaneous dehydration, increased sensitivity and suboptimal aesthetic outcomes [1-3].

The heterogeneity of results is attributable to the nature and concentration of the substances employed, the application parameters and the depth of action, all of which are further influenced by epidermal thickness and individual reactivity to chemical agents [4].

To address these limitations, resorcinol a phenolic compound widely used in dermatology as an antiseptic and keratolytic agent was selected [4]. In saturated aqueous solution, resorcinol does not compromise the integrity of intact skin, enabling localized, safe and reproducible application.

Its clinical effectiveness depends on the contact surface and the depth of dermal penetration, which is determined by the duration of exposure. Its clinical efficacy depends on contact, surface area and depth of dermal penetration, which depend on the duration of exposure.

Once it reaches the dermis, resorcinol exerts a cross-linking effect, reducing microtelangiectasias and



melanocytes, thus contributing to the prevention of pigmentation recurrence.

This article summarizes twenty-five years of clinical experience with resorcinol in the treatment of dermo-epidermal hyperpigmentation, lip wrinkles and irregularities of the lower eyelid margin. Current techniques for lip wrinkles demonstrate limited efficacy; phenol yields superior results but induces prolonged erythema and shiny depigmented skin [5].

Similarly, physical methods for hyperpigmentation lack standardization and carry risks of hypopigmentation and dehydration. Agents that inhibit melanogenesis require prolonged use, provide only temporary benefits and do not achieve complete pigment clearance.

The Timed TD 50 Micropulse apparatus (Korpo) enables standardized delivery of diathermic current across approximately seventy procedures (technique for implementing measured electrosurgical data), with precise regulation of real power output, emission duration and waveform characteristics [6].

Modulation of high-frequency currents, combined with the consistent electrical conductivity of human tissues, allows selective interventions with minimal risk to deeper dermal structures. The uniformity of tissue conductivity supports the reproducibility of procedural parameters. The device is cost-effective and does not require annual maintenance due to its internal self-monitoring system.

The mixed peeling protocol comprises three standardized procedures:

- De-epithelialization
- Epidermal permeabilization
- Electroporo cosmesis

Each technique has specific clinical indications and defined operational parameters, ensuring reproducible and safe aesthetic outcomes. The short duration and superficial action of the pulsed diathermic current prevent thermal injury to the dermis and facilitate transdermal absorption of resorcinol.

This article provides a systematic description of the operating protocols, instrumentation and clinical applications of these methods, highlighting their relevance in the management of dermo-epidermal pigmentation disorders, wrinkles and cutaneous irregularities.

Materials and Methods

Devices and equipment

All procedures were performed using the Timed TD 50 Micropulse (Korpo srl, Italy), a high-frequency

electrosurgical system designed for controlled tissue interaction through pulsed emissions. The system features:

- Real-time self-diagnosis at each startup.
- Immunity to electromagnetic interference.
- No requirement for periodic calibration.

Over 70 protocols are pre-programmed into the device as part of the Timedsurgery platform (technique for implementing measured electrosurgical data), allowing clinicians to perform a range of procedures, including de-epithelialization, Electroporo cosmesis and epidermal permeabilization.

Electrosurgical handpieces and settings

Electrosurgical procedures were conducted using interchangeable Electromaniples with variable shapes and diameters, adapted to specific treatment areas and indications. The electrodes used are:

EM10-yellow electromaniple, bent at an angle (0.20 mm diameter) - primarily for de-epithelialization.

EM15 Electromaniple (1.5 mm diameter) - used in epidermal permeabilization.

Rotating electrodes - used in Electroporo cosmesis

Programmable settings included the following adjustable parameters:

Emission type: Direct pulsed

Emission duration: Ranging from 0.3 to 24.5 hundredths of a second. Power (Coag mode): 1 to 50 Watts, discretized, depending on the procedure.

Patient safety and procedure protocols

Before each procedure, patients received a clinical evaluation and informed consent was obtained. When required, local or regional anaesthesia was administered using lidocaine or mepivacaine with epinephrine, depending on the sensitivity of the area being treated.

All mixed peeling was conducted in accordance with dermatologic safety standards. Post-procedural care includes:

- Avoidance of topical agents or creams in the treated area.
- Using paper towels to dry the area to promote crust formation gently.
- Observation of natural crust formation and desquamation.

Healing times, the duration of redness and patient-reported outcomes were recorded. Standardized clinical photography and video were used to document treatment efficacy. Informed consent included



permission to use the images.

Results

De-epithelialization procedures

De-epithelialization using the Timed TD 50 system was applied in multiple clinical contexts with satisfactory outcomes.

