Use of silicone spray in cutaneous repair in dermal ablation procedures: study of 20 cases

Efeito do uso de silicone em spray na reparação cutânea em procedimentos envolvendo ablação epidérmica: estudo de 20 casos

Original Article

ABSTRACT

Introdução: *There is no standardized approach to immediate post-procedure care for epidermal ablation; the conscientious choice of products can provide greater comfort to the patient, reduced risks and complications, and shorter recovery times.*

Objective: *To analyze the safety and effectiveness of silicone spray in tissular restoration after two epidermal ablation procedures – fractional ablative 2,790 nm YSGG laser and dermabrasion.*

Methods: *Patients with photoaging or acne scars (n = 20) applied silicone spray on one side of the face and liquid Vaseline (control) on the other side of the face after the procedures. Transepidermal loss of water was measured in all patients.*

Results: *Erythema and burning sensation were the most common findings, and were significantly more frequent in the areas where Vaseline was applied.*

Conclusions: *Silicone spray is safe and effective for use after epidermal ablative procedures, and is significantly superior to Vaseline in controlling burning sensations and erythema.*

Keywords: *silicones; wound healing; dermabrasion; laser therapy.*

RESUMO

Introdução: Não existe padronização dos cuidados imediatos após procedimentos de ablação epidérmica; a escolha cuidadosa dos produtos pode oferecer maior conforto ao paciente e menores riscos e períodos de recuperação e complicações

Objetivo: Analisar a segurança e eficácia do silicone em spray na reparação tecidual de dois procedimentos de ablação epidérmica, o laser YSGG ablativo fracionado de 2790nm e a dermoabrasão.

Métodos: Foram avaliados 20 pacientes com fotoenvelhecimento ou cicatrizes de acne, divididos aleatoriamente em dois grupos iguais; cada paciente usou de forma aleatorizada em cada hemiface, o silicone *spray* e vaselina líquida como controle. Todos os pacientes foram submetidos à medida de perda de água transepidérmica.

Resultados: Todos os pacientes completaram o estudo; o eritema e a ardência foram os achados mais comuns, sendo significativamente mais frequentes na área de aplicação da vaselina.

Conclusões: O silicone em spray se mostrou seguro e eficiente nos cuidados após procedimentos ablativos epidérmicos, sendo significativamente superior à vaselina no controle da ardência e do eritema.

Palavras-chave: silicones; cicatrização de feridas; dermabrasão; terapia a laser.

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Conflicts of interests: yes

INTRODUÇÃO

Procedures involving the controlled removal of parts of the epidermis and dermis are indicated for treating cutaneous photoaging and scars. These treatments promote cutaneous repair by stimulating collagen synthesis, resulting in clinical improvements to the skin's texture, color and firmness.[1]

Several current technologies – such as ablative lasers, whose parameters allow the adjustment and control of the level of penetration – provide these effects. A more traditional, but no less effective, procedure, dermabrasion, also provides varied degrees of penetration.[2] While there is no standardization of post-procedure care, therapeutic measures aim to accelerate reepithelialization, reduce recovery time and minimize discomfort.[3]

Topical silicone has been described in the prevention of hypertrophic scars, with results similar to those obtained with compression bandages or silicon gel plaques. The greatest advantage of topical silicone over other curative types is its ease of application, removal and asepsis, in addition to increased patient comfort.[4]

This study's objective is to evaluate the efficacy and safety of a new application method of topical silicone – in spray – in patients who underwent dermabrasion or ablative laser treatment.

METHODS

Patients with moderate to intense photoaging and acne scars, with phototypes II and III, were evaluated in this randomized, blind, controlled study. They were treated at the Medcin Instituto da Pele's Dermatology Service (Osasco, São Paulo, Brazil) in July/September 2010. The patients (n = 20) were randomized to receive either ablative laser or motor-powered dermabrasion with diamond fraise. All patients received anti-herpetic prophylaxis. Immediately before the procedure, the patients underwent an evaluation of the integrity of the cutaneous barrier, known as transepidermal water loss 5 (TEWL) measurement, with the aid of an evaporimeter (Tewameter TM300, Courage & Khazaka®, Germany), in an environment with standardized and controlled temperature and humidity.

