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Research Article

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Peeling with 30% Salicylic acid in the treatment of facial skin photoaging

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Abstract

Introduction: *Chemical peeling consists of the application of one or more chemical ablative agents to the surface of the skin to induce keratolysis or keratocoagulation, with subsequent regeneration, achieving improved texture and pigmentation. It is currently a popular tool in the dermatology therapeutic arsenal, however, few studies objectively evaluate its efficacy.*

Objective: *To evaluate the efficacy and safety of the 30% salicylic acid peeling in the treatment of facial skin rejuvenation.*

Method: *An observational, analytical and longitudinal study was carried out in 280 patients from two hospitals (Surgical Clinic: "Hermanos Ameijeiras" and General Teaching: "Enrique Cabrera"), in the period between January 2010 and January 2020. Treatment It was applied monthly for 6 months. The final evaluation was carried out 3 months after the end of the treatment.*

Results: *256 women and 24 men were treated with an average age of 34.2 (± 6.3) years. After treatment, there were significant changes in the Glogau Photo Damage Scale (P = 0.015), in the Global Aesthetic Improvement Scale (P = 0.023) and in the Lemperle Wrinkle Assessment Scale (P = 0.017). The adverse events found were burning, inflammation and scaling. The degree of satisfaction reported by the patients was good (6.4%) and very good (93.5%) (P = 0.001).*

Conclusions: *The 30% salicylic acid peel proved to be effective and safe to reduce the signs of facial skin aging, associated with a high degree of patient satisfaction.*

Key Words: chemical Peeling. Rejuvenation of Facial Wrinkles. Facial skin photoaging. Salicylic acid.

Introduction

Numerous techniques and procedures have been developed over the centuries to reverse the ravages of age. Among these, chemical peels have stood the test of time. It consists of the application of one or more chemical ablative agents to the surface of the skin to induce keratolysis or keratocoagulation, that is, controlled destruction of all or part of the epidermis or dermis, which results in the subsequent regeneration with a texture and improved pigmentation. [1, 2]. These qualities have made peeling a popular tool in the therapeutic arsenal of dermatology, however, few studies objectively evaluate its efficacy, which led to the realization of the present investigation.

Goals

The primary objective was to determine the efficacy and safety of the 30% salicylic acid peel in the treatment of facial skin photoaging and the secondary objectives were: 1) to evaluate the clinical response to treatment, 2) to evaluate the type and intensity of adverse events that are presented and 3) describe the degree of satisfaction of the patients.

Method

An observational, analytical, longitudinal study was carried out in 380 patients from two hospitals (Surgical Clinic: "Hermanos Ameijeiras" and General Teaching: "Enrique Cabrera"), in the

period between January 2010 and January 2020. Treatment with Salicylic acid 30% (SA) was applied monthly for 6 months. Three months after the end of the treatment, the response to it was evaluated (final evaluation), comparing the current state with the initial state; For this, the patient had to attend the scheduled consultation. Throughout the study there was a rigorous control of adverse reactions.

Inclusion criteria

Patients between 20 and 60 years of age, of any sex, skin phototype from I to III according to Fitzpatrick's classification [3]. Skin photoaging grade II to III according to Glogau's classification [4]. grade 1 to 3 according to the scale of evaluation of the Lemperle's wrinkles [5]. normal complementary tests (hemogram with differential, coagulogram, blood chemistry and serology for HIV, hepatitis B and C), with signed informed consent.

Exclusion criteria (Table 1).

Elimination criteria

Patients who wish to abandon the study, presence of an adverse event and / or complication that prevents continuing with the treatment or patients who have missed a treatment session.

Table 1: Exclusion criteria and their relationship with the time limits to perform the procedure.