The standard parameters used were: Direct pulsed 4/9 hundredths of a second, 2-3 Watts (coagulation mode) and the EM10-yellow Electromaniple bent at an acute angle. The corner of the yellow Electromaniple should touch the slightly moistened skin surface. The epidermis is removed with the same non-activated electrode. The technique effectively removed the epidermis while preserving the dermal papillae and capillary plexus [7].

No medication of any kind, ointments, creams, disinfectants, etc., should be applied. This would lead to hypertrophic scars. No infections have ever occurred with mixed peels. If the patient is itchy, they can take an antihistamine tablet at 6 p.m. It is not advisable to carry out the treatment during hormonal fertility therapy due to the prolonged redness that may occur.

Vitiligo and piebaldism

In cases of stable vitiligo and piebaldism, pulsed de-epithelialization was used to prepare the skin for the application of a graft of cultured autologous keratinocytes and melanocytes, derived from a 1 cm² biopsy taken 20 days prior [8].

Successful graft engraftment was observed without scarring or adverse events in more than 250 cases treated [9].

Epidermolysis bullosa

The technique was also applied to transfer genetically modified epidermis in a patient with bullous epidermolysis, enabling successful grafting without disruption of the underlying dermis [10].

Periocular wrinkle and festoons reductio

Mixed peeling with resorcinol saturated, diluted to 50%, was used to treat eyelid festoons and crow's feet [11]. A uniform frost was achieved in 20 seconds.

90 seconds are needed in the temporal region, where the skin is thickest. Clinical photographs revealed a notable reduction in rhytids and an improvement in skin texture (**Figure 1**).



Figure 1: ♂ 64 years old. (A) Roughness of the lower eyelid. De-epithelialization and application of a 50% diluted saturated resorcinol solution for 40 seconds; (B) Result after a single treatment.

Lower palpebral hyperpigmentation

In cases of dark circles, a single treatment session combining de-epithelialization and resorcinol application (40 seconds) resulted in a notable reduction of pigmentation (**Figure 2**). No recurrences were noted at 1-year follow-up [12]. Only the lower eyelid is treated. In the eyelids, a 50% saturated solution of resorcinol is used.

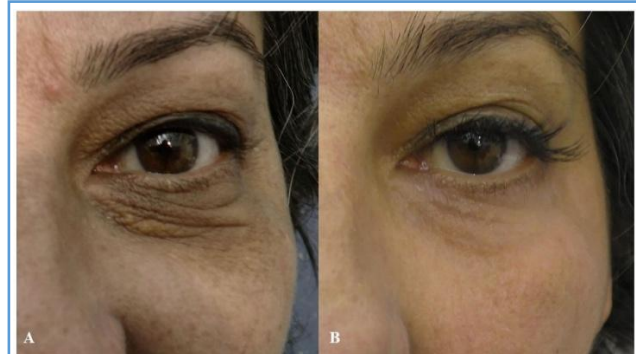


Figure 2: ♀ 50. (A) Dark circles. De-epithelialization and application of a 50% diluted saturated resorcinol solution for 40 seconds; (B) Result after a single treatment.

Perioral wrinkles

De-epithelialization of the upper and lower lip, followed by the application of resorcinol for 90 seconds, resulted in a permanent disappearance of vertical wrinkles and an improvement in skin texture (**Figures 3-4**). Healing took place under a crust with minimal post-inflammatory redness; hyperpigmentation is rare and always resolves within three months [13]. No product should be applied to the treated area. In very rare cases, a wrinkle may remain and is treated again after total healing by performing the mixed peeling in the rectangle that contains it. Once the redness has



passed, the patient must expose the lip to the sun to stimulate the melanocytes that reside in the breakthroughs of the lip hair follicles.



Figure 3: The epidermis detaches owing to the specific current, not to the abrasive action of the electrode. Bleeding is rare, as epidermal detachment occurs above the papillary-capillary plexus.



Figure 4: ♀ 49 years old. (A) Lip wrinkles. The saturated solution of resorcinol is applied for a total of 90 seconds, starting from the philtrum, followed by the wrinkles near the vermilion, and finally, for a few seconds, on the sides of the nasal wings; (B) Result after a single treatment.

Large hyperpigmented lesions

Treatment of large dermo-epidermal hyperpigmentations with de-epithelialization and the application of resorcinol (20-30 seconds) resulted in discolouration of the pigmentation over several weeks (Figure 5) [14].