The Xeo platform (Cutera® Lasers, San Francisco, California, USA), coupled with a 2790 nm fractional ablative YSGG (Ytrium Scandium Gallium Garnet) laser handpiece, was used for the laser treatments. Anesthetic cream containing lidocaine and prilocaine (Emla® cremates, Astra Zeneca of Brazil) was applied one hour before the treatment. An 80 mJ fluence was used with density level 2, in two passes with 30% overlap, according to the intensity of the wrinkles or scars.

The Beltec LB 100®(Araraquara, SP, Brasil) dermabrasor with coarse diamond fraise was used for the dermabrasion treatments, with a rotation speed varying between 3 and 5 (8-10,000 rpm), with one pass.

The patients were then instructed to apply the study product on one side of the face (right or left side, according to the randomization) twice a day. Sunscreen containing inorganic filters was also offered for use during the day. Liquid Vaseline (control) was used on the control side of the face. Evaluations was were conducted before the procedure, immediately after the procedure without product, 30 minutes after application of the product, and 15 and 30 days after the procedure. Each evaluation included clinical and subjective measurements (the presence and intensity of erythema, edema, burning sensation, drying and stretching sensation were investigated), and TEWL measurements were taken in the two evaluation areas (right and left side of the face). Should any doubt arise, patients were instructed to seek advice in the Dermatology Service where the evaluation was being carried out.

This study was conducted in compliance with good clinical practices, the Declaration of Helsinki, and the Brazilian National Health Council's resolution n. 196 of 10 October 1996 and complementary decisions.

STATISTICAL ANALYSIS

The treatments were compared at each time point with the clinical and subjective evaluations. The data recorded at each time point for the product being tested were compared to those obtained immediately after the procedure for each characteristic using the Wilcoxon test for paired data.

RESULTS

All 20 patients (18 women and 2 men) completed the study and attended all the sessions. None of the patients presented adverse reactions that entailed the suspension of treatment or developed secondary infections or dyschromias. One patient presented intense erythema and desquamation, in addition to a burning sensation, on the side of the face treated with Vaseline on the fifth day of the treatment course. She was medicated with 1% hydrocortisone in the affected area for seven days, with total regression of the symptoms and no recurrence.

The degrees of erythema and edema were considered in the clinical evaluation. The occurrence of adverse effects was assessed at all time points.

CLINICAL EVALUATIONS

ERYTHEMA

A statistically significant milder degree of erythema ($p = 0.036$) was observed in the treated area (silicone spray) compared to the control area (liquid Vaseline) immediately after application. Both treatments led to statistically significant improvement of the erythem AT 15 and 30 days, with no difference between treatments (Table 1).

EDEMA

Although not statistically significant, the occurrence of edema increased between the time point immediately after the procedure and the one after the application of the product, with incidence and intensity slightly greater in the control side of the face. The regression of the edema was complete by the end of the assessment period in all cases and was significant over time ($p = 0.006$), but between-group differences were not significant (Table 2).

Table 1: Clinical evaluation of erythema in treated and control sides of the face over time

Erythema							
Intensity	T Immediate	T Following the application*		T 15 days		T 30 days	
		Treated	Control	Treated	Control	Treated	Control
Absent	1	0	0	19	19	20	20
Mild	9	15	10	1	1	0	0
Moderate	10	5	9	0	0	0	0
Intense	0	0	1	0	0	0	0

* statistically significant difference (p = 0.036) between the treated area (silicone spray) and control area (liquid Vaseline) with significance level = 5%

SUBJECTIVE EVALUATIONS

ERYTHEMA

A milder degree of erythema was observed in the area treated with silicone spray when compared to the control area, however there was no statistical significance ($p < 0.05$). Both treatments provided statistically significant improvement of erythema AT 15 and 30 days, with no observed between-group differences (Table 3).

EDEMA

Edema is only reported in the time point immediately after the application, with greater incidence and intensity on the control side of the face, though without statistical significance. The edema regression was complete by the end of the assessment period in all cases, and was significant over time ($p = 0.006$), however without there were no significant between-group differences (Table 4).

BURNING SENSATION

Reports of a burning sensation took place in the time point immediately after the application of the products, with a significant reduction in the area treated with silicone spray. The control area did not obtain an equivalent degree of improvement, with a statistically significant difference of $p = 0.036$. At all other time points, both treatments showed effectiveness, with no significant difference (Table 5).

OTHER EFFECTS

Stretching: That symptom was described in both sides of the face by three patients, in the immediately after time point. Only one patient reported this symptom in both areas after 15 days.