Criteria	Time limits
Cardiovascular or pacemaker, neurological, liver, kidney, endocrine or immunological diseases, decompensated.	Simultaneous to the procedure.
Severe psychiatric disorder or other limitation that prevents the patient from giving his informed consent or makes his evaluation difficult.	Simultaneous to the procedure.
Pregnancy or breastfeeding	Simultaneous to the procedure.
Herpes simplex infection and / or other septic foci.	Simultaneous to the procedure.
Prone to forming keloids.	Before the procedure.
Application of topical retinoids, aesthetic treatments in the region to be treated, including lasers, intense pulsed light, chemical peels, mesotherapy, carboxytherapy, face lift or others.	Three months prior to the procedure.
Fillers in the region to be treated.	One year prior to the procedure.
Hormonal treatment (estrogens, progesterone, hormonal contraceptives, etc.).	One year prior to the procedure.
Ionizing radiation treatments.	Five years prior to the procedure.
Inadequate photoprotection.	Unlimited

Procedures

Once the patients gave informed consent, the included subjects registry template and the investigator's internal registry were filled out. All information on the included patients was compiled in the data collection notebook. One week before the intervention, it was indicated to apply tretinoin (gel) at night. The next technique for performing the peeling was: patient adaptation (inclined between 45 and 60 degrees); antiseptic cleaning and degreasing of the entire facial area with alcohol so that its penetration is homogeneous; Small cotton-tipped applicators were used to remove the solution (SA at 30%) and apply it to the skin; the patient's eyes remained closed throughout the procedure; abrasion sequentially from a forehead to the temples, then to the cheeks, and finally to the lips and eyelids. The solution is applied evenly, in a single coat to achieve a white frost. The eyelids must be treated delicately and carefully. After an appropriate time, the solution can be diluted (not necessary, only if a yellowish-gray color appears in some area). If severe erythema appears, apply topical antibiotic ointment or mild topical corticosteroid cream. Finally, indications are made to patients about outpatient care and sun protection.

Variables Related to the Response to Treatment

The response to treatment was evaluated taking into account the patient examination of the patient, using the Glogau photodamage scale (Table 2), [4]. the Lemperle wrinkle evaluation scale (Table 3) [5]. and the scale of global aesthetic improvement (GAIS) (Table 4). [6].

Table 2: Classification of photoaging according to Glogau.[4]

Type	Characterization
Type I "No wrinkles"	Early photoaging: slight pigmentary changes, no keratosis, minimal wrinkles, no scars, young patient, generally 28-35 years of age, no or minimal makeup.
Type II "Movement wrinkles"	Early to moderate photoaging: visible early senile lentigo, early actinic keratosis, slight signs of scars, wrinkles and parallel smile lines begin to appear, patient age: late 30s or 40s, usually she wears some makeup.
Type III "Wrinkles at rest"	Advanced photoaging: obvious dyschromia and telangiectasias, visible keratoses, neoplasms (+), wrinkles even when not moving, patient age: fifty years or older, always wears a lot of makeup.
Type IV "Wrinkles only"	Intense photoaging: grayish-yellow skin, cutaneous neoplasms (+++), all wrinkled skin, no normal skin, age of patient: sixties or seventies, cannot wear makeup, "hard and cracked".

Table 3: Lemperle wrinkle evaluation scale.[5]

Grade	Characteristics
0	Without wrinkles.
1	Very fine wrinkles, hardly noticeable.
2	Fine and superficial wrinkles.
3	Moderately deep wrinkles.
4	Deep wrinkles, with well-defined edges.
5	Very deep wrinkles, redundant crease.

Table 4: Global aesthetic improvement scale (GAIS).[6]

	Evaluation	Degree of improvement
1	Total answer.	Patient with exceptional or much better improvement (excellent corrective result, total disappearance of the lesions).
2	Marked partial response.	Patient greatly improved or considerably better (marked improvement in appearance, but not completely optimal, reduction of lesions by ≥ 50% and <100%).
3	Slight partial response.	Improved or somewhat better patient (appearance slightly better than initial condition, but needs more treatments, <50% lesions decrease).
4	Non-response	No change (the same number and size of lesions as at the start of treatment).
5	Progression.	Worse (increased number or size of lesions).

Adverse Events

The adverse events reported in the reviewed literature are burning, pain, edema, infections, hyperpigmentation and healing disorders (delayed healing or hypertrophic scar) at the site of application [7, 8].