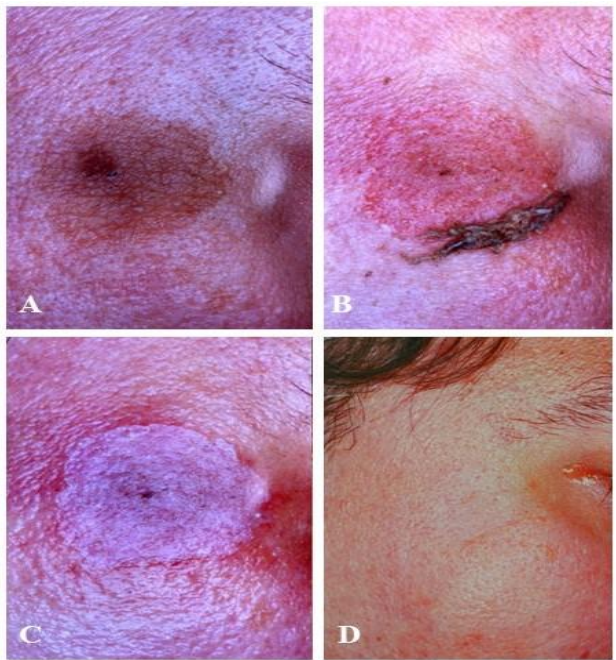


Figure 5: ♂ 42 years old. (A) Large dermo-epidermal hyperpigmentation of the face; (B) De-epithelialization; (C) Application of the saturated solution of resorcinol for 20 seconds; (D) Result after a single session.

Depigmentation in generalized vitiligo

Two sessions spaced 6 months apart (60-second resorcinol application) were sufficient to eliminate residual melanocytes (Figure 6) [15].

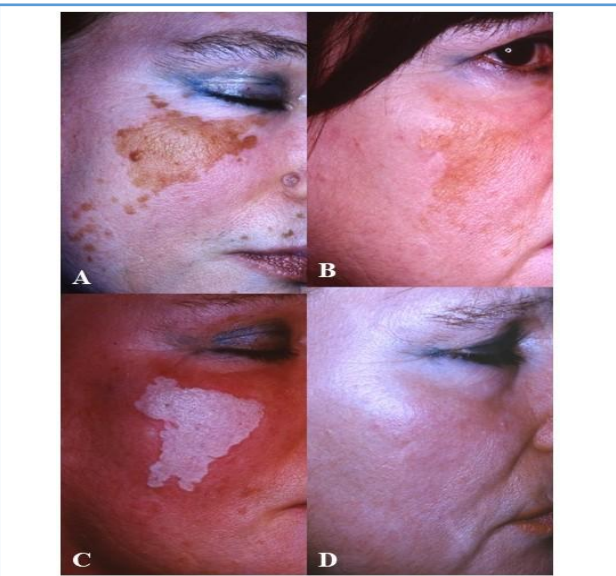


Figure 6: ♀ 55 years old. (A) Persistence of normal skin in generalized vitiligo; (B) Result after the first mixed peeling with de-epithelialization and application of resorcinol solution in saturated solution for 60 seconds; (C) After 6 months, the mixed peeling was repeated; (D) Stable depigmentation result.



Giant scalp nevi in neonates

Giant nevi of the scalp must be treated with mixed peeling within 10 days of birth. At 7 days of age, a scalp nevus is treated under general anesthesia, with de-epithelialization and a 30-second application of a saturated resorcinol solution, without hair loss or

scarring. The treatment was repeated one year later (Figure 7). In this second session, the solution was applied for 60 seconds. The nevi had transformed into a simple patch. The mixed peel saved this young patient from reconstructive surgeries whose outcomes would have affected his life and confirmed the ability of resorcinol in the elimination of melanocyte.



Figure 7: ♂ 7 days. (A) Giant congenital nevus of the scalp. De-epithelialization was performed; (B) A biopsy was taken. The resorcinol solution was applied for 30 seconds; (C) The result after the second mixed peeling session, one year later (60 seconds resorcinol); (D) After 18 years the nevus had been transformed into slightly stained skin. No hair damage

Electroporo cosmesis

Improved skin firmness and texture on the face and neck

Electroporo Cosmesis was performed by means of Direct Pulsed 0.3/5.3 hundredths of a second, 14-50 Watts (Coag) and rotating electrodes. After delivery of the current, a saturated resorcinol solution was applied for 2-3 minutes. The treatment was well tolerated. During washing, patients reported an extremely smooth skin surface followed by a pleasant tingling sensation. The skin is perfectly clean and the complexion is more uniform.

Treatment of melasma

Facial melasma is treated for a long time at 20 Watts, up to five minutes with the rotating electrode and the saturated resorcin solution in water is also maintained for a long time, until the first signs of frost. It can be objected that a limitation of this study includes the absence of a control group and the lack of objective quantification through validated scoring systems (*e.g.*, MASI for melasma).

The existence of different types of melasma and the ever-present recurrence make these checks irrelevant because they refer mainly to inhibitory therapies. With



mixed peeling, resorcin applied for a long time decreases the number of melanocytes, leading to a progressive decrease in hyperpigmentation. The low power of 20 Watts is poorly inflammatory and resorcin is not inflammatory. However, the effectiveness is determined by comparison with the neighboring skin.