None of the patients reported dryness or pain at any time point. Therefore, there was no significant difference between symptoms described by patients after these treatments.

EVALUATION OF THE INTEGRITY OF THE EPIDERMAL BARRIER

Tewametry or evaporimetry indirectly evaluates the integrity of the cutaneous barrier using TEWL. A significant increase in this value is expected after epidermal ablation treatments. Both treatments were able to inhibit TEWL, maintaining pre-treatment measurements, as can be observed in figures 1 (laser group) and 2 (dermabrasion group).

DISCUSSION

The erythema and edema clinically verified and reported by the study patients are typical side effects of these procedures, and are more common in laser treatments. In both procedures they subside relatively quickly, and are easily managed with analgesics and anti-inflammatories. Silicone is a synthetic polymer with silicon atoms linked by oxygen bridges. There is evidence that the benefits of using topical silicone in tissular repair processes transcends the mechanical barrier that it provides.[6]

Table 2: Clinical evaluation of edema in treated and control sides of the face over time

Edema							
Intensity	T Immediate	T Following the application		T 15 days		T 15 days	
		Treated	Control	Treated	Control	Treated	Control
Absent	10	12	10	20	20	20	20
Mild	7	6	7	0	0	0	0
Moderate	3	2	3	0	0	0	0
Intense	0	0	0	0	0	0	0

Table 3: Subjective evaluation of erythema in treated and control sides of the face over time

Erythema							
Intensity	T Immediate	T Following the application		T 15 days		T 30 days	
		Treated	Control	Treated	Control	Treated	Control
Absent	1	5	3	20	20	20	20
Mild	6	10	9	0	0	0	0
Moderate	13	5	8	0	0	0	0
Intense	0	0	0	0	0	0	0

Table 4: Subjective evaluation of edema in treated and control sides of the face over time

Edema							
Intensity	T Immediate		T Following the application		T 15 days	T 30 days	
		Treated	Control	Treated	Control	Treated	Control
Absent	15	18	17	20	20	20	20
Mild	3	2	3	0	0	0	0
Moderate	2	0	0	0	0	0	0
Intense	0	0	0	0	0	0	0

Silicon is a micronutrient that participates in the biosynthesis of collagen and increases the cappilaries' permeability, accelerating the healing process. It also exerts a positive effect in the proteinaceous phosphorylation of saccharides and nucleotides, which are crucial in the formation of the cytoskeleton.[7]

The silicone's action mechanism in speeding the healing process is not fully understood, however the reduction of the TEWL seems to play a crucial role. Mustoe reports that the repair of the cutaneous barrier – entailing a reduction in TEWL – inhibits the stimulation of cytokines synthesis by keratinocytes, resulting in a decrease in the activation of dermal fibroblasts. This mechanism helps to inhibit the occurrence of contractures and cicatricial hypertrophies.[8] In addition, the use of silicone in the prevention of hypertrophic scars is widely recommended, and can be used on children who have suffered burns.[9]

Topical silicone's safety profile is well established. There is no evidence of systemic absorption, and it presents a low risk of adverse reactions such as contact dermatitis, even in wounded skin caused by laser resurfacing.[10-12] The forms of topical application of silicone do not seem to interfere in the healing process' modulation.[13]

Although recent, the use of silicone in spray seemed to offer equivalent barrier treating effects, as well as in the relief of signs and symptoms of the restoration process in large areas. The silicone spray was capable of significantly reducing TEWL, repairing the cutaneous barrier without interfering in the speed of the healing process.

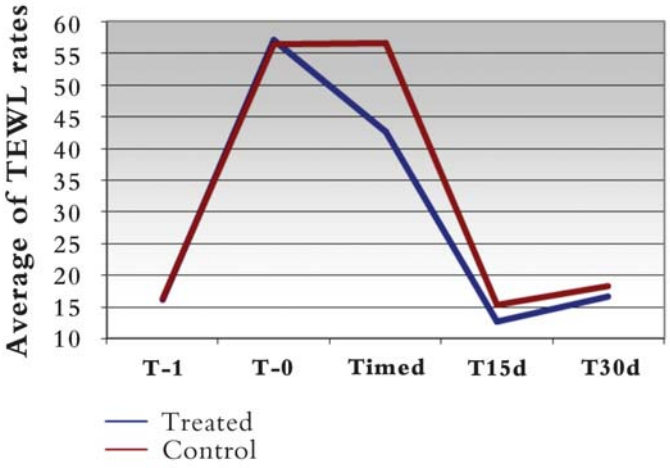
The present study demonstrated a profile of high tolerability in the control of symptoms and frequent signs following ablative procedures, and was superior to Vaseline in the erythe-