Classification of adverse events (Table 5) [9]

Degree of satisfaction of patients to treatment

The degree of satisfaction (PSSS) of the patients with the treatment was evaluated taking into account what was reported by the patient according to the scale (Table 6) [10].

Table 5: Intensity scale of adverse events.(9)

Intensity	Characteristics
Mild	if the adverse event subsided without treatment.
Moderate	if treatment was required, but the adverse event subsided with it.
Serious	if he required hospitalization or did not yield to treatment.
Very serious	if it endangered the life of the patient, if it caused sequelae or disability.

Table 6: Scale of the degree of patient satisfaction.(10)

	Evaluation	Degree of satisfaction
1	Very bad.	I did not get any improvement and the treatment caused me multiple discomforts (inflammation, bruising and pain).
2	Bad.	I did not get any improvement, but the treatment did not cause me any discomfort.
3	Regular.	The improvement was little.
4	Good.	The improvement was noticeable, but not total.
5	Very good	The improvement was complete with minimal discomfort.

Bioethical considerations

The protocol was submitted to the consideration and approval of a Review and Ethics Committee for Clinical Research created for this purpose, which evaluated it from an ethical point of view. In addition, this protocol was submitted to scientific and methodological review and approval by the Institutional Scientific Council of the Hospital Clínico Quirúrgico "Hermanos Ameijeiras".

Statistical Methods Used

The medical records of the patients included in the study were stored in the Department's file. With the information gathered, a Microsoft Office version XP database in Excel format was created, which was exported to the SPSS version 21.0 system for analysis. To summarize the information of the study sample, the arithmetic mean, standard deviation and minimum and maximum values were used. For all quantitative variables, the student's t test was used. For all qualitative variables (degree of photodamage, degree of aesthetic improvement, degree of severity of wrinkles and degree of satisfaction), the absolute numbers and percentages before and after treatment were calculated, which were compared using the Chi-square test of Pearson. In all hypothesis tests carried out, a significance level $\alpha = 0.05$ was used.

Sample's size calculation

The sample size was calculated using the C4-Study Design Pack computerized program. (C4- SDP) for sample size calculation (CTM). Version 1.1 ® Glaxo Wellcome. SA; [11]. Considering the following values: percentage of success reported in the literature 70%, percentage of success in the current study of 80%. With an alpha error of 0.05, a power of 80% and covering a loss of 5% of patients, it was necessary to have 380 subjects in total.

Results

The study sample consisted of 256 women and 24 men, with skin phototypes between II and IV. The mean age ranged around 34.2 (± 6.3) years (Table 7).

Table 7: Epidemiological and clinical characteristics of the subjects.

	Mean (SD)	34.2 (± 6.3)	
	(Minimum; Maximum)	(22; 60)	
		N	%
Age	20-29	28	10.0
	30-39	92	32.8
	40-49	88	31.4
	50-60	72	25.7
Sex	Female	256	91.4
	Male	24	8.6
Skin phototype	I	0	0
	II	263	93.9
	III	17	6.1
Glogau	II	52	18.6
	III	228	81.4
Degree of the wrinkles.	1	0	0
	2	69	24.6
	3	134	47.8
	4	77	27.6

Regarding the Glogau PhotoDamage Scale, 228 patients were classified as grade III, and 52 as grade II before the start of the study. After treatment, 156/228 (68.4%) patients who were classified as grade III were reclassified as grade II and 36/52 (69.2%) patients who were classified as grade II were reclassified as grade I ($p = 0.015$); the rest of the patients remained in the same grade assigned before treatment.

Regarding the scale for the evaluation of Lemperle's wrinkles, 77 patients were classified as grade IV, 134 as grade III and 69 as grade II before the start of the study. After treatment, 56/77 (72.7%) patients who were classified as grade IV were reclassified as grade III, 92/134 (68.5%) patients who were classified as grade III were reclassified as grade II, and 40 / 69 (57.9%) patients who were classified as grade II were reclassified as grade I ($p = 0.017$); the rest of the patients remained in the same assigned grade before treatment.