Erythrosis and roughness of the face, neck and the body

To correct these imperfections, resorcinol is dissolved in 3% hydrogen peroxide until saturation. H₂O₂ enhances the action of resorcinol on dilated superficial vessels (Figure 8).



Figure 8: ♀ 49 years old. (A) Erythrosis of the face with hyperpigmentation and result after one mixed peeling session. (B) Electroporo Cosmesis at 38 Watts for a few minutes; (C) A saturated solution of resorcinol in H₂O₂ at 3% was applied until a light frost or uniform redness formed; (D) The thin superficial skin layer peels off.

Clinical improvement was observed after one or more sessions, performed every 2 months [16]. Electroporo cosmesis was performed at 50 watts on rough areas of the neck and arms and was often performed after abdominal liposuction (Figure 9).



Figure 9: ♀ 63 years old. (A) Abdominal Wrinkles. Electroporo Cosmesis at 50 Watts. A saturated solution of resorcinol in H₂O₂ at 3% was applied until a light frost appeared; (B) Result after one mixed peeling session.

Epidermal permeabilization (Mixed peeling 0.5)

For dermo-epidermal hyperpigmentation of the face, a combination of Electroporo cosmesis and mixed peeling 0.5 was employed using the EM15 Electromaniple at 0.5/24.5 hundredths of a second, 38

Watts (Coag mode). The resorcinol solution was applied until visible frosting occurred [17]. Pigmented lesions faded and treated areas were indistinguishable from surrounding skin after complete healing (Figure 10). Mixed peeling 0.5 can treat benign melanosis of the penis without anesthesia [18]. No scarring or hypopigmented patches were noted.



Figure 10: ♀ 47 years old. (A) Multiple dermo-epidermal hyperpigmentations of the face. First, Electroporo Cosmesis was performed on the entire face; (B) Subsequently, the epidermis above each spot was made porous by touching it several times with a 1.5 mm diameter electrode at 38 Watts, 0.5/ hundredths of a second; (C) The saturated solution of resorcinol in water was applied to the permeabilized epidermis until a uniform frost formed, and then to the entire face for a few minutes; (D) Result after one mixed peeling 0.5 session.

Discussion

This study demonstrates the clinical utility of specific high-frequency diathermic procedures together with the application of resorcinol for targeted dermatological applications. The Timed TD 50 system allows precise control of tissue interaction, enabling safe and reproducible interventions with minimal collateral damage.

De-epithelialization is particularly effective in preparing the skin for cell grafting in vitiligo and in aesthetic applications such as wrinkle reduction and pigmentation control. Preserving the dermal layer

appears crucial for resorcinol absorption and minimizing adverse effects.

Electroporo cosmesis, by temporarily increasing epidermal permeability, enhanced the efficacy of resorcinol in treating melasma, facial erythema and photoaging. The combination of physical and chemical modalities yielded synergistic effects, enabling consistent outcomes with low energy settings (14-20 watts).

Nonetheless, the results support the safety, efficacy and versatility of diathermic-based protocols in both medical and aesthetic dermatology.



Mixed Peeling 0.5 provided a minimally invasive solution for localized hyperpigmentation, offering advantages in safety, patient comfort and the absence of anaesthesia requirements. The permanent reduction of melanocyte activity suggests a long-lasting depigmenting effect.

Across all applications, resorcinol played a central role in modifying pigmentation and inducing controlled keratolysis. Its application after precisely timed epidermal modification allowed for targeted depth of action without systemic absorption or toxicity.

Limitations of this study include the absence of a control group and the lack of objective quantification through validated scoring systems (*e.g.*, MASI for melasma, wrinkle grading scales). Future studies should include histological analysis, long-term follow-up and standardized patient-reported outcomes.

Nonetheless, the results support the safety, efficacy and versatility of diathermic-based protocols in both medical and aesthetic dermatology.

Conclusion

The specific, standardized high-frequency currents of mixed peels followed by the application of resorcinol in water or 3% hydrogen peroxide have demonstrated excellent suitability for multiple therapeutic indications. The results, which were difficult to achieve with other methodologies, were reproducible and free of significant complications.

In the treatment of hyperpigmentation, resorcinol's ability to reduce the number of melanocytes helps minimize the risk of recurrence, thereby reducing or eliminating the need for daily use of melanogenesis inhibitors.

In older patients, improvements in complexion, elimination of lip wrinkles and lower eyelid laxity significantly enhance the aesthetic results of surgical facelifts.

Our clinical experience, gained in over 40 years of study and experimentation with current high-frequency frequencies, has allowed us to discover and enhance the lesser-known properties of resorcinol applied directly to the dermis, leading to the development of the techniques described in this article.

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