Table 5: Subjective evaluation of burning sensation in treated and control sides of the face over time

Ardência							
Intensity	T Immediate	T Following the application*		T 15dias		T 30dias	
		treated	control	treated	control	treated	control
Absent	4	12	8	20	20	20	20
Mild	8	6	7	0	0	0	0
Moderate	8	2	5	0	0	0	0
Intense	0	0	0	0	0	0	0

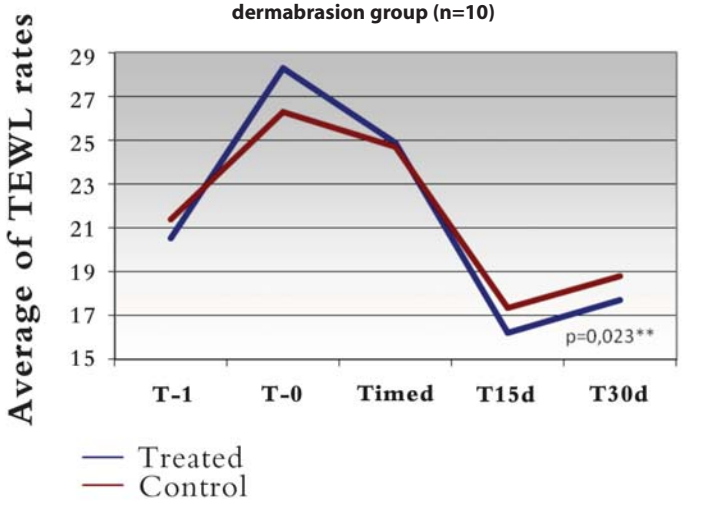
*statistically significant difference (p = 0.036) between the treated area (silicone spray) and control area (liquid Vaseline) with significance level = 5%

Graph 1: TEWL curve in treated and control areas over time: laser group (n=10)



T-1 (before the procedure; T0: after the procedure, without treatment);
T immediate: after treatment;
T15: 15 days after;
T30: 30 days after;
* statistically significant reduction in T immediate;
** statistically significant reduction in T15.

Graph 2: TEWL curve in treated and control areas over time: dermabrasion group (n=10)



T-1 (before the procedure; T0: after the procedure, without treatment);
T immediate: after treatment;
T15: 15 days after;
T30: 30 days after;
* statistically significant reduction in T15;
** statistically significant reduction in T30.

ma and burning sensation evaluation parameters. The only patient who had a complication – erythema and desquamation – demonstrated these reactions in the area where Vaseline was used (Figure 1). Although Vaseline does not offer sensitizing potential, there are reports of dermatitis in wounded skin.[14,15]

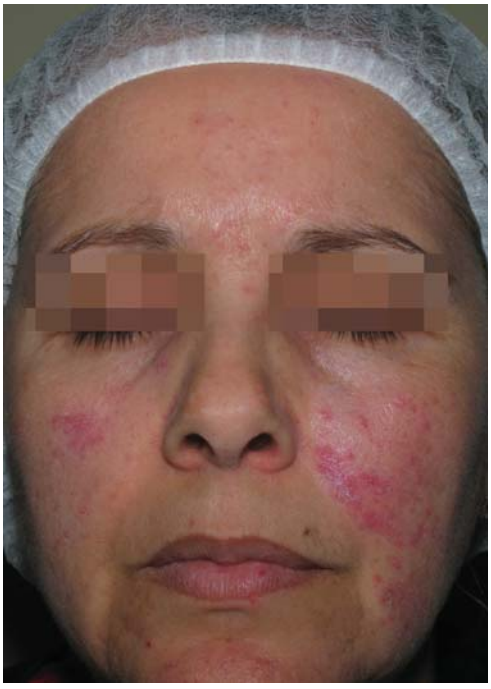


Figura 1 - Eritema e descamação com predomínio na área de uso da vaselina

CONCLUSION

Topical silicone spray was proven to be safe and effective in cutaneous restoration process following ablative procedures in the epidermis, and was statistically superior to Vaseline in the control of erythema and burning sensation, common symptoms in these procedures. Its effect is possibly related to the cutaneous barrier repair, evidenced by the reduction in TEWL. ●

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