According to the Global Esthetic Improvement Scale, there were significant changes after treatment ($p = 0.023$); 2/280 (0.71%) patients achieved a total response, 58/280 (20.7%) patients achieved a marked partial response, and 220/280 (78.6%) patients achieved a mild partial response (Figure 1, 2).

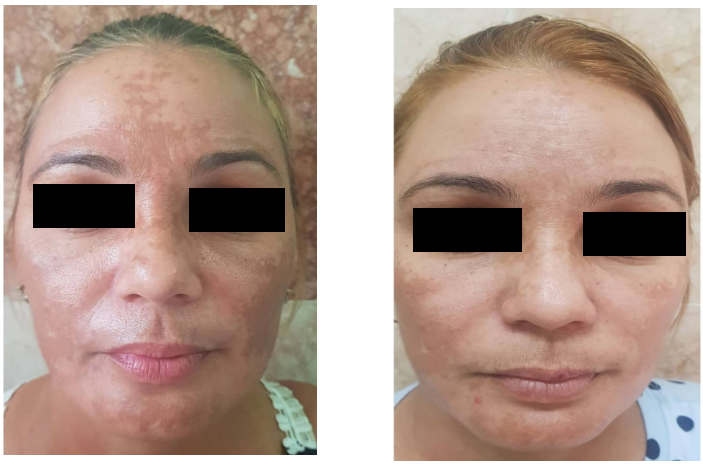

Figure 1: Images showing the improvement of the skin on the face of a patient (A) before and (B) three months after peeling treatment with 30% SA.

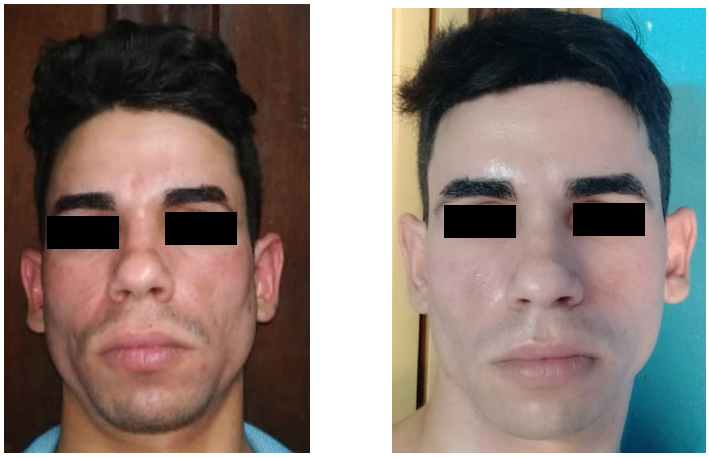

Figure 2: Images showing the improvement of the skin on the face of another patient (A) before and (B) three months after the peeling treatment with 30% SA.

All patients reported some adverse event (burning, inflammation and desquamation), which were of slight intensity, did not imply changes before the intervention and were completely resolved. The burning occurred during the procedure and disappeared immediately after the completion of the procedure (100%), the inflammation (3.6%) lasted 2 to 3 days and the desquamation (100%) lasted 5 to 7 days of duration (Table 8).

Table 8: Adverse events.

		N = 280	
		N	%
Adverse events	BURNING	280	100.0
	INFLAMMATION	10	3.6
	DESQUAMATE	280	100.0

Of the 280 patients treated with 30% salicylic acid peel, 18/280 patients (6.4%) reported a good degree of satisfaction and a very good degree of satisfaction 262/280 patients (93.5%), because they achieved evident improvement with respect to their initial condition (Table 9).

Table 9: Degree of satisfaction, according to the patients' own satisfaction scale (PSSS).

SATISFACTION	N = 280		
	N	%	p
	0	0	0.001 (χ^2)
	18	6.4	
	262	93.5	

Discussion

Despite the growth of technically more sophisticated skin resurfacing modalities, such as light-based, radiofrequency, and ultrasound, chemical peel procedures have grown and evolved dramatically from their inception in ancient times to the present day. Modern chemoxfoliation offers safe and effective options for patients with wrinkles, dyschromia, and other signs of environmental and UV-induced skin damage.(12) Salicylic acid (also known as orthohydroxybenzoic acid) is a naturally occurring beta hydroxy acid that is derived from sweet birch, wintergreen leaves, and bark willow. It has a pKa of 2.97 and is poorly soluble in water. It destroys intercellular lipids that are covalently attached to the cornified envelope surrounding keratinocytes, resulting in the desquamation of the stratum corneum and the activation of basal keratinocytes and dermal fibroblasts [1, 13].

Swinehart JM et al. Exfoliated the back of the hands and forearms with salicylic acid ointment at 50%, buffered with methyl salicylate, after pretreatment with topical tretinoin and localized 20% trichloroacetic acid. Their results show that the peeling is effective for the elimination of lentigines, pigmented keratoses and actinically damaged skin [14].

Kligman D et al demonstrated a decrease in lentigo pigmentation, surface roughness and a reduction in fine lines of facial skin, after performing a 30% salicylic acid (hydroethanolic vehicle) peel [15]. Arif T based on his extensive literature review concluded that the efficacy and safety of salicylic acid peel in Fitzpatrick skin types I-III, as well as skin types V and VI, have been well documented in Literature [16].

Kligman DE et al conducted an investigation comparing the efficacy to improve photodamage between topical tretinoin (0.25%) and retinol (0.25%) applied at night after a 30% salicylic acid peel (SA) on the skin of the human face. They included 20 women who received a full 30% SA facial peel followed by overnight application of tretinoin on one randomized half face and retinol on the opposite side (split face study). The identical procedure was repeated at week 2. Subject and investigator outcome evaluations were captured at weeks 2 and 4. Results showed that, based on investigator evaluation, both exfoliation regimens were effective in improving parameters. photodamage compared to baseline values. The P values with tretinoin at week 4 were: P = .00008 texture, P = .00013 roughness, P = .00221 pores, P = .00098 dryness, P = .02770 erythema, and P = .00008 general appearance. The P values with retinol at week 4 were: P = .00019 texture, P = .00053 roughness, P = .00221 pores, P = .00147 dryness, P = .02770 erythema and P = .0043 general appearance. In evaluation compared to baseline, both tretinoin and retinol were effective in improving overall appearance (P = .0229 and P = .0190, respectively). Based on the investigator's assessment comparing tretinoin to retinol, tretinoin was slightly better than retinol at week 4 in improving texture P = .00506, roughness P = .01171, and overall appearance P = .00506. By subject self-assessment comparing tretinoin to retinol, there was no difference in overall appearance (P = .2367 and P = .3613, respectively). They concluded that both topical tretinoin (0.25%) and retinol (0.25%) can be used safely and effectively when applied in the office immediately after the SA peel to improve the signs of photoaging [17].

Soleymani T et al conducted a systematic review on the types, frequency of use, and efficacy of chemical peels currently available for dermatological use in the United States. The results show that chemical peels are the third most correctly performed non-invasive cosmetic procedure. There has been a paradigm shift in recent years, with lasers largely replacing deep peels. Despite this change, surface peels have proliferated in both popularity and product diversity. When used for the proper indication and with proper technique, nearly all exfoliating agents have demonstrated excellent clinical efficacy and remain an indispensable cost-effective tool in the dermatologist's cosmetic toolbox [18].

In our study, there was clinical improvement in the Glogau photodamage scale (P = 0.015), in the global scale of aesthetic improvement (P = 0.023) and in the scale for assessing the severity of Lemperle's wrinkles (P = 0.017) and associated with a high degree of patient satisfaction (P = 0.001). Adverse events were mild and without any permanent consequences on the individual.

Conclusions

The application of the 30% salicylic acid peel proved to be effective and safe in reducing the signs of facial skin aging, associated with a high degree of patient satisfaction.

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